User Guide

Autodesk®
March 2010

© 2010 Autodesk, Inc. All Rights Reserved. Except as otherwise permitted by Autodesk, Inc., this publication, or parts thereof, may not be reproduced in any form, by any method, for any purpose. Certain materials included in this publication are reprinted with the permission of the copyright holder.

Disclaimer
THIS PUBLICATION AND THE INFORMATION CONTAINED HEREIN IS MADE AVAILABLE BY AUTODESK, INC. "AS IS." AUTODESK, INC. DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING THESE MATERIALS.

Trademarks
The following are registered trademarks of Autodesk, Inc., in the USA and/or other countries: Autodesk Robot Structural Analysis, Autodesk Concrete Building Structures, Spreadsheet Calculator, ATC, AutoCAD, Autodesk, Autodesk Inventor, Autodesk (logo), Buzzsaw,
Design Web Format, DWF, ViewCube, SteeringWheels, and Autodesk Revit.
All other brand names, product names or trademarks belong to their respective holders.

Third Party Software Program Credits
ACIS Copyright© 1989-2001 Spatial Corp. Portions Copyright© 2002 Autodesk, Inc.
Copyright© 1997 Microsoft Corporation. All rights reserved.
International CorrectSpell™ Spelling Correction System© 1995 by Lernout & Hauspie Speech Products, N.V. All rights reserved.
InstallShield™ 3.0. Copyright© 1997 InstallShield Software Corporation. All rights reserved.
PANTONE® and other Pantone, Inc. trademarks are the property of Pantone, Inc.© Pantone, Inc., 2002.
Portions Copyright© 1991-1996 Arthur D. Applegate. All rights reserved.
Portions relating to JPEG © Copyright 1991-1998 Thomas G. Lane. All rights reserved. Portions of this software are based on the work of the Independent JPEG Group.
Portions relating to TIFF © Copyright 1997-1998 Sam Leffler. © Copyright 1991-1997 Silicon Graphics, Inc. All rights reserved.

Government Use
Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in FAR 12.212 (Commercial Computer Software-Restricted Rights) and DFAR 227.7202 (Rights in Technical Data and Computer Software), as applicable.

TABLE OF CONTENTS

© 2010 Autodesk, Inc. All rights reserved

© 2010 Autodesk, Inc. All rights reserved

© 2010 Autodesk, Inc. All rights reserved

© 2010 Autodesk, Inc. All rights reserved

© 2010 Autodesk, Inc. All rights reserved

1. PROGRAM DESCRIPTION

1.1. General description of the program

AutoCAD® Structural Detailing facilitates the preparation of final drawings of component parts of designed structures. After completing the structure design and generating a structure calculation model (this stage comprises calculations and verification of structure elements), the project technical documentation with required final drawings are prepared.
AutoCAD® Structural Detailing - Reinforcement provides the tools to create detailed drawings of RC structure reinforcement. Included is a complete set of options for drawing details of an RC structure drawing, which are adjusted to the engineer-designer's needs and make it possible to draw objects in an intuitive manner. The program is divided into a three parts as described below:

1. Edition of a drawing or part of a drawing (projections, intersections, etc.) - including additional drawing elements, correction of existing structure elements, adding structure element dimensions.
2. Generation of final drawings.
3. Printout management.

AutoCAD® Structural Detailing combined with ***Autodesk Robot Structural Analysis*** provides the tools to create a complete structural project including:

- Generation of a structure model and structure calculations.
- Structure design (e.g. calculation of reinforcement required in RC structure elements).
- Generation of final drawings allowing edition of prepared drawings.

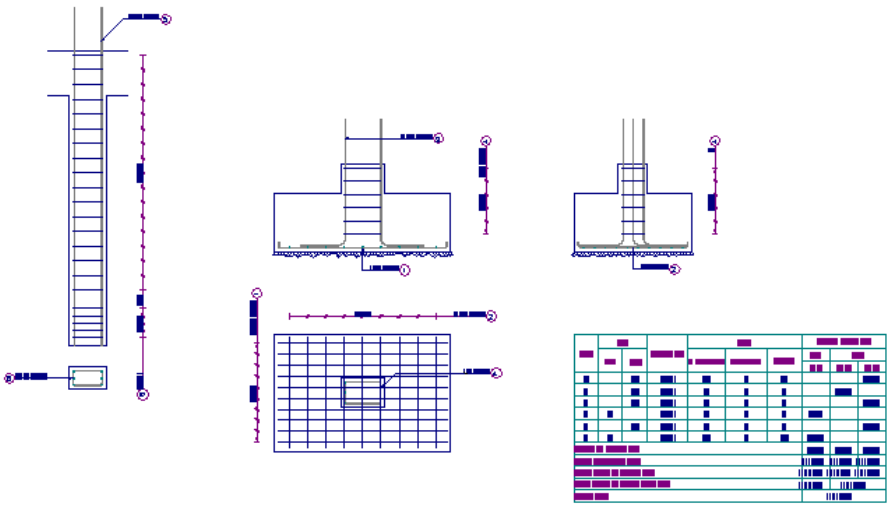
The following objects have been distinguished in the program:

- View - a single drawing; it is always a document's component, if it has been added to a printout, it is simultaneously a printout's element. NOTE: only a view (drawing) contained in a printout may be printed
- Printout - ready-to-use printout composed of views; its equivalent in the AutoCAD® program is a layout together with AutoCAD views provided on it; for each printout there is exactly one layout corresponding to it.

The following elements detail the different stages of work on a project.

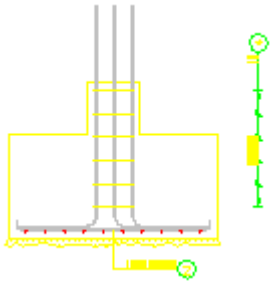
1.2. Stages of work on structure project drawings

Creating documentation for a designed structure (drawings) involves the following stages:
1. Definition of documents
A document is a set of drawings (views) of RC structural elements; which consists of views. A document cannot be printed.

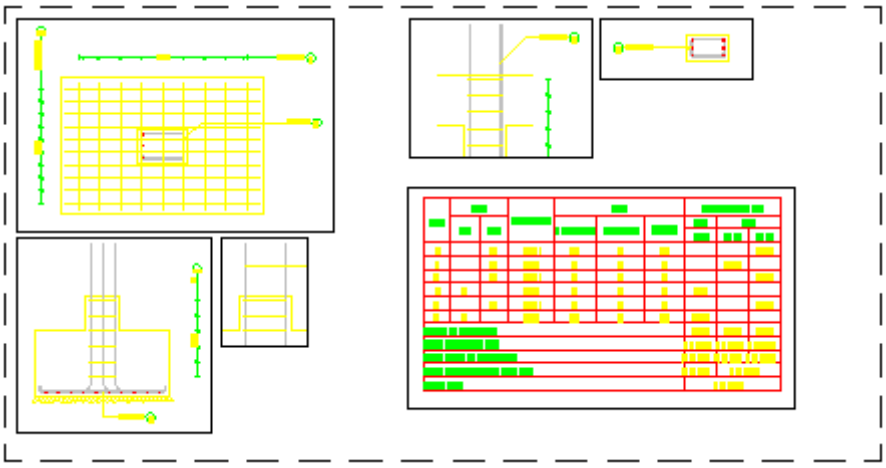


© 2010 Autodesk, Inc. All rights reserved

2. Definition (edition) of views
A view is a single drawing which always constitutes a document component. If a view is added to a printout, then it is simultaneously a printout element. Views (drawing) can only be printed when contained in a printout.



3. Printout generation
A printout is a prepared, ready-to-use document that consists of views. Each printout corresponds to a single layout.



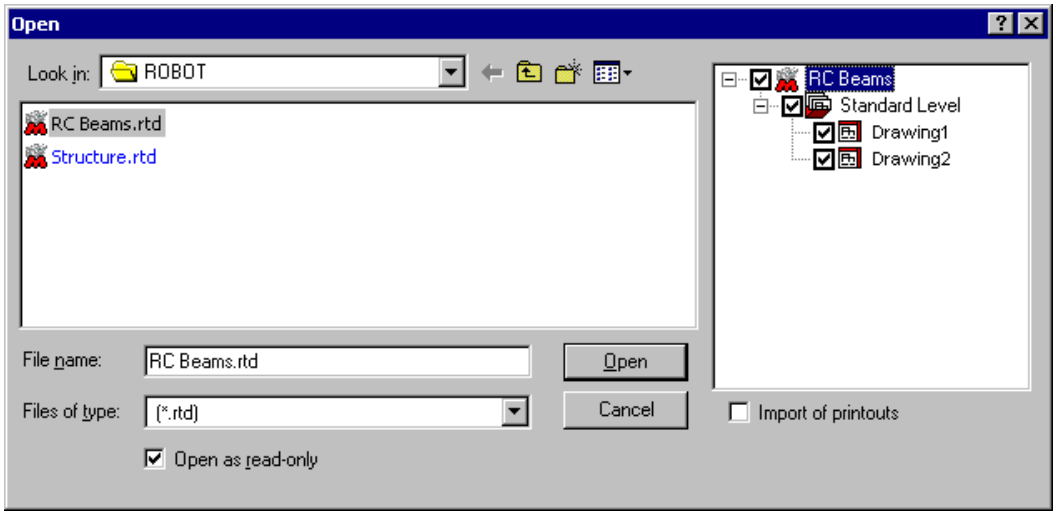
All operations are performed in printout layouts.
A printout layout is an object of the ***AutoCAD***® program, and is used for composition of a final printout. For each printout layout there is one printout.

1.3. Example of loading a drawing created in Robot

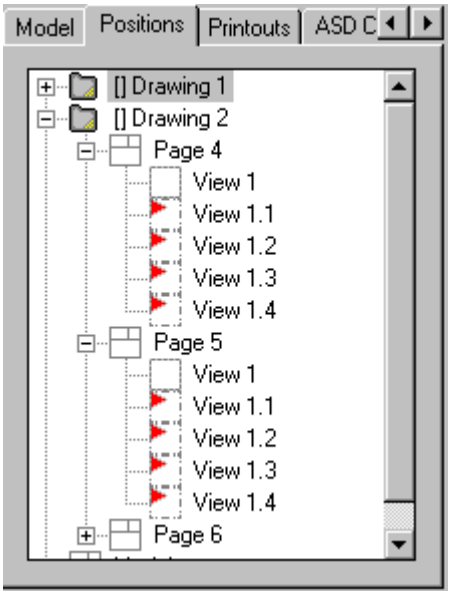
To load a drawing made in an RC module of ***Autodesk Robot Structural Analysis*** (beams, columns, spread footings, etc.), follow the steps below:

- Run the option:
  Menu: Reinforcement > Insert drawing from Robot
  Ribbon: ASD - Reinforcement > Tools > Insert drawing from Robot
  Toolbar: Definition-bars > Insert drawing from Robot 
  Command line: RBCR_TOOL_IMPORT_RM
- In the ***Open*** dialog (shown below), select a drawing from the tree located in the right-hand side of the dialog (in this case these are *Drawing1* and *Drawing2* on the standard level, belonging to the ***RC Beams*** project).
  NOTE: If the *Import of printouts* option is selected, then drawings prepared for printing in ***Robot*** are loaded.

© 2010 Autodesk, Inc. All rights reserved



- Click **Open**; the selected drawings of an RC beam are loaded to ***AutoCAD® Structural Detailing - Reinforcement***. In the ***Object Inspector*** dialog, on the *Positions* tab for each drawing, positions are created that include the appropriate views of the RC beam elements (as shown below).



In ***AutoCAD® Structural Detailing - Reinforcement*** there is a possibility to edit the loaded drawings and to prepare final drawings of RC structure elements.

© 2010 Autodesk, Inc. All rights reserved

1.4. Options available in the menu

All the options available in ***AutoCAD® Structural Detailing – Reinforcement*** are presented below. The following information is included:

- Position of the option in the text menu,
- Position of the option in the ribbon,
- The icon symbolizing the option,
- Command activating the option from the command line,
- Short description of the option.

See also: Ribbon

Reinforcement - elevation

Opens the ***Reinforcement - elevation*** dialog; the option defines the reinforcing bars (longitudinal reinforcement) in an element of an RC structure.
Menu: Reinforcement > Reinforcement - elevation
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement - elevation
Toolbar: Definition-bars > Reinforcement - elevation
Command line: RBCR_DEF_BAR_BV

Reinforcement - cross-section

Opens the ***Reinforcement - cross-section*** dialog; the option defines reinforcing bars (transversal reinforcement) in a cross-section of an RC structure element.
Menu: Reinforcement > Reinforcement - section
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement - section
Toolbar: Definition-bars > Reinforcement - section
Command line: RBCR_DEF_BAR_BS

Special stirrups

Opens the ***Special stirrups*** dialog; this option defines special stirrups (transversal reinforcement) in the cross-section of an RC structure element.
Menu: Reinforcement > Special stirrups
Ribbon: ASD - Reinforcement > Reinforcement - definition > Special stirrups
Toolbar: Definition-bars > Special stirrups
Command line: RBCR_DEF_STIRRUP_SPEC

Reinforcement- point

Opens the **Reinforcement- point** dialog; the option defines the distribution of reinforcement which is presented as points (reinforcement n cross-section).
Menu: Reinforcement > Reinforcement - point
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement - point
Toolbar: Definition-bars > Reinforcement point
Command line: RBCR_DISTRIBUTION_POINT

Special reinforcement

Opens the **Special reinforcement** dialog; the option defines particular reinforcing bars used in different elements of RC structures (e.g. crest-shaped reinforcement, corbel reinforcement, transport handles, etc.).
Menu: Reinforcement > Special reinforcement
Ribbon: ASD - Reinforcement > Reinforcement - definition > Special reinforcement
Toolbar: Definition-bars > Special reinforcement
Command line: RBCR_DEF_BARLIBSPECIAL

© 2010 Autodesk, Inc. All rights reserved

Wire fabrics in cross section

Opens the **Wire Fabric Shape** dialog; the option defines a wire fabric in the cross section of an RC structure element.
Menu: Reinforcement > Wire fabrics in cross section
Ribbon: ASD - Reinforcement > Reinforcement - definition > Wire fabrics in cross section
Toolabar: Definition-wire fabrics > Wire fabrics in cross section
Command line: RBCR_DEF_NET_SIDE

Wire fabrics in cross section - symbol

The option presents an indicated wire fabric in cross section outside the formwork contour to show a full shape and geometry of a reinforcement (this is a detailed presentation of a wire fabric needed for a bar bender to shape the reinforcement properly).
Menu: Reinforcement > Wire fabrics in cross section - symbol
Ribbon: ASD - Reinforcement > Reinforcement - definition > Wire fabrics in cross section - symbol
Toolbar: Definition-wire fabrics > Wire fabrics in cross section - symbol
Command line: RBCR_DEF_NET_PULL

Reinforcement bars - legend

The option presents an indicated bar outside the formwork contour to show the whole reinforcement shape and geometry (it is a detailed bar presentation needed for a bar bender to shape reinforcement properly).
Menu: Reinforcement > Reinforcement - bar legend
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement bars - legend
Toolbar: Definition-bars > Reinforcement bars - legend
Command line: RBCR_DEF_PULL

Reinforcement distribution

The option defines reinforcement distribution.
Menu: Reinforcement > Reinforcement distribution
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement distribution
Toolbar: Definition-bars > Reinforcement distribution
Command line: RBCR_DISTRIBUTION

Surface reinforcement - wire fabrics

Opens the ***Surface reinforcement distribution - wire fabrics*** dialog; the option defines regions of wire fabric distribution (e.g. reinforcement of RC plates).
Menu: Reinforcement > Surface reinforcement - wire fabrics
Ribbon: ASD - Reinforcement > Reinforcement - definition > Surface reinforcement - wire fabrics
Toolbar: Definition-bars > Surface reinforcement-wire fabrics
Command line: RBCR_NETD_RECT

Surface reinforcement - bars

Opens the ***Surface reinforcement - bars*** dialog; the option defines regions of bar distribution (e.g. reinforcement of RC slabs).
Menu: Reinforcement > Surface reinforcement - bars
Ribbon: ASD - Reinforcement > Reinforcement - definition > Surface reinforcement - bars
Toolbar: Definition-bars > Surface reinforcement - bars
Command line: RBCR_DEF_BAR_SURF

Radial reinforcement - bars

Opens the ***Radial surface reinforcement*** dialog; the option defines radial reinforcement (e.g. reinforcement of round RC slabs).
Menu: Reinforcement > Radial distribution
Ribbon: ASD - Reinforcement > Reinforcement - definition > Radial reinforcement - bars
Toolbar: Definition-bars > Radial reinforcement - bars
Command line: RBCR_CREATE_RADIAL

© 2010 Autodesk, Inc. All rights reserved

Wire fabrics distribution

Opens the ***Surface reinforcement distribution - wire fabrics*** dialog; the option defines regions of wire fabric distribution (e.g. reinforcement of RC slabs).
Menu: Reinforcement > Distribution - wire fabrics
Ribbon: ASD - Reinforcement > Reinforcement - definition > Wire fabrics disctribution
Toolbar: Definition-wire fabrics > Wire fabrics distribution
Command line: RBCR_NS_DISTRIBUTION

Steel profiles - definition

Steel profiles

Opens the ***Steel profiles*** dialog; the option defines steel profiles.
Menu: Reinforcement > Definition - steel profiles > Steel profiles
Ribbon: ASD - Reinforcement > Reinforcement - definition > Steel profiles
Toolbar: Definition - steel profiles > Steel profiles
Command line: RBCR_CREATE_STEEL_VIEW

Steel profiles - description

Opens the ***Profile description*** dialog; the option defines the indicated steel profile.
Menu: Reinforcement > Definition - steel profiles > Steel profiles - description
Ribbon: ASD - Reinforcement > Reinforcement - definition > Steel profiles - description
Toolbar: Definition - steel profiles > Steel profiles - description
Command line: RBCR_CREATE_STEEL_DESC

Steel profiles - section

Selecting this option results in generation of a steel profile section; to create a vertical section, indicate a cutting line (two points defining a segment) and a section 'depth'.
Menu: Reinforcement > Definition - steel profiles > Steel profiles - section
Ribbon: ASD - Reinforcement > Reinforcement - definition > Steel profiles - section
Toolbar: Definition - steel profiles > Steel profiles - section
Command line: RBCR_CREATE_STEEL_SECTION

Cut profile to line

The option enables cutting a steel profile so that it fits a plane defined by the line.
Menu: Reinforcement > Definition - steel profiles > Cut profile to line
Ribbon: ASD - Reinforcement > Reinforcement - definition > Cut profile to line
Toolbar: Definition - steel profiles > Cut profile to line
Command line: RBCR_CREATE_STEEL_CUT

Delete cut

The option deletes a cut from a created steel profile.
Menu: Reinforcement > Definition - steel profiles > Delete cut
Ribbon: ASD - Reinforcement > Reinforcement - definition > Delete cut
Toolbar: Definition - steel profiles > Delete cut
Command line: RBCR_CREATE_STEEL_CUTS

Reinforcement description

Bar description

The option describes a reinforcing bar.
Menu: Reinforcement > Reinforcement description > Bar description
Ribbon: ASD - Reinforcement > Reinforcement - definition > Bar description
Toolbar: Definition-bars > Bar description
Command line: RBCR_BARBVFORMDESC

© 2010 Autodesk, Inc. All rights reserved

Reinforcement distribution description

The option defines reinforcement distribution.
Menu: Reinforcement > Reinforcement description > Reinforcement distribution description
Ribbon: ASD - Reinforcement > Reinforcement - definition > Reinforcement distribution description
Toolbar: Definition-bars > Reinforcement distribution description
Command line: RBCR_DISTRIB_DESC

Bar ends

The option defines a symbol of bar ends.
Menu: Reinforcement > Reinforcement description > Bar ends
Ribbon: ASD - Reinforcement > Reinforcement - definition > Bar ends
Toolbar: Definition-bars > Bar ends
Command line: RBCR_BAR_END

Description of wire fabric in cross section

The option defines a wire fabric in the cross section.
Menu: Reinforcement > Reinforcement description > Description of wire fabric in cross section
Ribbon: ASD - Reinforcement > Reinforcement - definition > Description of wire fabric in cross section
Toolbar: Definition-wire fabrics > Description of wire fabric in cross section
Command line: RBCR_DEF_NET_SIDE_DESC

Styles of reinforcement description

Opens the ***Description of reinforcement shape*** dialog; the option allows defining description styles (format) for individual elements of reinforcement.
Menu: Reinforcement > Reinforcement description > Styles of reinforcement description command
Ribbon: ASD - Reinforcement > Settings > Styles of reinforcement description
Command line: RBCR_SHAPE_DESCR

Reinforcement tables

Bars - Main table

The option adds a main table for reinforcing bars presented in a drawing at a point in the drawing.
Menu: Reinforcement > Reinforcement tables > Bars - Main table
Ribbon: ASD - Reinforcement > Reinforcement table > Bars - Main table
Toolbar: Reinforcement table > Bars - Main table
Command line: RBCR_LIST_BAR_MAIN

Bars - Element table

The option creates a reinforcement table which presents reinforcing bars divided into structural elements (beams, columns, etc.).
Menu: Reinforcement > Reinforcement table > Bars - Element table
Ribbon: ASD - Reinforcement > Reinforcement table > Bars - Element table
Toolbar: Reinforcement table > Bars - Element table
Command line: RBCR_LIST_BAR_ELEM

Bars - Detailed table

The option adds a detailed table for a reinforcement position with variable distribution or with bar surface distribution provided in a drawing.
Menu: Reinforcement > Reinforcement table > Bars - Detailed table
Ribbon: ASD - Reinforcement > Reinforcement tables > Bars - Detailed table
Toolbar: Reinforcement tables > Bars - Detailed table
Command line: RBCR_LIST_BAR_DETA

© 2010 Autodesk, Inc. All rights reserved

Bars - Summary table

The option adds a summary table for reinforcing bars presented in a drawing.
Menu: Reinforcement > Reinforcement table > Bars - Summary table
Ribbon: ASD - Reinforcement > Reinforcement tables / Bars - Summary table
Toolbar: Reinforcement tables / Bars - Summary table
Command line: RBCR_LIST_BAR_SUM

Wire fabrics – Main table

The option adds a main table for wire fabrics presented in a drawing.
Menu: Reinforcement > Reinforcement table > Wire fabrics - Main table
Ribbon: ASD - Reinforcement > Reinforcement tables > Wire fabrics - Main table
Toolbar: Reinforcement tables > Wire fabrics - Main table
Command line: RBCR_LIST_NET_MAIN

Wire fabrics – Summary table

The option adds a summary table for wire fabrics presented in a drawing.
Menu: Reinforcement > Reinforcement table > Wire fabrics - Summary table
Ribbon: ASD - Reinforcement > Reinforcement tables > Wire fabrics - Summary table
Toolbar: Reinforcement tables > Wire fabrics - Summary table
Command line: RBCR_LIST_NET_SUM

Update - reinforcement tables

The option updates the selected table after making changes in reinforcement geometry/parameters.
Menu: Reinforcement > Reinforcement table > Update - reinforcement tables
Ribbon: ASD - Reinforcement > Reinforcement table > Update - reinforcement tables
Toolbar: Reinforcement table > Update - reinforcement tables
Command line: RBCR_LIST_ACT

Table Printout/Export/Edit

The option prints or exports a table of the indicated reinforcement to an *.xls or *.csv format file.
Menu: Reinforcement > Reinforcement table > Table Printout/Export/Edit
Ribbon: ASD - Reinforcement > Reinforcement table > Printout/Export/Edit
Toolbar: Reinforcement table > Printout/Export/Edit
Command line: RBCR_LIST_EXP

Styles - reinforcement tables

Opens the ***Reinforcement tables - style manager*** dialog; the option defines/modifies styles of the reinforcement tables applied to prepare a reinforcement table for RC structure elements.
Menu: Reinforcement > Reinforcement table > Styles - reinforcement tables
Ribbon: ASD - Reinforcement / Reinforcement table / Printout/Export/Table edit
Command line: RBCR_LIST_PAR

Insert drawing from *Autodesk Robot Structural Analysis*

The option inserts a drawing prepared in ***Autodesk Robot Structural Analysis***.
Menu: Reinforcement > Insert drawing from Robot
Ribbon: ASD - Reinforcement > Tools > Insert drawing from Robot
Toolbar: Definition-bars > Insert drawing from Robot
Command line: RBCR_TOOL_IMPORT_RM

© 2010 Autodesk, Inc. All rights reserved

Reinforcement areas from *Autodesk Robot Structural Analysis*

The option reads values of required (theoretical) reinforcement areas calculated for a plate in ***Autodesk Robot Structural Analysis***. A ***Robot*** file (*.rtd) is read, providing values of top and bottom reinforcement for every finite element on the plate. After opening the file in ***AutoCAD® Structural Detailing*** plate reinforcement is presented in a form of crosses which disappear once the appropriate plate reinforcement is generated in ***AutoCAD® Structural Detailing***.
Menu: Reinforcement > Reinforcement areas from **Robot**
Ribbon: ASD - Reinforcement > Tools > Reinforcement areas from Robot
Toolbar: Definition-bars > Reinforcement areas from Robot
Command line: RBCR_TOOL_IMPORT_PL

Structure elements - reinforcement

Submenu with commands to define reinforcement of typical elements of RC structures.

Spread footing

The option defines reinforcement of a typical spread footing once several characteristic parameters are determined in the dialog (spread footing geometry/reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Spreat footing
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Spread footing
Toolbar: Structure elements - reinforcement > Spread footing

Sleeve footing

The option defines reinforcement of a typical sleeve footing once several characteristic parameters are determined in the dialog (footing geometry/reinforcement parameters).
Menu: Reinforcement > Typical structures - reinforcement > Structure elements - reinforcement > Sleeve footing
Ribbon: ASD Structure elements > Structure elements – reinforcement / Sleeve footing
Toolbar: Structure elements - reinforcement / Sleeve footing

Continuous footing

The option defines reinforcement of a typical continuous footing once several characteristic parameters are determined in the dialog (continuous footing geometry/reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Continuous footing
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Continuous footing
Toolbar: Structure elements - reinforcement > Continuous footing

Column

The option defines reinforcement of a typical column - circular or rectangular, once several characteristic parameters are determined in the dialog (column geometry/reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Column
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Column
Toolbar: Structure elements - reinforcement > Column

Opening

The option defines reinforcement of a typical opening - circular or rectangular, once several characteristic parameters are determined in the dialog (opening geometry/reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Opening
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Opening
Toolbar: Structure elements - reinforcement > Opening

© 2010 Autodesk, Inc. All rights reserved

Corner

The option derfines reinforcement of a typical corner once several characteristic parameters are determined in the dialog (corner geometry/reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Corner
Ribbon: ASD - Structure elements > Structure elements > reinforcement > Corner
Toolbar: Structure elements > reinforcement > Corner

Slab corner

The option defines reinforcement of a typical RC slab corner after specifying a few characteristic parameters in the dialog (slab corner geometry / reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Slab corner
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Slab corner
Toolbar: Structure elements - reinforcement > Slab corner

Distribution of prefabricated slabs

The option derfines distribution of prefabricated slabs and generating reinforcement for these slabs after specifying several characteristic parameters in the dialog (geometry of the slab distribution region/ reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Distribution of prefabricated slabs
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Distribution of prefabricated slabs
Toolbar: Structure elements - reinforcement > Distribution of prefabricated slabs

Beam

The option defines typical beam reinforcement after specifying a few characteristic parameters in the dialog (beam geometry / reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Beam
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Beam
Toolbar: Structure elements - reinforcement > Beam

Stairs

The option defines typical stair reinforcement after specifying a few characteristic parameters in the dialog (stair geometry / reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Stairs
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Stairs
Toolbar: Structure elements - reinforcement > Stairs

Pile cap

The option defines typical reinforcement of a pile cap (pile foundation) after specifying a few characteristic parameters in the dialog (pile cap geometry / reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Pile cap
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Pile cap
Toolbar: Structure elements - reinforcement > Pile cap

Pile

The option defines reinforcement of a typical pile of pile foundation after specifying a few characteristic parameters in the dialog (pile geometry / reinforcement parameters).
Menu: Reinforcement > Structure elements - reinforcement > Pile
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Pile
Toolbar: Structure elements - reinforcement > Pile

© 2010 Autodesk, Inc. All rights reserved

Retaining wall

The option enables defining reinforcement of a typical retaining wall after providing several characteristic parameters in the dialog (retaining wall geometry/reinforcement parameters)

Menu: Reinforcement > Structure elements - reinforcement > Retaining wall

Ribbon: ASD - Structure elements > Structure elements - reinforcement > Retaining wall

Toolbar: Structure elements - reinforcement > Retaining wall

Ground beam

The option defines typical reinforcement of a ground beam after specifying a few characteristic parameters in the dialog (beam geometry / reinforcement parameters).

Menu: Reinforcement > Structure elements - reinforcement > Ground beam

Ribbon: ASD - Structure elements > Structure elements - reinforcement > Ground beam

Toolbar: Structure elements - reinforcement > Ground beam

Parapet

The option defines typical reinforcement of a parapet after specifying a few characteristic parameters in the dialog (parapet geometry / reinforcement parameters).

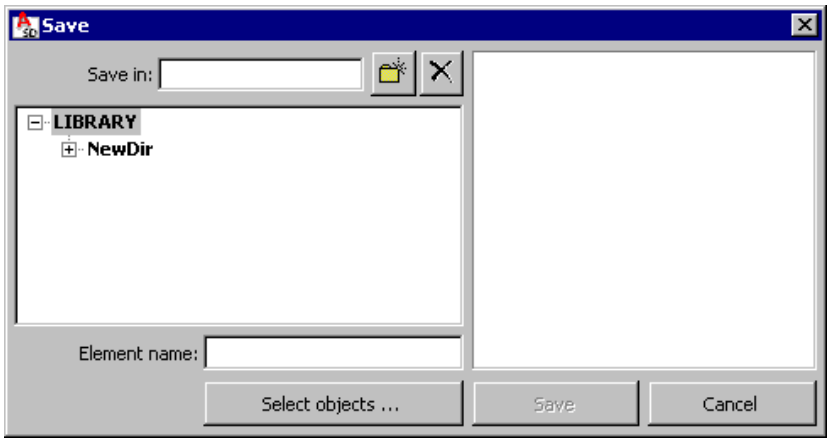
Menu: Reinforcement > Structure elements - reinforcement > Parapet

Ribbon: ASD - Structure elements > Structure elements - reinforcement > Parapet

Toolbar: Structure elements - reinforcement > Parapet

Create linear element

The option defines the RC structure element (section of an RC element) that is assigned the element length. Once selected, the following dialog displays:



After clicking **Select objects**, the element (a block of drawing elements) displays. Such an element may be saved to the database.

Menu: Reinforcement > Structure elements - reinforcement > Create linear element

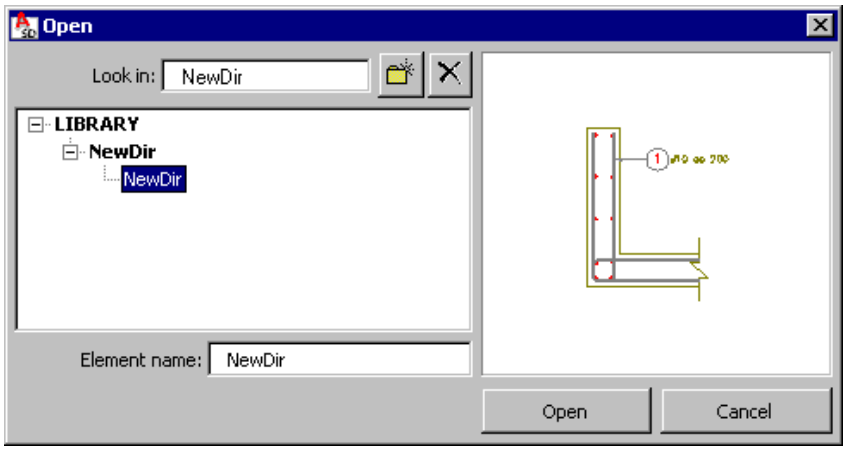
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Create linear element

Toolbar: Structure elements - reinforcement > Create linear element

© 2010 Autodesk, Inc. All rights reserved

Insert linear element

The option inserts the RC structure element (section of an RC element) that has been assigned the length. Once selected, the following dialog displays:



After selecting a saved linear element, a block of drawing elements is placed in a drawing. The linear element chosen is assigned name and length; the spacing of elements over the length (e.g. 3 meters of length with spacing every 20 cm) is also specified.
Menu: Reinforcement > Structure elements - reinforcement > Insert linear element
Ribbon: ASD - Structure elements > Structure elements - reinforcement > Insert linear element
Toolbar: Structure elements - reinforcement > Insert linear element

Structure elements - formworks

Submenu with commands which define the formwork of typical elements of RC structures.

Spread footing

The option derfines the formwork of a typical spread footing after providing several characteristic parameters in the dialog (spread footing geometry).
Menu: Reinforcement > Formwork > Spread footing
Ribbon: ASD - Structure elements > Structure elements - formwork > Spread footing
Toolbar: Structure elements - formwork > Spread footing

Continuous footing

The option defines the formwork of a typical continuous footing after providing several characteristic parameters in the dialog (continuous footing geometry).
Menu: Reinforcement > Structure elements - formwork > Continuous footing
Ribbon: ASD - Structure elements > Structure elements - formwork > Continuous footing
Toolbar: Structure elements - formwork > Continuous footing

Sleeve footing

The option enables defining reinforcement of a typical sleeve footing after providing several characteristic parameters in the dialog (sleeve footing geometry)
Menu: Reinforcement > Structure elements - formwork > Sleeve footing
Ribbon: ASD - Structure elements > Structure elements - formwork > Sleeve footing
Toolbar: Structure elements - formwork > Sleeve footing

© 2010 Autodesk, Inc. All rights reserved

Column

The option defines the formwork of a typical column after providing several characteristic parameters in the dialog (column geometry).
Menu: Reinforcement > Structure elements - formwork > Column
Ribbon: ASD - Structure elements > Structure elements - formwork > Column
Toolbar: Structure elements - formwork > Columns

Beam

The option defines the formwork of a typical beam after providing several characteristic parameters in the dialog (beam geometry).
Menu: Reinforcement > Structure elements - formwork > Beam
Ribbon: ASD - Structure elements > Structure elements - formwork > Beam
Toolbar: Structure elements - formwork > Beam

Stairs

The option defines the formwork of typical stairs after providing several characteristic parameters in the dialog (geometry of stairs).
Menu: Reinforcement > Structure elements - formwork > Stairs
Ribbon: ASD - Structure elements > Structure elements - formworks > Stairs
Toolbar: Structure elements - formwork > Stairs

Pile cap

The option defines the formwork of a typical pile cap (pile foundation) after providing several characteristic parameters in the dialog (pile cap geometry).
Menu: Reinforcement > Structure elements - formwork > Pile cap
Ribbon: ASD - Structure elements > Structure elements - formwork > Pile cap
Toolbar: Structure elements - formwork > Pile cap

Ground beam

The option defines the formwork of a typical ground beam after providing several characteristic parameters in the dialog (beam geometry).
Menu: Reinforcement > Structure elements - formwork > Ground beam
Ribbon: ASD - Structure elements > Structure elements - formwork > Ground beam
Toolbar: Structure elements - formwork > Ground beam

Parapet

The option defines the formwork of a typical parapet after providing several characteristic parameters in the dialog (parapet geometry).
Menu: Reinforcement > Structure elements - formwork > Parapet
Ribbon: ASD - Structure elements > Structure elements - formwork > Parapet
Toolbar: Structure elements - formwork > Parapet

Retaining wall

The option enables defining formworks of a typical retaining wall after providing several characteristic parameters in the dialog (retaining wall geometry).
Menu: Reinforcement > Structure elements - formwork > Retaining wall
Ribbon: ASD - Structure elements > Structure elements - formwork > Retaining wall
Toolbar: Structure elements - formwork > Retaining wall

© 2010 Autodesk, Inc. All rights reserved

Additional connecting elements

The option enables inserting additional connecting elements in the drawing (e.g. bolts, anchors).

Menu: Reinforcement > Structure elements - formwork > Additional connecting elements

Ribbon: ASD - Structure elements > Structure elements - formwork > Additional connecting elements

Toolbar: Structure elements - formwork > Additional connecting elements

Tools

Set scale of reinforcement description

The option chnages the scale of reinforcement description; once this option has been applied, the drawing displayed on the *Model* tab shows no changes, because modification of the scale is presented while generating a printout (a final drawing) on printout layouts.

Menu: Reinforcement > Tools > Set scale of reinforcement description

Ribbon: ASD - Reinforcement > Modify > Set scale of reinforcement description Toolbar: Tool > Set scale of reinforcement description

Command line: RBCR_DESC_SCALE

Create projection plane

The option defines a view used during generation of a final drawing; while generating a projection plane, the scale should be specified.

Menu: Reinforcement > Tools > Create projection plane

Ribbon: ASD - Reinforcement > Tools > Create projection plane

Toolbar: Tools > Create projection plane

Command line: RBCT_ADDVIEW

Element manager

The option divides the reinforcing bars into structural elements (beams, columns, etc.).

Menu: Reinforcement > Tools > Element manager

Ribbon: ASD - Reinforcement > Tools > Element manager

Toolbar: Tools > Element manager

Command line: RBCR_CREATE_ELEMENT

See also:
Element manager

Create cross-section

The option creates a cross-section; to create a cross-section, select an object, cutting line (two points defining a segment) and cross-section 'depth'. Use this option for surface and linear distributions.

Menu: Reinforcement > Tools > Create cross-section

Ribbon: ASD - Reinforcement > Tools > Create cross-section

Toolbar: Tools > Create cross-section

Command line: RBCR_CREATE_ELSECTION

Copy view

The option copies a selected view. You can use this option for views (of cross-sections, for example) in which top / bottom reinforcement of a slab is displayed. Copied views are mutually linked.

Menu: Reinforcement > Tools > Copy view

Ribbon: ASD - Reinforcement > Tools > Copy view

Toolbar: Tools > Copy view

Command line: RBCR_COPY_VIEW

Edit bar / wire fabric database

The option edits databases of reinforcing bars and wire fabrics (modifying parameters of bars or wire fabrics, adding new ones).

Menu: Reinforcement > Tools > Edit bar > wire fabric database

Ribbon: ASD - Reinforcement > Modify > Edit bar/wire fabric database

Command line: RBCR_TOOL_DBEDIT

© 2010 Autodesk, Inc. All rights reserved

Multiple reinforcements

The option defines multiple selected reinforcement (the reinforcement quantity in a structure); the value specified is provided in the reinforcement summary table (in the *Number of elements* column).
Menu: Reinforcement > Tools > Multiple reinforcements
Ribbon: ASD - Reinforcement > Modify > Multiple reinforcements
Toolbar: Modify > Multiple reinforcements
Command line: RBCR_TOOL_QUANTN

Reinforcement - information

The option displays basic information concerning indicated reinforcing bar or reinforcement distribution.
Menu: Reinforcement > Tools > Reinforcement - information
Ribbon: ASD - Reinforcement > Tools > Reinforcement – information
Toolbar: Tools > Reinforcement - information
Command line: RBCR_TOOL_INFO

Renumbering of reinforcement position

The option changes the reinforcement numbering; the following elements (assigned to the bar shape) are considered during renumbering: spacing description, bar description placed outside the formwork contour, reinforcement tables, etc.
Menu: Reinforcement > Tools > Renumbering of reinforcement position
Ribbon: ASD - Reinforcement > Tools > Renumbering of reinforcement position
Toolbar: Tools > Renumbering of reinforcement position
Command line: RBCR_TOOL_RENUM

Find reinforcement

The option finds a reinforcement position in a generated drawing.
Menu: Reinforcement > Tools > Find reinforcement
Ribbon: ASD - Reinforcement > Tools > Find reinforcement
Toolbar: Tools > Find reinforcement
Command line: RBCR_TOOL_FINDR

Show reinforcement without description

The option marks (highlighting on the screen) the reinforcement for which a description has not been generated.
Menu: Reinforcement -> Tools ->Show reinforcement without description
Ribbon: ASD > Reinforcement > Tools > Show reinforcement without description
Command line: RBCR_TOOL_SELNDSC

Add lap splices

The option automatically generates lap splices for point reinforcement bars that are not assigned a shape (only their length is defined) and whose length exceeds the commercial length of reinforcing bars (for example 12 m). Bar lap splices are generated in accordance with options for lap splices of reinforcing bars on the *Codes / Materials* tab in the Job Preferences dialog.
Menu: Reinforcement >Tools > Add lap splices
Ribbon: ASD - Reinforcement > Tools > Add lap splices
Command line: RBCR_DISTRIBUTION_POINT_ADD_LAP

Explode

The option explodes some of the composed objects into individual elements.
Menu: Reinforcement > Tools > Explode
Ribbon: ASD - Reinforcement > Tools > Explode
Toolbar: Tools > Explode
Command line: RBCR_EXPLODE

© 2010 Autodesk, Inc. All rights reserved

Reinforcement calculator

The option opens the Reinforcement calculator dialog. Bar diameters and reinforcement areas are given in units that have been selected in Preferences. The calculator enables calculation of the following quantities:

- Reinforcement areas, for example:
  7*ϕ 12 = 7.92 cm2
  7*ϕ 12 + 5*ϕ 16 = 17.97 cm2
  7*ϕ 12 + 5*ϕ 16 + 8*ϕ 10 = 24.25 cm2
- Required number of reinforcing bars (for example 44/ϕ14 = 29 bars)
- Required number of reinforcing bars with the assumed diameter (e.g. 18 and 12 mm) with additional assumption that numbers of bars with each diameter are approximately equal (for example: 44 /ϕ 18 /ϕ 12 = 12*ϕ 18.0 + 12*ϕ 12.0)
- Required number of reinforcing bars with the assumed diameter (e.g. 18 and 12 mm) in such a way so that bars with 12 mm diameter constitute a certain percent of all bars (for example: 44 /ϕ 18 /ϕ 12 %25 = 16 * ϕ 18.0 + 5 * ϕ 12.0)
- Difference between the area given (e.g. 44 cm2) and the total area of indicated reinforcing bars (for example: 44 - 5* ϕ 12 = 38.35 cm2).

Menu: Reinforcement > Tools > Reinforcement calculator
Ribbon: ASD - Reinforcement > Tools > Reinforcement calculator
Toolbar: Tools > Reinforcement calculator
Command line: RBCR_TOOL_CALCULATOR

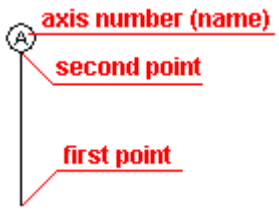
Save model in dwg format

The option saves a model of a structure element in a DWG format file. It allows opening a file in the AutoCAD® program and carrying out further operations on a generated drawing.
NOTE: If a drawing is saved in a *.DWG format file, and next opened in AutoCAD® on a computer where ***AutoCAD® Structural Detailing - Reinforcement*** is **NOT** installed, then diameter symbols will not be displayed. For diameter symbols to be displayed, you must copy the diam.sex file to the appropriate AutoCAD folder (the file has to be copied to the folder to which the path is set in the AutoCAD® program).
Menu: Reinforcement > Tools > Save model in dwg format
Ribbon: ASD - Reinforcement > Tools >Save model in dwg format
Toolbar: Tools > Save model in dwg format
Command line: RBCT_MODELEXPORT

Graphic elements
Insert axis

The option inserts an axis to a selected place in a drawing. Symbols are drawn according to the default style set in the ***Job Preferences*** dialog. To insert a symbol of a structural axis in a drawing, do as follows:

1. Select the command Reinforcement > Graphic elements > Insert axis
2. Enter a number (name) of the structural axis
3. Indicate the first point of the axis symbol
4. Indicate the second point of the axis symbol (see the drawing below).



The axis number is proposed according to the settings in the default style; while inserting the axis any number may be typed (every next one will be inserted according to the recently-applied numbering). The axis number may be modified using the context menu option.

© 2010 Autodesk, Inc. All rights reserved

Menu: Reinforcement > Graphic elements > Insert axis
Ribbon: ASD - Reinforcement > Graphic elements > Insert axis
Toolbar: Graphic elements > Insert axis
Command line: RBCT_DEF_SYMBOL_AXIS

Insert section symbol

The option inserts a section symbol to a selected place in a drawing. Symbols are drawn according to the default style set in the ***Job Preferences*** dialog. To insert a section symbol in a drawing, do as follows:

1. Select the command Reinforcement > Graphic elements > Insert section symbol
2. Enter a number (name) of the section
3. Indicate the first point of the section
4. Indicate the second point of the section.

Profile numbering is proposed according to the settings in the default style; while inserting section symbols any number may be typed (every next one will be inserted according to the recently-applied numbering). The section symbol may be modified using the context menu option.

Menu: Reinforcement > Graphic elements > Insert section symbol
Ribbon: ASD - Reinforcement > Graphic elements > Insert section symbol
Toolbar: Graphic elements > Insert section symbol
Command line: RBCT_DEF_SYMBOL_SECTION

Insert elevation mark

The option inserts an elevation mark to a selected place in a drawing. Symbols are drawn according to the default style set in the ***Job Preferences*** dialog. To insert an elevation mark in a drawing:

1. Select the command Reinforcement > Graphic elements > Insert elevation mark
2. Determine the reference (zero) level
3. Indicate a point on a selected level.

Levels inserted during one session are linked with each other; when several levels are defined a value of the level inserted first must be specified, whereas the remaining ones are entered depending on the place where the symbol is inserted. Modification of an elevation mark may cause changes in values of individual levels (the remaining ones are recalculated), deleting designations, adding new symbols to an already-existing group.

Menu: Reinforcement > Graphic elements > Insert elevation mark
Ribbon: ASD - Reinforcement > Graphic elements > Insert elevation mark
Toolbar: Graphic elements > Insert elevation mark
Command line: RBCT_DEF_SYMBOL_COTE

Styles – graphic elements

Opens the ***Styles of symbols*** dialog; the option defines styles (format) of symbols presented in structure drawings (elevation mark, section symbol or structural axis symbol).
Menu: Reinforcement > Graphic elements > Styles - Graphic elements
Ribbon: ASD - Reinforcement > Settings > Styles - Graphic elements
Command line: RBCT_DEF_SYMBOL_STYLE

Modify

Reinforcement

The option modifies parameters of a selected reinforcement (reinforcing steel grade, diameter, etc.). Reinforcement parameters may be changed in the dialog.
Menu: Reinforcement > Modify > Reinforcement
Ribbon: ASD - Reinforcement > Modify > Modify reinforcements
Toolbar: Modify > Modify reinforcements
Command line: RBCR_MOD_REINF

© 2010 Autodesk, Inc. All rights reserved

Graphical parameters

The option modifies graphical parameters of a selected reinforcement (filling, color, etc.) and of switching on/off descriptions of values for reinforcement crosses imported from ***Autodesk Robot Structural Analysis***. Reinforcement parameters may be changed in the dialog.
Menu: Reinforcement > Modify > Graphical parameters of reinforcement
Ribbon: ASD - Reinforcement > Modify > Graphical parameters
Toolbar: Modify > Modify graphical parameters
Command line: RBCR_MOD_PROP

Reinforcement lap splices

The option modifies the lap splice parameters in bars. The dialog displays where the lengths of lap splices may be modified.
Menu: Reinforcement > Modify > Reinforcement lap splices
Ribbon: ASD - Reinforcement > Modify > Reinforcement lap splices
Toolbar: Modify > Modify reinforcement lap splices
Command line: RBCR_MOD_BAR_LAP

Reinforcement description

The option modifies the description parameters of a selected reinforcement and description of automatic distribution of wire fabrics. The dialog displays where the parameters of reinforcement description may be changed.
Menu: Reinforcement > Modify > Reinforcement description
Ribbon: ASD - Reinforcement > Modify > Reinforcement description
Toolbar: Modify > Reinforcement description
Command line: RBCR_MOD_DESC

Cover

The option changes the cover value for the existing reinforcement; this parameter refers to a cover of bar segments, cover of bar ends (bars are mainly ended with hooks), to region for distribution varying linearly and wire fabrics in cross section.
Menu: Reinforcement > Modify > Cover
Ribbon: ASD - Reinforcement > Modify > Cover
Toolbar: Modify > Modify reinforcement cover
Command line: RBCR_TOOL_EDCOV

Bent diameters

The option modifies the values of bend diameters of reinforcing bars and wire fabrics in cross section.
Menu: Reinforcement > Modify > Bent diameters
Ribbon: ASD - Reinforcement > Modify > Bent diameters
Toolbar: Modify > Modify bent diameters
Command line: RBCR_TOOL_EDBEND

Length of bar segment

The option modifies the lengths of reinforcing bar segments and wire fabrics in cross section. A value of lengthening or shortening of a bar segment is entered directly from the keyboard.
Menu: Reinforcement > Modify > Length of bar segment
Ribbon: ASD - Reinforcement > Modify > Length of bar segment
Toolbar: Modify > Modify length of bar segment
Command line: RBCR_TOOL_EDSEGM

Delete first/last reinforcement segment

The option deletes the first or the last element of reinforcement.
Menu: Reinforcement > Modify > Delete first/last reinforcement segment
Ribbon: ASD - Reinforcement > Modify > Delete first/last reinforcement segment
Toolbar: Modify > Delete first/last reinforcement segment
Command line: RBCR_TOOL_BAR_DEL

© 2010 Autodesk, Inc. All rights reserved

Add first/last reinforcement segment

The option adds the first or last reinforcement element.
Menu: Reinforcement > Modify > Add first\last reinforcement segment
Ribbon: ASD - Reinforcement > Modify > Add first/last bar segment
Toolbar: Modify > Add first/last bar segment
Command line: RBCR_TOOL_BAR_ADD

Find shape code

This option recognizes and adjusts shape codes for defined reinforcement bars..
Menu: Reinforcement > Modify > Find shape code
Ribbon: ASD - Reinforcement > Modify > Find shape code
Toolbar: Modify > Find shape code
Command line: RBCR_TOOL_DETECT_CODE

Modification of surface distribution region

The option modifies a cover value or values of support width of the region for surface distribution regions (bar distribution or wire fabric distribution).
Menu: Reinforcement > Modify > Modification of surface distribution region
Ribbon: ASD - Reinforcement > Modify > Modification of surface distribution region
Toolbar: Modify > Modification of surface distribution region
Command line: RBCR_MOD_CHBOUNDARY

Job Preferences

Opens the ***Job Preferences*** dialog; it enables the basic parameters applied in ***AutoCAD® Structural Detailing*** (codes, units, materials, etc.).
Menu: Reinforcement > Job Preferences
Ribbon: ASD - Reinforcement > Settings > Job Preferences
Toolbar: Tools > Job preferences
Command line: RBCR_JOB_PREF

Preferences

Opens the ***Options*** dialog; it enables setting parameters for the work environment in ***AutoCAD® Structural Detailing***.
Menu: Reinforcement > Preferences
Ribbon: ASD - Reinforcement > Settings > Preferences
Toolbar: Tools > Preferences
Command Line: OPTIONS

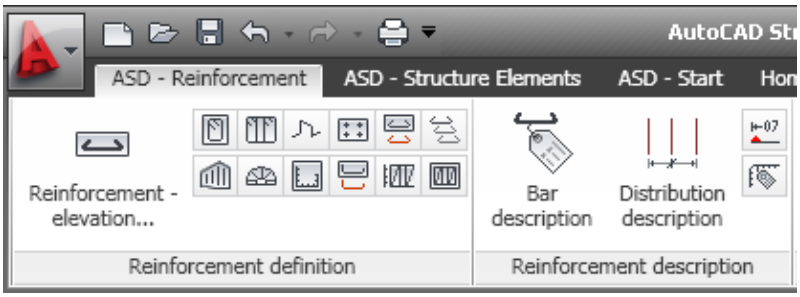
Object Inspector – Show / Hide

The option enables the presentation (show/hide) of the ***Object Inspector*** dialog.
Menu: Reinforcement > Object inspector > Show / Hide
Ribbon: ASD - Reinforcement > Tools > Object inspector - Show / Hide
Command line: RBCTOI

© 2010 Autodesk, Inc. All rights reserved

1.5. Ribbon

The ribbon is an element of the user interface which replaces the traditional menu and toolbars and allows easy managing and adjusting the workspace.



The ribbon consists of several panels, grouped on tabs that are designated by task or subject. The ribbon panels include many commands that have been on toolbars and in dialogs so far, such as icons, drop-down lists, sliders, text fields and other elements characteristic of a given tab. Using the ribbon, you do not have to display many toolbars; thus the application displays fewer functions and increases the allowable workspace placing the whole interface on a small area that can be anytime shown or hidden.
The ribbon displays automatically when a drawing is created or opened using the *2D Drafting* or *3D Modeling* workspace. You can display the ribbon manually using either of the following methods:

- select the main menu Tools -> Palettes -> Ribbon
- type *RIBBON* in the command line to show the ribbon or *RIBBONCLOSE* to hide it.

You can customize the ribbon, that is you can add, delete and modify positions of panel elements, in the Customize User Interface (CUI) editor window. Open this editor using either of the following methods:

- click 

on the Manage tab > Customization > User Interface
- type *CUI* in the command line.

NOTE:
You can display the ribbon horizontally, vertically or as a floating palette.

Using the editor you can also switch between workspaces (such as the classic workspace without the ribbon). To do it, select the *Customize* tab > *Workspaces* and select *Set current* from the context menu.

To change between workspaces, you can also use the Workspace Switching icon at the bottom right corner of the screen.

© 2010 Autodesk, Inc. All rights reserved

2. CONFIGURATION

2.1. Job preferences

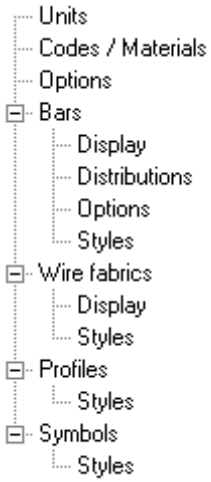
2.1.1. Job preferences

This option is used to adopt basic parameters used in ***AutoCAD® Structural Detailing***. There are three ways to access this option from:

- Menu: Reinforcement / Job preferences
- Ribbon: ASD - Reinforcement / Settings / Job preferences
- Toolbar: Tools / Job Preferences 
- Command line: RBCR_JOB_PREF.

The ***Job preferences*** dialog is split into two main parts:

- The left side of the dialog contains a selection tree (see the drawing below) from which you select one of the options of the program job preferences.



- To the right of the selection tree are parameters appropriate for the option selected from the selection tree; the dialog is updated after selecting an option.

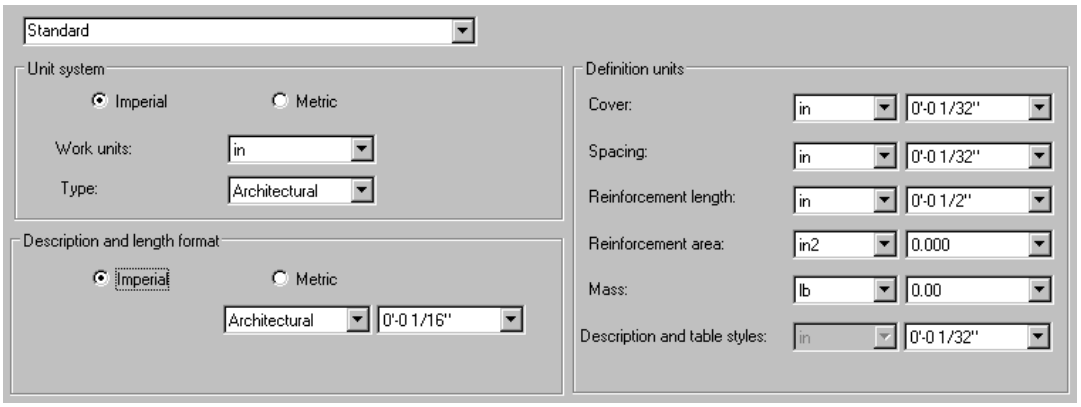
The right side of the dialog provides the standard buttons (**OK**, **Cancel**, **Help**) and the following:
Default – Click this button to save values of the job preferences parameters as the default values
Save - Click this button to save the current status of preference parameters under a name located on the *Units* tab
Delete - Click this button to delete the set of job preferences saved under the current name located on the *Units* tab.

See also:
Preferences

© 2010 Autodesk, Inc. All rights reserved

2.1.2. Units

After selecting the *Units* option from the selection tree located on the left side of the Job Preferences dialog, the right part of the dialog displays the options shown below.



The top part of the dialog contains the field for selection of the preference option set.
You can specify the work units in ***AutoCAD® Structural Detailing***.
Select one of the following unit systems:

- imperial
  type:
  - architectural (0'-0)
  - engineering (0'-0'')
- metric.

There is also the *Description and length format* option which is used to parameterize the length unit. The option is applied only for dimensions and description of reinforcement length (reinforcement presented outside the drawing contour). You can select imperial or metric system for description. If the imperial format is selected, choose the engineering or architectural type. For metric format, the option is used to determine how to present length values less than 1m and length values over 1m. For example, if centimeters are selected in the format *for < 1.0 m* field, then the dimension 0.33 m will be displayed as 33 cm.

In the bottom part of the dialog you select the units applied in the ***AutoCAD® Structural Detailing - Reinforcement*** dialogs. Units have been divided into the following categories:

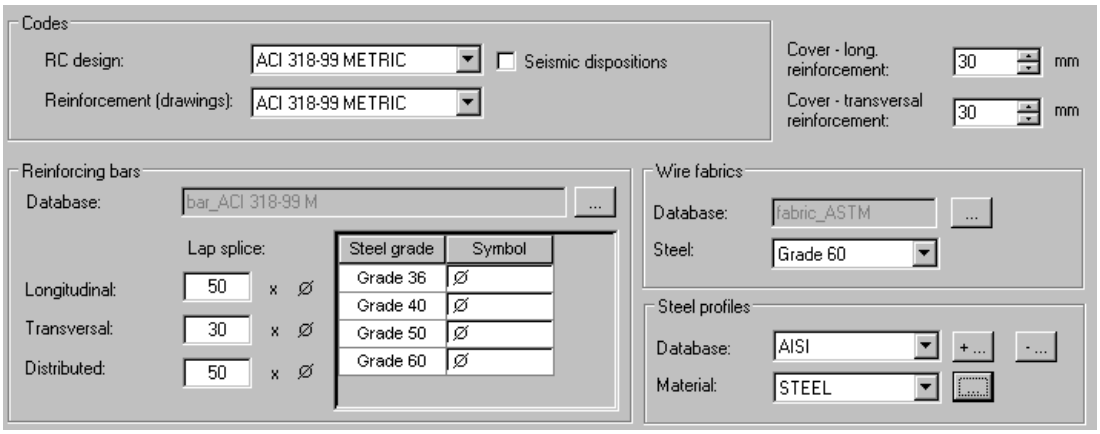
- Length unit, including the following components: cover, spacing, reinforcement length, formwork dimensions, etc.
- Unit of reinforcement diameter
- Unit of reinforcement area
- Mass unit
- Number of decimal places for description and table styles.

Units are selected from the drop-down list available for each of the categories. For all the units, it is possible to change the manner of presenting the format of numbers of the quantities listed. These fields define the number of decimal places for each of the quantities. To change the number of decimal places, select the relevant item on the 2nd selection list to the right of the unit. The unit precision is reflected in descriptions of reinforcement, dimensions, etc. Note: Reinforcement tables have their own precision settings.

© 2010 Autodesk, Inc. All rights reserved

2.1.3. Codes / Materials

After selecting the *Codes -> Materials* option from the selection tree located in the Job Preferences dialog, the following options display:



NOTE:
Materials are displayed automatically after selecting an RC code.

In the *Codes* field, you select the code for RC structure design and drawings (drawings of reinforcement). A selected drawing code displays the appropriate symbols of designation, hatching, etc. valid in a given country whose code is currently in use. The following codes are available:

- RC codes:
  - American code ACI 318-08/M
  - British code BS 8110
  - Eurocode 2
  - Eurocode 2 (Italian NAD)
  - French code BAEL 99
  - Belgian code NBN B 15-002
  - Polish codes: PN-84/B-03264 and PN-B-03264:1999
  - Romanian code STAS 10107/0-90
  - Russian code SNiP 2.03.01-84
  - Ukrainian code DSTU 3760-98
  - Spanish code EHE 98
  - Norwegian code NS 3473E: 1999
  - Italian code DM 9/96
  - South African code SABS 82: 1997
  - German code DIN 1045
  - Swedish code BBK 04
  - Danish code DS 411
  - Austrian code ONORM B 4700
  - Indian code IS 456: 2000
  - Singaporean code CP65

- Drawing codes: (corresponding to appropriate RC code):
  - American code ACI 318-08/M
  - British code BS 8666: 2000
  - Eurocode 2
  - Eurocode 2 (Italian NAD).
  - French code NF P 02-016
  - Belgian code NBN B 15-002
  - Polish code PN-ISO 4066:1194
  - Romanian code STAS

© 2010 Autodesk, Inc. All rights reserved

- Russian code GOST 21.501-93
- Spanish code EHE 98
- Norwegian code NS 3473
- Italian code DM 9/96
- South African code SABS 82: 1997
- German code DIN 1045
- Swedish code BBK 04
- Singaporean code CP65.

The *Codes* field also contains the *Seismic dispositions* option. It effects the length of reinforcing bar hooks and of lap splices in longitudinal bars; in the reinforcing bar databases, for French and Romanian codes there are additional columns containing hook lengths available if seismic dispositions are active. If the *Seismic dispositions* option is selected, then hook lengths are taken from this additional column in which seismic effects are considered (if seismic dispositions are active, hook lengths are increased approximately twice depending on the code). Values of lap splices are increased by 30% in relation to those defined in the preferences.

In the *Reinforcing bars* field, you select steel classes for the relevant reinforcement type from the selected database of reinforcing bars; a steel class is assigned a symbol corresponding to it. The drop-down lists contain steel symbols (they depend on a selected code).
Steel classes available on the selection lists correspond to the chosen database of reinforcing bars; to change the reinforcing bar database (the field in which the file name is presented in inaccessible), click the (**…**) button located next to the *Database* field and in the ***Open*** dialog to indicate appropriate database file (*.xml). It results in adapting the reinforcement parameters to the user needs.
On the unfolding list, graphical symbols are displayed; you will be able to enter any character string from the keyboard.
Below the list of standard steel designations is presented:

Ø Ø Ø Ø HA RL T R #

.
For reinforcing bars, you may select a lap splice for longitudinal, transversal and distributed reinforcement; the lap splice length is adopted as a multiple of a reinforcing bar diameter.

The *Wire fabrics* field enables selection of steel classes from the chosen wire fabric database. Steel classes available on the selection lists correspond to the selected wire fabric database. To change the wire fabric database (the field in which the file name is presented in inaccessible), click the (**…**) button located next to the *Database* field and in the ***Open*** dialog indicate the appropriate database file (*.xml). It results in adapting the wire fabric parameters to the user needs.

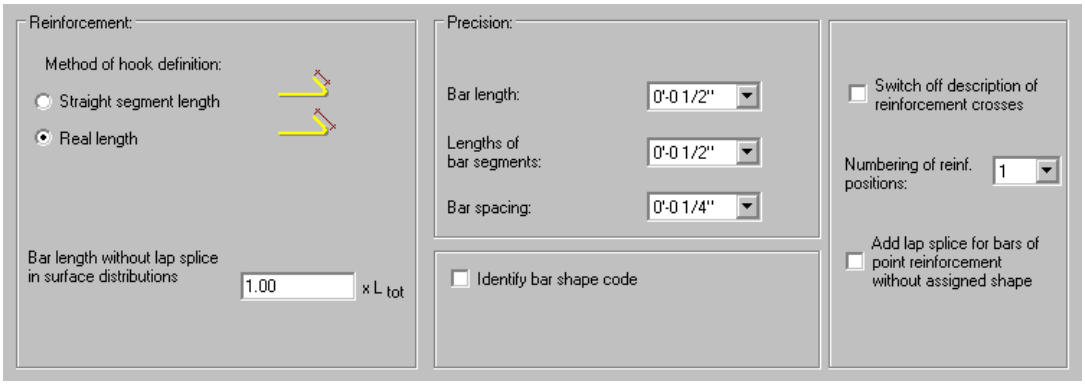
In the upper part of the dialog a value of a reinforcement cover is specified: separately for longitudinal bars (reinforcement – elevation), and separately for transversal bars (reinforcement – section). A cover value for longitudinal reinforcement given in the edit fields is used while defining reinforcement - elevation and special reinforcement, whereas a value of the transversal reinforcement cover is used when defining reinforcement - section.

The *Steel profiles* field allows selection of steel profile databases. To add a new profile database to the list of active profile databases, click '**+**', and select a steel profile database. A profile database can be deleted from the list of active profile databases; by selecting a profile database from the list and clicking '**-**'.
The *Steel profiles* field also allows selection of materials for steel profiles. Materials found on the selection list correspond to selected materials from a material database. To add a material to the list click (**…**) located next to the *Material* field, and select an appropriate material in the ***Material database*** dialog.

© 2010 Autodesk, Inc. All rights reserved

2.1.4. Options

After selecting the *Options* option from the selection tree located in the Job preferences dialog, the following options display:



In the *Reinforcement* dialog you specify the method for defining a hook length:

-  as a length of the straight segment of a hook
-  as a real length of a hook.

Use the *Bar length without lap splice in surface distributions* field to specify the length of bars for which reinforcement lap splices will not be used in reinforcement distribution (see: Distribution/definition of reinforcement - lap splices). Bars are distributed so that they fit the distribution region, but without taking account of the maximum length of bars (single bars in the distribution can be longer than Lmax) and without laps.

Use the lists in the *Precision* field to select precision for:

- length of reinforcing bars
- length of reinforcing bar segments
- bar spacing.

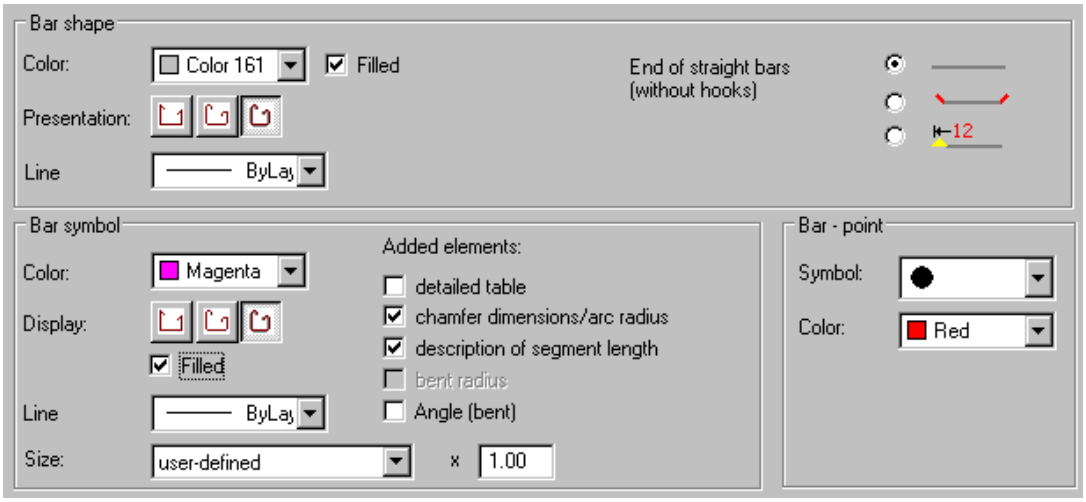
Once the Recognize code of bar shape option is selected, the bar code automatically adjusts after it is drawn. All types of bars defined in the program will be compared with the bars with the code from the database used by the user; if a defined shape does not find its equivalent in the database, it will remain a bar without code.

In the upper right part of the dialog is the *Switch off description of reinforcement crosses* option. If it is activated, values loaded with reinforcement crosses for slabs will not be displayed (in the drawing).
Use the *Numbering of reinforcement positions* option to specify the way numbers of reinforcement positions are presented (it is particularly important for the British RC code); you can present the numbering as 1, 2, 3, ... or 01, 02, 03, ...
Below is the *Add lap splice for bars of point reinforcement without assigned shape* option. If selected, lap splices are added automatically for point reinforcement bars that are not assigned a shape (only their length is defined) and whose length exceeds the commercial length of reinforcing bars (12 m, for example). it is presented in the reinforcement table. Lap splices for bars are generated based on the options for lap splices of reinforcing bars on the *Codes > Materials* tab in the ***Job Preferences*** dialog.

© 2010 Autodesk, Inc. All rights reserved

2.1.5. Display (bars)

Access the dialog by selecting *Bars -> Display* from the Job preferences dialog. The dialog includes additional options as shown below.

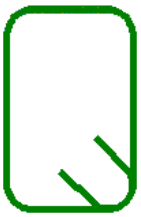


The options included in the *Bar shape* field:

- *Color* - selects the color used to draw reinforcement; thickness of reinforcing bars are drawn in proportion to their diameter
- If the *Filled* option is selected, the reinforcing bar contour that is being drawn is filled in completely with a selected color.

The *End of straight bars* option is used to set the manner of presenting bar ends in a drawing (presentation: without ends, with ends, with ends and description); the option pertains only to straight bars without hooks.
Below the shapes of reinforcing bars are presented:

- contour - filled



- contour - not filled

You may also choose the color and thickness of lines with which a bar shape is drawn. Three icons are used to determine the method of presenting reinforcement:

-  provides rough (schematic) reinforcement presentation - in the form of a broken line
-  presents reinforcement together with bend curvatures
-  shows reinforcement presenting its real diameter and real dimensions.

The line reflecting simplified shapes is a bar axis (with arc elements) or the outer line of a bar (without arc elements), while its location with respect to the formwork (an RC element contour) depends on a cover value.

© 2010 Autodesk, Inc. All rights reserved

NOTE:
The bar length is the same regardless of the selected presentation method.

The options in the *Bar - point* field are used to select the type of reinforcing bar presentation in a section (point reinforcement). The following symbols used to designate bars in a section are provided on the drop-down list:

A color can be chosen for the indicated symbol.

The options from the *Bar symbol* field pertain to reinforcement whose description is provided outside the formwork contour.
You can select color and line thickness to be applied while drawing reinforcement. Three icons are used to determine the manner of presenting reinforcement:

-  provides rough (schematic) reinforcement presentation - in the form of a broken line (polyline)
-  presents reinforcement together with bend curvatures
-  displays reinforcement presenting its real diameter and real dimensions.

If the third option is selected, then the *Filled* option becomes accessible. When selected, you can fill in the reinforcing bar shape that is being drawn. In case of rough presentation and presentation showing bent curvatures, the list of line thickness selection is available.
This field also includes the *Added elements* option; this is a list of elements to be added to a bar whose description is provided outside the formwork contour:

- *Detailed table* - in the case of a bar (whose description is provided outside the contour), whose length is linearly variable (the result of the linearly-varying distribution), the table contains a detailed list with a separate description of each bar; for a bar of constant length, the table consists of one line that contains description of bar dimensions.
- *Chamfer dimensions* / arc radius - (horizontal and vertical) dimension lines describing chamfered segments of reinforcement and arcs.
- *Description of segment length* - dimensions determining total length (with hooks included) of each bar segment
- *Bent radius* - information about the size of radiuses of roller mandrels that form bends. This option is not available in this current version.
- *Angle (bent)* – an angle between neighboring bar segments is specified.

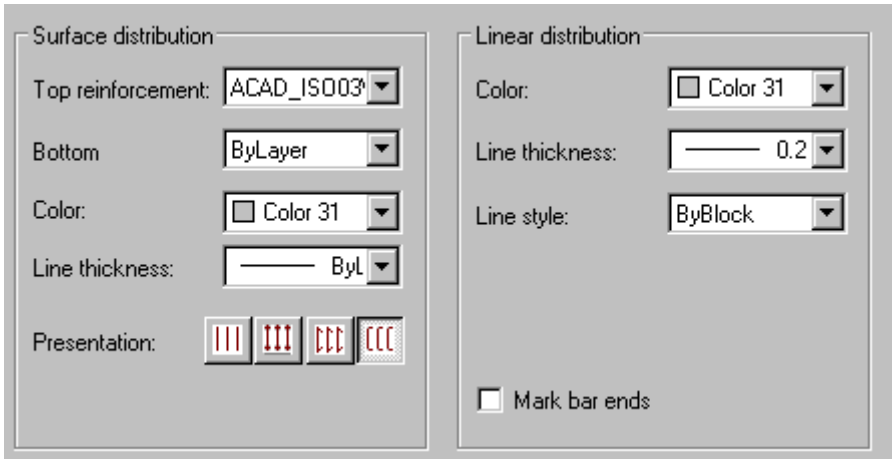
The options included in the drop-down *Size* list are used to determine the size of reinforcement symbols. The following sizes are available:

- *1 : 1* - a symbol size equals the size of reinforcement in an element formwork
- *User-defined* - once selected, indicate (graphically) the contour in which the bar symbol is to be contained
- *Scale factor* - once this option is selected, an edit field displays. Select a scale factor that will decrease or increase the symbol with respect to the real size of a bar included in a formwork. For example, entering a coefficient value of 0.5, causes the drawing to be twice as small, whereas entering a value of 2 indicates that the drawing will be twice as large.

© 2010 Autodesk, Inc. All rights reserved

2.1.6. Distributions (bars)

This dialog contains options used to present the reinforcing bars belonging to surface distributions. Access the dialog by selecting *Bars -> Distributions* from the Job preferences dialog. The dialog includes additional options as shown below.



The options located in the *Surface distribution* field are used to define reinforcing bars belonging to surface distributions.

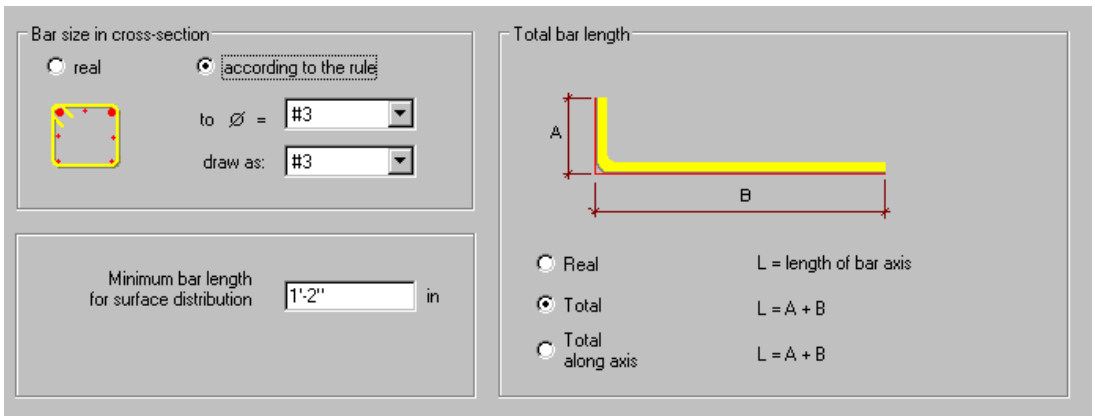
The *Surface distribution* field allows you to:

- Determine a line style used for drawing the top / bottom reinforcement
- Select a color and thickness of the line for distributed reinforcement
-  select (the *Presentation* option) the method of presenting the reinforcement (significant for bars with hook ends).

The options in the *Linear distribution* field specify the distribution of existing (with the shape already defined) reinforcement. You can choose a color for presenting reinforcement in the linear distribution and line thicknesses and style.
If the *Mark bar ends* option is selected, ends of reinforcing bars in the linear distribution are marked according to the description style for ends of distributed bars.

2.1.7. Options (bars)

This dialog contains options used to present the reinforcing bar in a cross-section of an RC structure element. Access the dialog by selecting *Bars -> Options* from the Job preferences dialog. The dialog includes additional options as shown below.

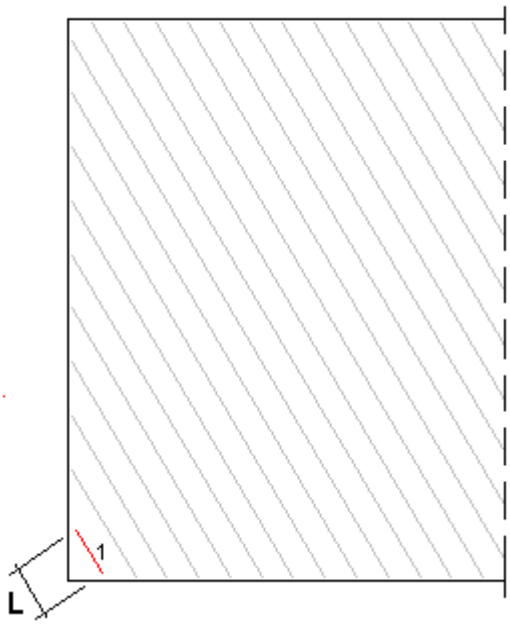


© 2010 Autodesk, Inc. All rights reserved

Bar size in cross-section:

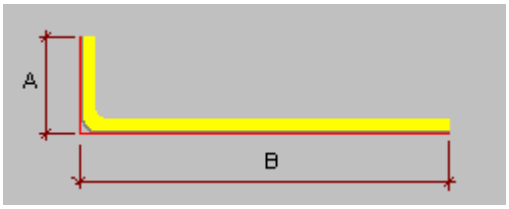
- *Real* - if this option is selected, then the real size (in scale) of a bar in cross-section (reinforcing bar diameter) is presented in a drawing
- *According to the rule* - if this option is selected, then you can choose a size of the bar in cross-section, whose diameter is not greater than the reinforcing bar diameter; for example, if the following size values are chosen: to ϕ = 18 draw as 25 mm, then all reinforcing bars in cross-section whose diameters are not greater than 18 mm are presented as bars of 25 mm diameter.

Below is the *Minimum bar length for surface distribution* option. You can determine the minimal bar length; a bar whose length is less than this value, and it will not be generated during definition of surface distribution. An example situation is displayed in the drawing below. Bar no. 1 (diplayed in red), whose length is less than the minimal bar length defined in the dialog above, will not be generated (considered in tables).



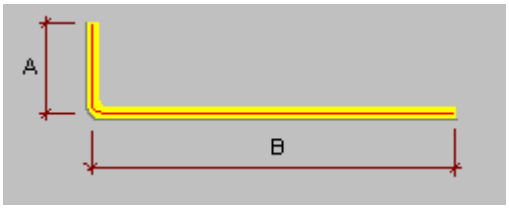
The right part of the dialog contains the *Total bar length* field; there are the following options available:

real - if this option is selected, the reinforcing bar length is calculated as exact length of bar axis.



total - if this option is chosen, the reinforcing bar length is calculated as the total of lengths of bar segments with hooks; bar lengths are given in compliance with total outer length.

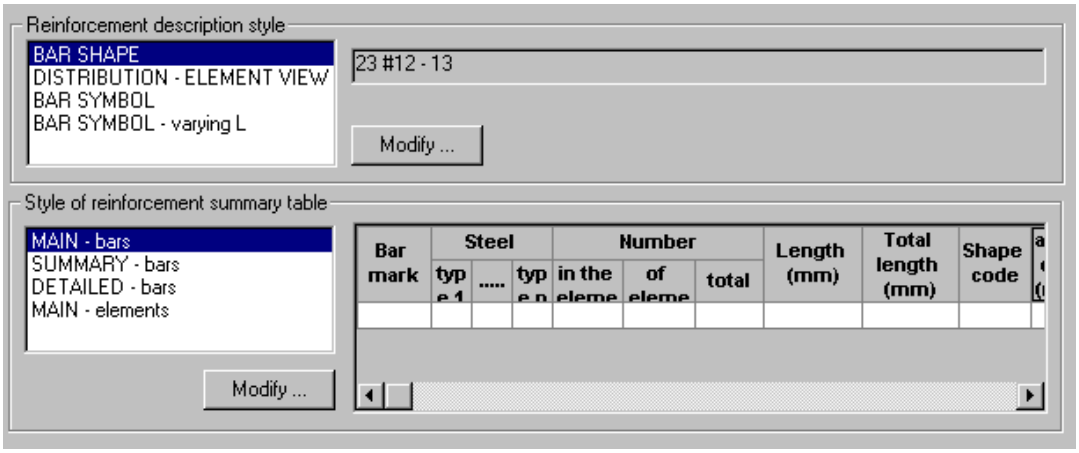
© 2010 Autodesk, Inc. All rights reserved



Total along axis - if this option is selected, the reinforcing bar length is calculated - in reinforcement tables - as a sum of lengths of segments of the bar with hooks; reinforcement tables specify lengths of bars along their axes.

2.1.8. Styles (bars)

This dialog provides basic information about the styles currently defined and relevant reinforcement or table to which these styles apply. Access the dialog by selecting *Bars -> Styles* from the Job preferences dialog. The dialog includes additional options as shown below.



The top part of the dialog includes styles of reinforcement descriptions with reinforcement division into categories considered. Once an appropriate reinforcement category is selected from the list (the category is highlighted), an example description displays based on the settings of the reinforcement description style.

To modify a style:
Click **Modify**. The dialog used for defining styles of reinforcement description opens; it enables direct modification of a selected type of reinforcement.

The bottom part of the dialog displays the table styles applied to prepare a reinforcement table. Once an appropriate table style is selected, an example reinforcement table for the element indicated on the list, is displayed. Click **Modify** to open the dialog used for defining table styles.

2.1.9. Display (wire fabrics)

Access this option by selecting *Wire fabrics -> Display* from the Job preferences dialog. The following dialog displays:

© 2010 Autodesk, Inc. All rights reserved

The following options are available in the *Wire fabric shape* field:

- *Color* – selection of a color that will be used to draw a wire fabric
- *Line thickness* – thickness of a line representing a wire fabric in a drawing
- If the *Filled* option is selected, the wire fabric contour being drawn will be completely filled with a selected color.

The *End of straight bars* option allows you to set the method of presenting bar ends in the drawing (presentation: without ends, with ends, with ends and description); the option only applies to straight bars without hooks.

The *Wire fabric distribution* field allows you to determine the style of lines applied to draw top / bottom reinforcement.
You can also select the type of wire mesh presentation in drawings (see reinforcement description styles – wire fabrics):

-  exact
-  group
-  simplified.

The options in the *Wire fabric symbol* field refer to reinforcement with a description placed outside the formwork contour.
You can select a color and thickness of a line that will be used to draw a wire fabric. Three buttons are used to determine the method of reinforcement presentation:

- The first button displays a schematic representation of a wire fabric - in the form of a broken line
- The second button displays a wire fabric with bend curvatures
- The third button displays a wire fabric with a real diameter and real dimensions.

If the third button is chosen, the *Filled* option becomes accessible. You can then fill the drawn shape of a wire fabric with a color. For the schematic presentation and the presentation including bend curvatures the list for selection of line thickness is available.
This field holds also the *Added elements* option; this a list of elements that will be appended to a wire fabric presented outside the formwork contour:

- *Detailed table* – a table including a detailed description of a wire fabric displays
- *Chamfer dimensions / arc radius* – dimension lines (horizontal and vertical) describing chamfered reinforcement segments and arcs
- *Description of segment length* – dimensions determining total length of every wire fabric segment
- *Bent radius* – in some cases it is necessary to provide information about the size of roller mandrels forming bends – the option is not available.
- *Angle (bent)* – an angle between the neighboring wire fabric segments is specified.

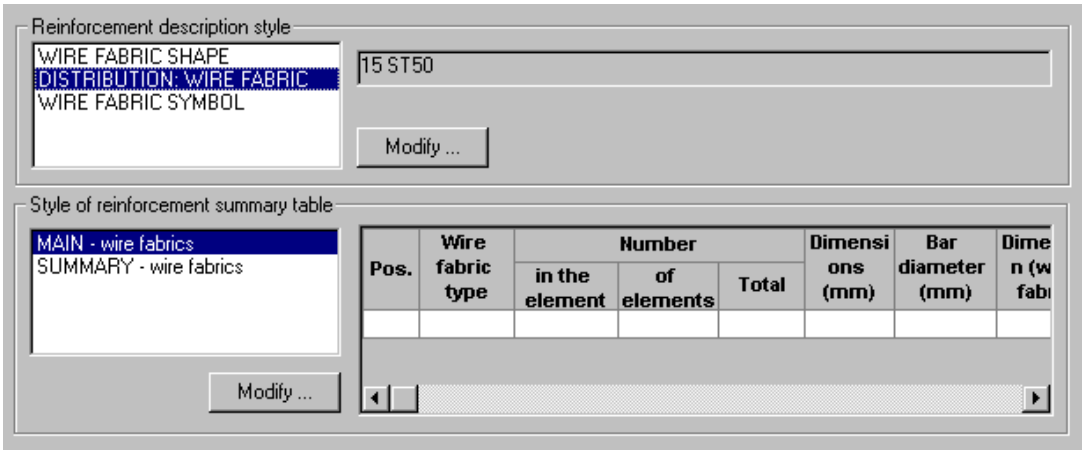
© 2010 Autodesk, Inc. All rights reserved

The options included in the drop-down *Size* list are used to determine the size of reinforcement symbols. The following sizes are available:

- *1 : 1* - it indicates that a symbol size equals the size of a wire fabric in an element formwork
- *User-defined* - once this option is selected, you indicate (graphically) the region in which the wire fabric symbol is to be contained
- *Scale factor* - once this option is selected, there appears an edit field. You then specify a scale factor that will decrease or increase the symbol with respect to the real size of a wire fabric included in a formwork. For example, entering a factor value of 0.5 results in the drawing being twice as small, whereas entering a value of 2 - results in the drawing being twice as large.

2.1.10. Styles (wire fabrics)

This dialog provides basic information about the styles currently defined and the relevant wire fabric reinforcement or table to which these styles apply. Access the dialog by selecting *Wire fabrics -> Styles* from the Job preferences dialog. The dialog includes additional options as shown below.



The top part of the dialog includes styles of reinforcement descriptions with division of wire fabric reinforcement into categories considered. Once an appropriate reinforcement category is selected from the list (the category is highlighted), an example description displays based on the settings of the reinforcement description style.

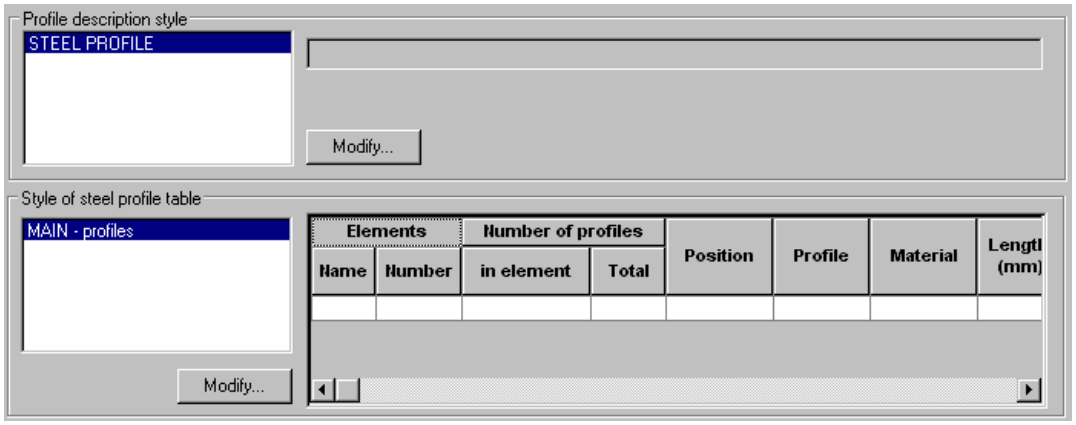
To modify a style:
Click **Modify.** The dialog used for defining styles of reinforcement description opens; it enables direct modification of a selected type of reinforcement.

The bottom part of the dialog displays the table styles applied to prepare a wire fabric reinforcement table. Once an appropriate table style is selected, an example reinforcement table for the element indicated on the list, is displayed. Click **Modify** to open the dialog used for defining table styles.

2.1.11. Styles (steel profiles)

This dialog provides basic information about the styles currently defined and relevant reinforcement or table to which these styles apply. Access the dialog by selecting *Profiles -> Styles* from the Job preferences dialog. The dialog includes additional options as shown below.

© 2010 Autodesk, Inc. All rights reserved



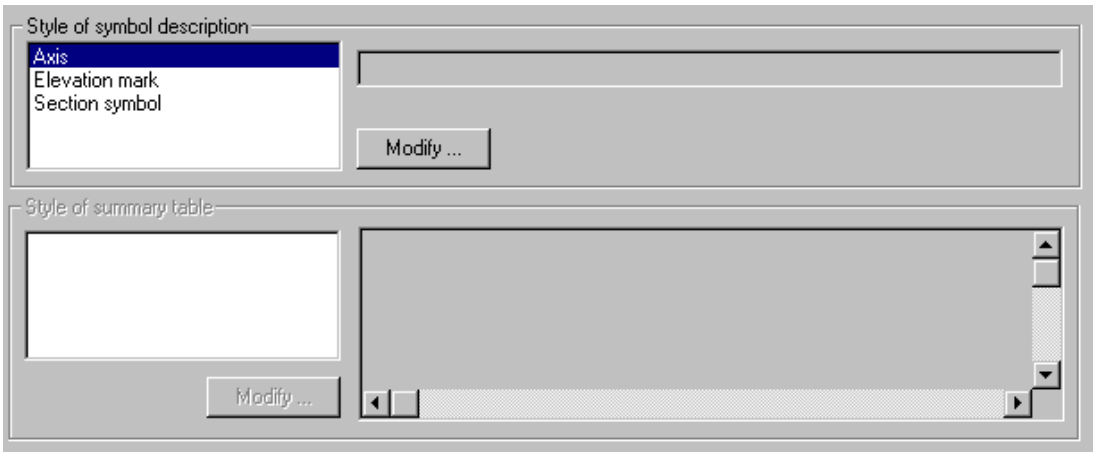
The top part of the dialog includes styles of steel profile descriptions with reinforcement division into categories considered. Once an appropriate reinforcement category is selected from the list (the category is highlighted), an example description displays based on the settings of the steel profile description style.

To modify a style:
Click **Modify**. The dialog used for defining styles of steel profile description opens; it enables direct modification of a selected type of steel profile.

The bottom part of the dialog displays the table styles applied to prepare a steel profile table. Once an appropriate table style is selected, an example steel profile table for the element indicated on the list, is displayed. Click **Modify** to open the dialog used for defining table styles.

2.1.12. Styles (symbols)

After selecting the *Symbols -> Styles* option from the Job preferences dialog, the following options display:



The dialog displays basic information about the currently-defined styles of symbol description (axis, level and section).
The upper part of the dialog includes a description of styles for the following symbols:

- axis symbol,
- elevation mark symbol and
- section symbol.

© 2010 Autodesk, Inc. All rights reserved

After selecting an appropriate style from the list (e.g. the elevation mark symbol – the name is highlighted), a description example displays based on the settings of the description style.

To modify a style:
Click **Modify**. The dialog used for defining styles for axes, elevation marks or sections opens; it enables direct modification of a selected type of reinforcement.

The bottom part of the dialog displays styles of a summary table. Once an appropriate table style is selected, an example table for the element indicated on the list, is displayed. Click **Modify** to open the dialog used for defining table styles.

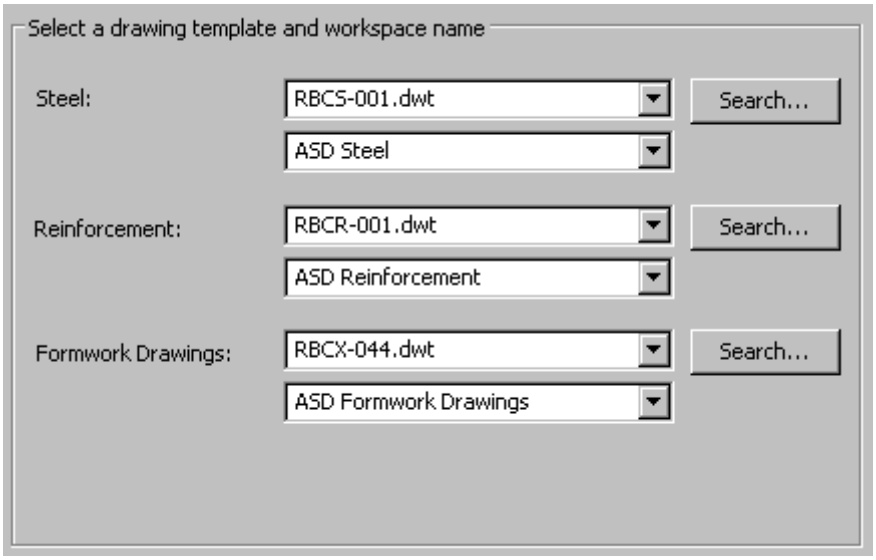
2.2. Preferences

2.2.1. Preferences

Select this option to use the basic parameters of ***AutoCAD® Structural Detailing***. There are two ways to access the option from:

- Menu: Reinforcement / Preferences
- Ribbon: ASD - Reinforcement / Settings / Preferences
- Toolbar: Tools / Preferences  .

In the AutoCAD® Options dialog, on the *Structural Detailing -> General Settings* tab you can select a work template for ***AutoCAD® Structural Detailing*** modules and workspace names (such as ASD or ASD Classic). Templates are located in the CFG folder and contain settings for a given country, for example the RBCR-001.dwt file is the template for the USA.



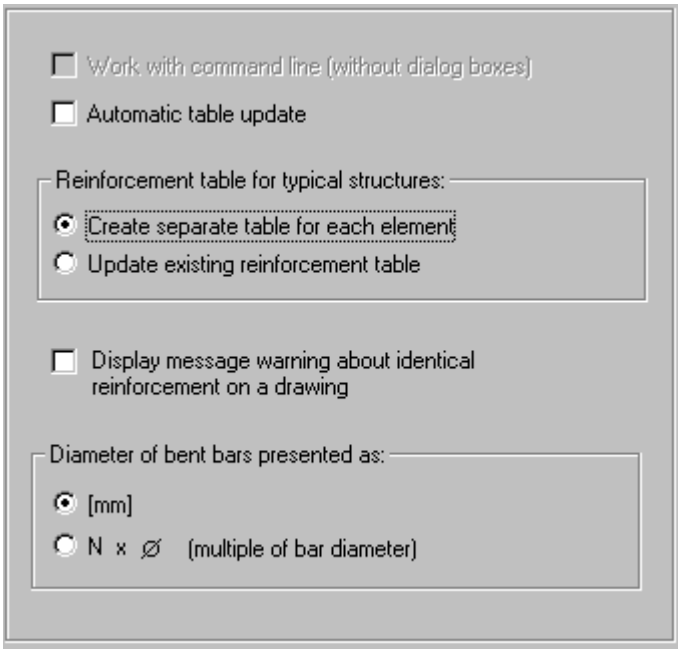
The *Structural Detailing* tab in the ***Options*** dialog is divided into two main parts:

- The left side of the dialog is a selection tree from which you select one of the program preference options

- To the right of the selection tree are the parameters that correspond to the option selected from the selection tree; the dialog is updated after selecting an option.

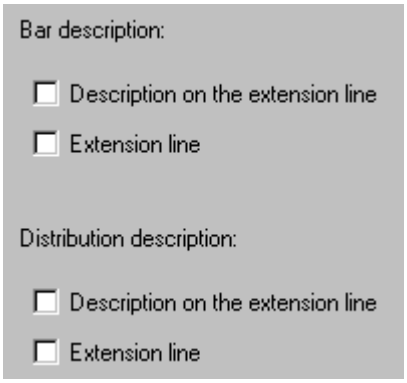
After selecting *Reinforcement* in the selection tree, the dialog displays the following options:

© 2010 Autodesk, Inc. All rights reserved



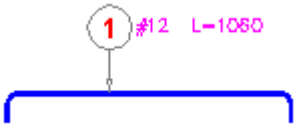
- *Automatic table update* - if this option is selected, then while working in the program reinforcement tables will be updated automatically after changes are made in a drawing.
- *Reinforcement table for typical structures* – enables you to select the method of generating a table for typical structures (column, beam, spread footing, pile cap, pile, etc.); the table may be generated for every element of an RC structure separately (separately for a beam, separately for a column, etc.) or an existing reinforcement table may be updated after adding another element of an RC structure.
- *Display message warning about identical reinforcement in a drawing* – if this option is selected, you are informed about any identical reinforcement.
- *Diameter of bent bars presented as* – enables you to choose the method of presenting diameters of bent bars: they are expressed either in selected units (e.g. in mm) or as a multiple of a reinforcing bar diameter.

After selecting the *Reinforcement -> Parametrization of descriptions* option from the selection tree, the dialog displays the following options allowing default settings of the way descriptions of bars and bar distributions will work:



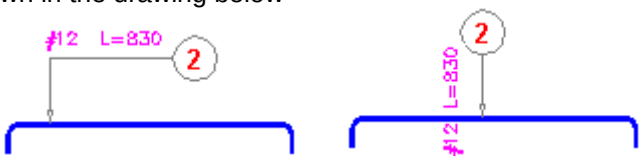
Bar description:

- *Description on the extension line* option switched off - a bar description is inserted as shown in the drawing below



© 2010 Autodesk, Inc. All rights reserved

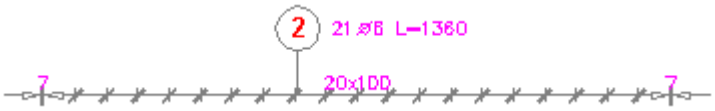
- *Description on the extension line* option switched on - a bar description is inserted as shown in the drawing below



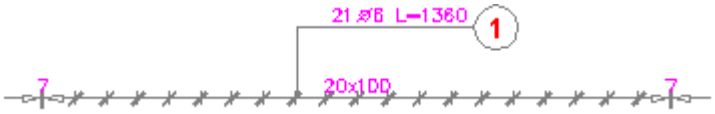
- *Extension line* option switched off - a bar description is inserted as shown in the drawing below (without the line connecting the bar with the label of the position number)

Distribution description:

- *Description on the extension line* option switched off



- *Description on the extension line* option switched on



- *Extension line* option switched off

NOTE:
A change of default settings in the above dialog effects the way new descriptions are inserted; descriptions which were defined earlier do not change.

AutoCAD® Structural Detailing has the following language versions:

 USA
 UK
 Italy
 Russia
 Poland
 France
 Spain
 Germany.

See also:
Job preferences

© 2010 Autodesk, Inc. All rights reserved

3. OBJECT INSPECTOR

3.1. Object Inspector Description

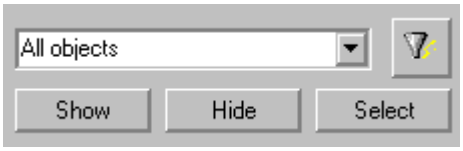
Inspector is a tool enabling management of elements (objects) included in a project created in ***AutoCAD® Structural Detailing***. By standard, the ***Inspector*** dialog displays besides the viewer (of graphic model definition), in the left-hand side of the program window. The width of the dialog is adjustable to accommodate space for the graphic model definition field.
The most important tasks carried out in the **Inspector** include:

- Presentation of project contents
- Presentation of generated views out of which printouts can be composed
- Change of scale of the general view in which objects will be created
- Change of view scales
- Change of name
- Deletion of views
- Filtering of elements (objects) in drawings
- Generation and management of the project drawing documentation.

The ***Object Inspector*** dialog is divided into three parts:

- Options for object filtering
- Four tabs containing lists (sets) of project elements depending on the design stage (modeling / positions / printouts)
- The table presenting properties of selected objects.

The top of the dialog includes options for filtering objects in drawings. A defined filter is identified by the name presented in the filter selection list in the ***Object Inspector*** dialog as shown below.

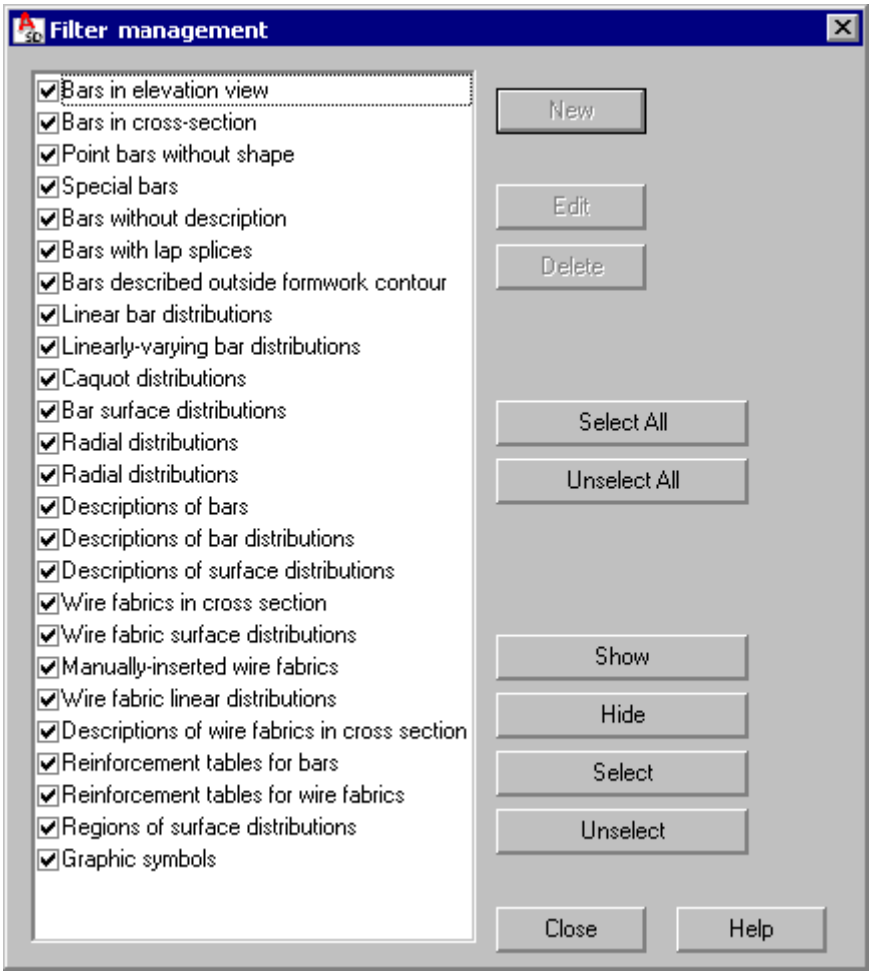


The following buttons are provided under the selection list:

- **Show** - clicking this button displays selected elements (e.g. radial distributions or bar descriptions) in the drawing.
- **Hide** - clicking this button hides selected elements (e.g. radial distributions or bar descriptions) in the drawing.
- **Select** - clicking this button selects chosen elements (e.g. radial distributions or bar descriptions) in the drawing.

Clicking  in the ***Object Inspector*** dialog opens the ***Filter management*** dialog as shown below.

© 2010 Autodesk, Inc. All rights reserved



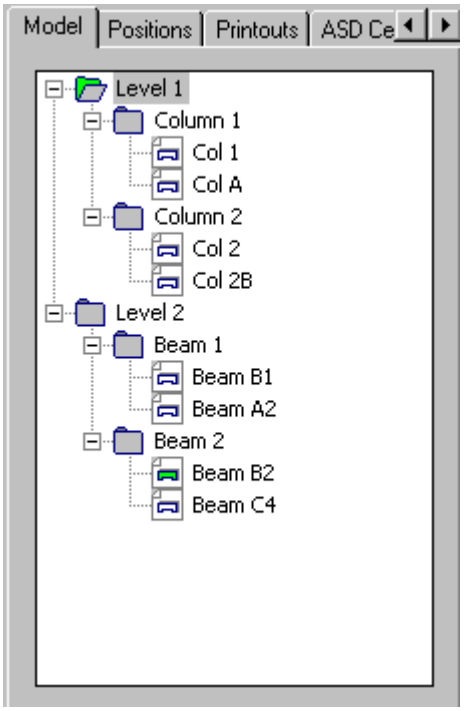
The dialog includes all defined filters and the following buttons:

- **Show, Hide, Select** - they work the same as in the ***Object Inspector*** dialog (see the description above)
- **Unselect** - clicking this button switches off selection of chosen elements (e.g. radial distributions or bar descriptions) in the drawing.
- **Select All / Unselect All** - clicking this button selects / switches off selection of all elements (filters) provided on the list
- **New, Edit, Delete** – these options are not available in the current program version.

3.2. Model

The Model tab provides a list of defined elements (levels, groups of elements as well as elements belonging to levels and groups) that describe the division of reinforcing bars into structural elements such as a beam, a column, a spread footing, etc. A structure of user-defined levels, groups and elements is shown in the form of a tree is shown below.

© 2010 Autodesk, Inc. All rights reserved



You can update, delete, and move individual components using the mouse; all these operations will result in updating the data contained in the ***Element manager*** dialog.
The context menu available on the *Model* tab holds the following commands:

- for a level and a group:

1. *Add element* – enables adding a new element to a selected group (the ***New element*** dialog opens on the screen then)
2. *Add group* (the option is accessible only for a level) – enables adding a new group to a selected level
3. *Steel table* – generates a reinforcement table with division into elements (the table works for multiselection)
4. *Delete* – deletes a level or a group; if a level containing components is deleted, then the components will remain (as if the level had never been created); if a group containing elements is deleted, then these elements can be assigned to a level or be left without being assigned.

- for an element:

1. *Show element* – zooms in a drawing to show all the components of the drawing
2. *Steel table* - generates a reinforcement table with division into elements (the table works for multiselection)
3. *Column table* - generates a reinforcement table for columns imported from Revit
4. *Beam table* - generates a reinforcement table for beams imported from Revit
5. *Add to element* – switches to the selection mode that enables choosing objects to be added to a selected element (once they are selected the ***Element manager*** dialog box opens on the screen)
6. *Delete* – deletes an element from the list (assignment of objects to an element is deleted).

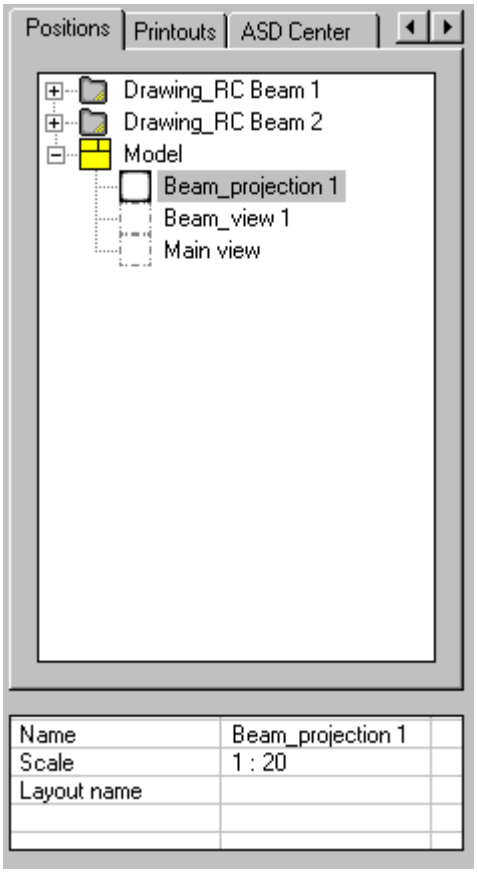
In ***AutoCAD® Structural Detailing - Reinforcement*** there is not a pre-determined order for creating 'elements'. The operation that is performed first depends on the user's choice and habits; elements can be created after drawing reinforcement of all elements of a structure (all at a time), or created one by one while drawing.
If additional reinforcement is added to an existing element, then it is necessary to use the context menu command *Add to element* available for the element.

See also:
Element manager

© 2010 Autodesk, Inc. All rights reserved

3.3. Positions

The Positions tab presents a list of defined views containing name, scale and name of the printout layout including a given view as shown below.



The icon of a document included on the list is presented as follows:

- - the document has been read from ***Autodesk Robot Structural Analysis***.
- in yellow - the document is active on the edition layout; moreover, there may exist views for a document, presented as:
  – active view
  – inactive view.

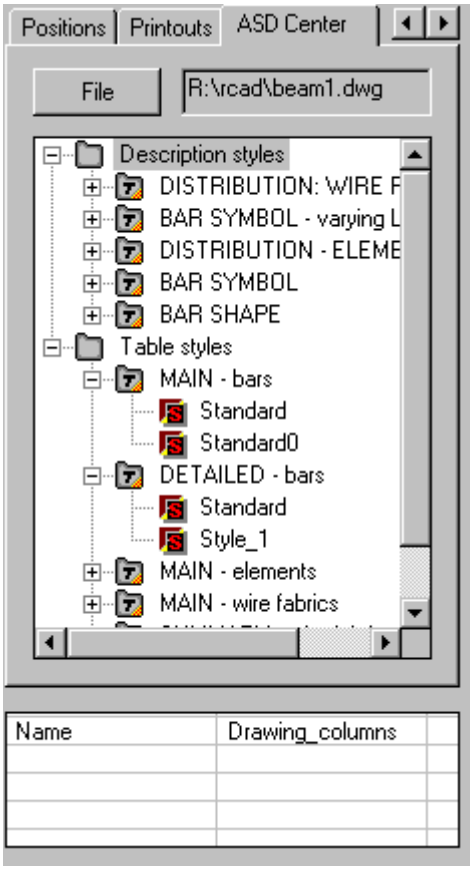
If the icon of a view provided on the list is shown in **bold**, it means that it is an active view. Access the context menu by right-clicking the *Positions* tab. The menu contains several options which allow performing operations on selected positions:

- *Change name* - choosing this command enables changing the name of a highlighted view (the name is entered to the command line)
- *Activate* - choosing this command activates the selected drawing
- *Add to current printout* - selecting this command adds a view with selected drawing to the current printout
- *Add to current printout as block* - selecting this command adds a view with selected drawing in form of block to the current printout.
  Arranging printouts by means of the blocks enables to create printout layouts with a large number of elements. It is possible to modify the elements presented in a block on a model only and the modification will be updated after moving on to the drawing area. It is not possible to modify elements by the means of the block edition.
- *Show view* - this option allows for presentation of the selected view
- *Delete view* - choosing this command enables deletion of the created view.

© 2010 Autodesk, Inc. All rights reserved

3.4. Structural Detailing Center

This Structural Detailing Center tab enables copying settings (styles) between projects.



Click the **File** button and select a file with an earlier-saved project, the ***Inspector*** dialog displays all the defined styles that may be used in the current project.
After highlighting a selected style, right-click the *Add* command, to add the style to the styles available in the current project.

3.5. Printouts

The Printouts tab enables management of printouts in ***AutoCAD® Structural Detailing***; it presents the list of all printouts defined in the ***AutoCAD® Structural Detailing*** project. Printouts are presented together with a set of views. The printout list contains all the printouts, even those which do not include any views. The structure of user-defined printouts and views is shown in a form of a tree. Due to logical reasons, views are placed in a printout, however, for the user's convenience, the tree also includes an intermediate level, so that it is obvious to which document given views belong. If the printout layout is active, then the icon of a printout corresponding to the active printout layout is presented in red color.
Printouts provided on the list are selected by selecting them (take note that only elements of one printout may be selected at a time - it is impossible to select elements of two different printouts). Selection of the printout in the dialog is synchronized with the graphic editor - an appropriate drawing displays on the screen.
Access the context menu by right-clicking the *Printouts* tab. The menu contains several options for performing operations on selected printouts:

- *Change name* - choosing this command enables changing the name of a highlighted printout (the name is entered to the command line)
- *Delete* - choosing this command results in removal of selected printouts from a project
- *Activate* - choosing this command causes the highlighted printout to become active (visible)

© 2010 Autodesk, Inc. All rights reserved

- *Unload printout* - choosing this command causes the selected printout to be excluded from the list of available printouts
- *Save printout* - choosing this command enables saving the selected printout as a *.dwg file
- *Save all printouts* - choosing this command enables saving all the printouts in a *.dwg file
- *Add printout* - selecting this command adds an empty printout to the project (the name is entered to the command line).

4. TYPICAL STRUCTURES

4.1. Reinforcement / formwork of typical RC structure elements

Use this option to define typical RC structure elements and their reinforcement. There are three ways to access this option from:

- Menu: select one of the options available in the submenu Reinforcement / Structure elements - reinforcement
- Ribbon: select one of the options available in the panel ASD Structure elements / Structure elements - reinforcement
- Toolbar: click the appropriate icon in the bar Structure elements - reinforcement
- Command line: RBCT_MACRO.

Typical structures are grouped into certain categories. When choosing a structure, find an appropriate category. The current version of ***AutoCAD® Structural Detailing - Reinforcement*** offers access to the following databases (macros) to define geometry / reinforcement of RC structure elements:

- Spread footing
- Sleeve footing
- Continuous footing
- Column
- Beam
- Opening
- Corner
- Slab corner
- Distribution of prefabricated slabs
- Stairs
- Pile cap (pile foundation)
- Pile
- Ground beam
- Parapet
- Retaining wall
- Additional connecting elements
- Linear element.

The macros listed are available from the menu (Reinforcement / Structure elements – reinforcement), ribbon (ASD Structure elements / Structure elements – reinforcement) and in the toolbar (Structure elements – reinforcement):

* Spread footing - 
* Sleeve footing - 
* Continuous footing - 

© 2010 Autodesk, Inc. All rights reserved

* Column - 
* Beam - 
* Opening - 
* Corner - 
* Slab corner - 
* Distribution of prefabricated slabs - 
* Stairs - 
* Pile cap (pile foundation) - 
* Pile - 
* Ground beam - 
* Parapet - 
* Retaining wall - 
* Linear element consisting of two options:
   Create linear element – the option defines an RC structure element (section of an RC element) that is assigned element length; such an element may be saved to the database
   Insert linear element - the option inserts an RC structure element (section of an RC element) that has been assigned length; after selecting a linear element, a block of drawing elements is placed in a drawing – a selected linear element is assigned a name and length.

The categories of typical structures are configured within a given model. After selecting a category, an additional dialog displays in which you can specify parameters of a selected element of an RC structure. The shape of this dialog depends on a structure category selected.

In the Formworks menu (Reinforcement / Structure elements - formworks), ribbon (ASD Structure elements / Structure elements - formworks) and in the toolbar (Structure elements – formworks) the following macros for formworks of RC structure elements are available:

- Spread footing - 
- Sleeve footing - 
- Continuous footing - 
- Column - 
- Beam - 
- Stairs - 

© 2010 Autodesk, Inc. All rights reserved

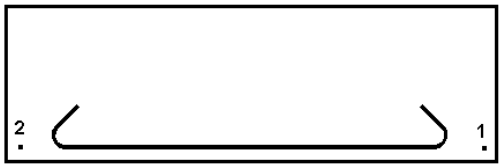
- Pile cap (pile foundation) - 
- Ground beam - 
- Retaining wall - 
- Parapet - 
- Additional connecting elements -  .

5. RULES APPLIED WHILE DEFINING REINFORCEMENT

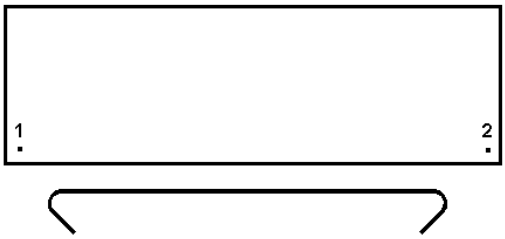
5.1. Location of a reinforcing bar in a drawing

The following principle applies when determining the position of a reinforcing bar in a drawing: Bar location depends on a direction of point definition. The principle that holds when defining a reinforcing bar consists in determining the order of points clockwise (along the EXTERNAL part of an object). The defined bar are positioned in the inner part of an object. In the case of a bar with hooks of a bending angle greater than zero degrees, the hooks are located on the opposite side with respect to the side where points defining the bar length are placed, thus they will be turned towards the middle of an object. An example of a reinforcing bar in a drawing is shown below.

Bar defined from right to left:
1 - Beginning of a reinforcing bar
2 - End of a reinforcing bar

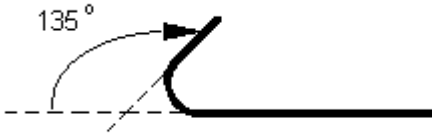


Bar defined from left to right:
1 - Beginning of a reinforcing bar
2 - End of a reinforcing bar



5.2. Angle of hook bending

The following principle applies when determining a value of the angle of hook bending:
The angle of hook bending is an angle by which a reinforcing angle should be bent to obtain a hook. An example of hook bending (with the angle set to 135 degrees) is shown below.



© 2010 Autodesk, Inc. All rights reserved

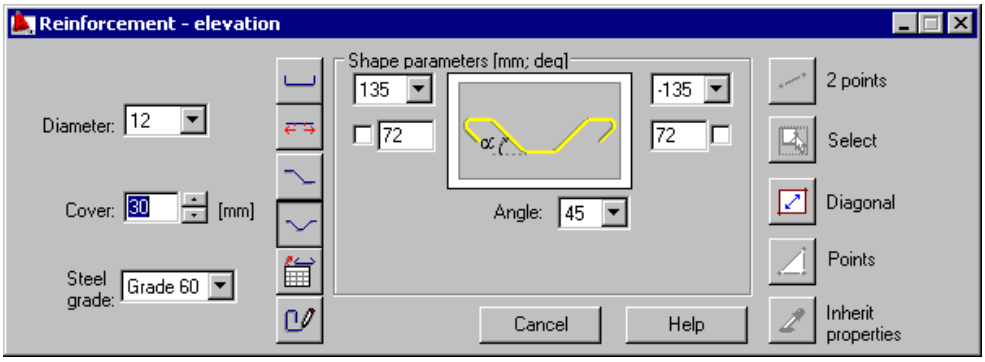
6. DEFINITION OF REINFORCEMENT - LONGITUDINAL REINFORCEMENT

6.1. DEFINITION OF BAR REINFORCEMENT - bar elevation (longitudinal reinforcement)

This option is used define the reinforcing bars (longitudinal reinforcement) in an element of RC structure. There are three ways to access this option from:

- Menu: Reinforcement / Reinforcement - elevation
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Reinforcement - elevation
- Toolbar: Bars - definition / Reinforcement - elevation 
- Command line: RBCR_DEF_BAR_BV.

Once the *Reinforcement - elevation* option is selected, the dialog used to select a shape of longitudinal reinforcement displays as shown (NOTE: while reinforcement is being defined this dialog remains visible).



The ***Reinforcement - elevation*** dialog can be split into three parts:

- The left side of the dialog displays basic information concerning reinforcement: diameter, cover and steel grade adopted from preference settings
- The middle of the dialog displays the icons that symbolize basic shapes of longitudinal reinforcement and allow selection of the reinforcement type; once a longitudinal reinforcement type is selected, contents of the field with parameters of a reinforcement shape changes
- The right side of the dialog displays several icons used to select the mode of graphical definition of reinforcement; if they are selected, the mode of graphic interface is selected according to the specific manner of contour definition. NOTE: bars can only be defined after one of these icons is selected.

The dialog opens and displays the longitudinal reinforcement type defined with the selected parameters.

 (located in the bottom right corner) is used to inherit (adopt) parameters from the reinforcement already defined. It is the standard tool provided in most dialogs.

The following types of longitudinal reinforcement are available:

-  straight bar
-  straight bar with bar anchor generation
-  bent bar - type 1
-  bent bar - type 2
-  bar from database
-  bar of any shape.

© 2010 Autodesk, Inc. All rights reserved

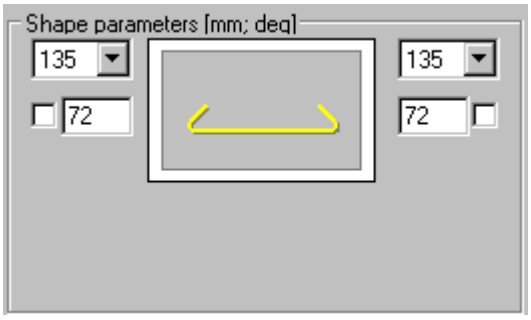
Once you define the reinforcement shape, the Reinforcement description dialog displays. You can then select the elements of reinforcement.

Reinforcing bars are also defined by means of the commands available.

See also:
Example of definition of longitudinal reinforcement

6.2. Straight bar

This option is used to define a straight bar. Access this option by clicking . The following dialog displays:



To define a bar, specify the following from the dialog:

- Bar diameter (the most recent diameter for this reinforcement type is adopted by default)
- Cover of a reinforcing bar (the most recent cover defined for this reinforcement type is adopted by default)
- In the *Parameters of reinforcing bar shape field - parameters of bar ending* with hooks, i.e., a hook angle and length (the hook length defined in the dialog denotes a length of the straight segment of a hook or its real length - see *Options* in the Job Preferences dialog). You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

The list of standard hook angle values: (see: method of measuring the angle of bar bending):

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

When defining the straight bar, only (2 Points) is available (the remaining icons are unavailable); indicate the two bar points, and click to start the definition.

NOTE:
Bar location depends on the direction of point definition. The principle that applies while defining a reinforcing bar includes determining the order of points clockwise (along the EXTERNAL part of an object). The defined bar will always be positioned in the inner part of an object. In the case of bar with hooks with a bending angle greater than zero degrees, the hooks will always be positioned on the side opposite to the side where points defining the bar length are placed, thus they will be turned towards the middle of an object.

© 2010 Autodesk, Inc. All rights reserved

After defining the first point determining the bar position, the bar length changes depending on the cursor position.

See also:
Commands from the command line - definition of longitudinal reinforcement

6.3. Definition of a straight bar (longitudinal reinforcement)

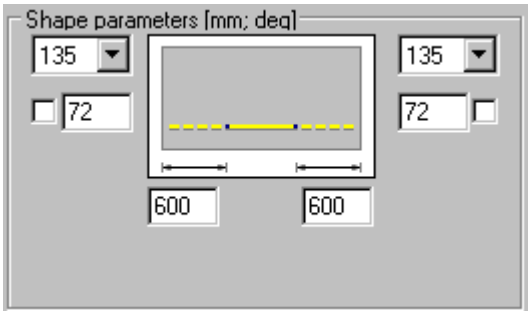
To define a straight bar, from the the ***Reinforcement - elevation*** dialog:

- Define the following information for the reinforcing bar: diameter, cover as well as parameters of bar ending with hooks (hook angle and length).
- Click  (2 Points), located on the right side of the dialog.
- Determine the bar point beginning and end positions.

See also:
Method of measuring the angle of bar bending
Location of a reinforcing bar in a drawing

6.4. Straight bar with anchor element

Click  , the following dialog displays:



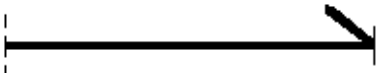
To define a bar, specifiy the following from the dialog:

- Bar diameter (the most recent diameter for this reinforcement type is adopted by default)
- Cover of reinforcing bars (the most recent cover defined for this reinforcement type is adopted by default)
- In the *Parameters of reinforcing bar shape field - parameters of anchors f*or reinforcing bar ends (anchor length or an anchor ended with a hook). You can lock a hook length by selecting the option next to the edit field for the hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with a locked hook length, the hook length does not change.

For an anchored bar, the default setting defines the anchor for a straight segment of a bar (hook angle equals zero). You may also define an anchor for a bar with hook of a specified bending angle. Thus three choices are available:

1 

anchor:
$\alpha = 0$
$l \neq 0$

2 

hook:
$\alpha \neq 0$ (by default, the value of 135 degrees is adopted)
$l = 0$

© 2010 Autodesk, Inc. All rights reserved

3  anchor ended with a hook:
$\alpha \neq 0$
$l \neq 0$

The list of standard hook angle values is presented below (see: method of measuring the angle of bar bending):

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

While a straight bar is being defined, only  (2 Points) is available (the remaining icons are unavailable); indicate the two bar points, and click to start the definition.

NOTE:
The bar location depends on the direction of point definition. The principle that applies while defining a reinforcing bar includes the order of points clockwise (along the EXTERNAL part of an object). The defined bar will always be positioned in the inner part of an object. In the case of bar with hooks with bending angle greater than zero degrees, the hooks will always be positioned on the side opposite to the side where points defining the bar length are placed, thus they will be turned towards the middle of an object.

After defining the first point determining the bar position, the bar length changes depending on the cursor position.

See also:
Commands from the command line - definition of longitudinal reinforcement

6.5. Definition of a straight bar with anchors (longitudinal reinforcement)

To define a straight bar with an anchor, from the ***Reinforcement - elevation*** dialog:

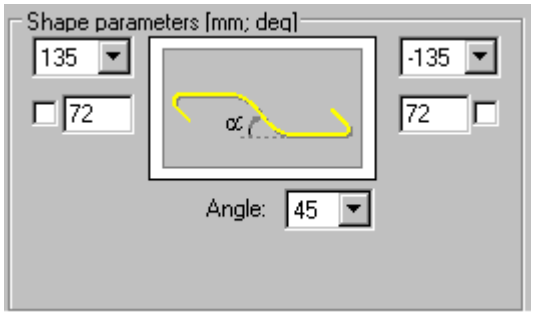
- Determine the following information (concerning the reinforcing bar): diameter, cover, parameters of bar ending with hooks, i.e., hook angle and length.
- Select the anchor type (only anchor or anchor and/or hook).
- Click  (2 Points), on the right side of the dialog.
- Determine the bar points beginning and end positions.

See also:
Method of measuring the angle of bar bending
Location of a reinforcing bar in a drawing

© 2010 Autodesk, Inc. All rights reserved

6.6. Bent bar - type 1

This option is used to define a bent bar. Acess this option by clicking . The following dialog displays:



To define a bar, specify the following from the dialog:

- Bar diameter (the most recent diameter for this reinforcement type is adopted by default)
- Cover of a reinforcing bar (the most recent cover defined for this reinforcement type is adopted by default)
- In the *Parameters of reinforcing bar shape* field - parameters of anchors for reinforcing bar ends, i.e. hook angle and length. You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

When defining the bent bar, it is important to determine the bar orientation. The default value of the inclination angle for a bent part in a longitudinal bar is 45 degrees. On the selection list other values of inclination angle are also available: 30, 45, 60 degrees.
Bar orientation (numbers shown in the drawing denote points defining a bar: **1** - **beginning of a reinforcing bar**, **2** - **end of a reinforcing bar**):

1. Beginning point of a bar is located on the right side

2. Beginning point of a bar is located on the left side

For a definition of a bent bar, only (Diagonal) is available (the remaining icons are unavailable).
After defining a first point determining the bar position, bar length and height change depending on the cursor position. Once a second point is indicated, then the mode changes to definition of a position of the oblique reinforcement segment; determine the position of the oblique branch point with respect to which the position of the oblique bar part is determined. Move the cursor to display the distances between the indicated point and the bar end.

See also:
Commands from the command line - definition of longitudinal reinforcement

© 2010 Autodesk, Inc. All rights reserved

6.7. Definition of a bent bar (type 1) - longitudinal reinforcement

To define a bent bar, from the ***Reinforcement - elevation*** dialog:

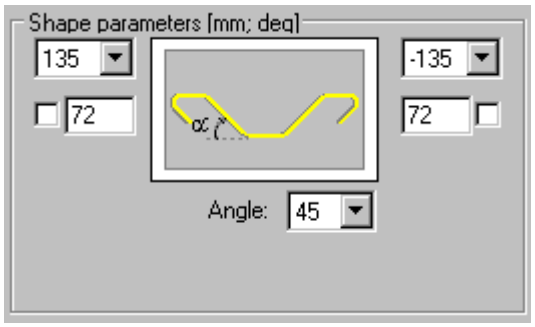
- Determine the following information (concerning the reinforcing bar): diameter, cover, parameters of a bent bar ending with hooks, i.e. hook angle and length at the beginning and end of a reinforcing bar.
- Determine the angle of the bar bending (the following values of a bending angle are available: 30, 45 and 60 degrees).
- Click  (Diagonal), on the right side of the dialog.
- Determine the bar points beginning and end positions.
- Determine the length (position) of the bent part of a reinforcing bar.

See also:
Method of measuring an angle of bar bending
Location of a reinforcing bar in a drawing

6.8. Bent bar - type 2

How to define a bent bar

This option is used to define a bent bar – type 2. Access this option by clicking  . The following dialog displays:



To define a bar, specify the following from the dialog:

- Bar diameter (the most recent diameter for this reinforcement type is adopted by default)
- Cover of a reinforcing bar (the most recent cover defined for this reinforcement type is adopted by default)
- In the *Parameters of reinforcing bar shape* field - parameters of anchors for reinforcing bar ends, i.e. hook angle and length. You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

When defining a bar, it is important to determine the bar orientation. The default value of the inclination angle for a bent part in a longitudinal bar is 45 degrees. On the selection list other values of inclination angle are also available: 30, 45, 60 degrees.

Bar orientation (numbers shown in the drawing denote points defining a bar: **1** - **beginning of a reinforcing bar**, **2** - **end of a reinforcing bar**):

1. Beginning point of a bar is located on the right side

© 2010 Autodesk, Inc. All rights reserved

2. Beginning point of a bar is located on the left side

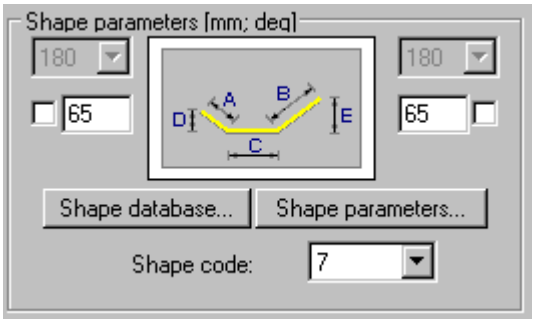
For a definition of a bent bar only  (Diagonal) is available (the remaining icons are unavailable).
After defining a first point determining the bar position, bar length and height change depending on the cursor position. Once a second point is indicated, then the mode changes to definition of a position of the oblique reinforcement segment; determine the position of the oblique branch point with respect to which the position of the oblique bar part will be determined. Move the cursor to display the distances between the indicated point and the bar end.

The above operation is performed for a second oblique segment of reinforcement.

See also:
Commands from the command line - definition of longitudinal reinforcement

6.9. Bar from database

Click  , the following dialog displays:



 *NOTE:*
Bar shapes are used to define a bar and to assign an appropriate identification code to it.

In the *Shape parameters* field the following options are provided:

- Schematic drawing of the reinforcement shape.
- Edit fields where hook parameters are determined (hooks are ascribed permanently to the shape from database). You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.
- Selection list containing codes - they affect bending diameters (French code)
- Two buttons: **Shape database** and **Shape parameters**.

On the right side of the dialog, only the *Points* icon is available. When selected, the definition of a bar from the database begins. The remaining icons are unavailable.

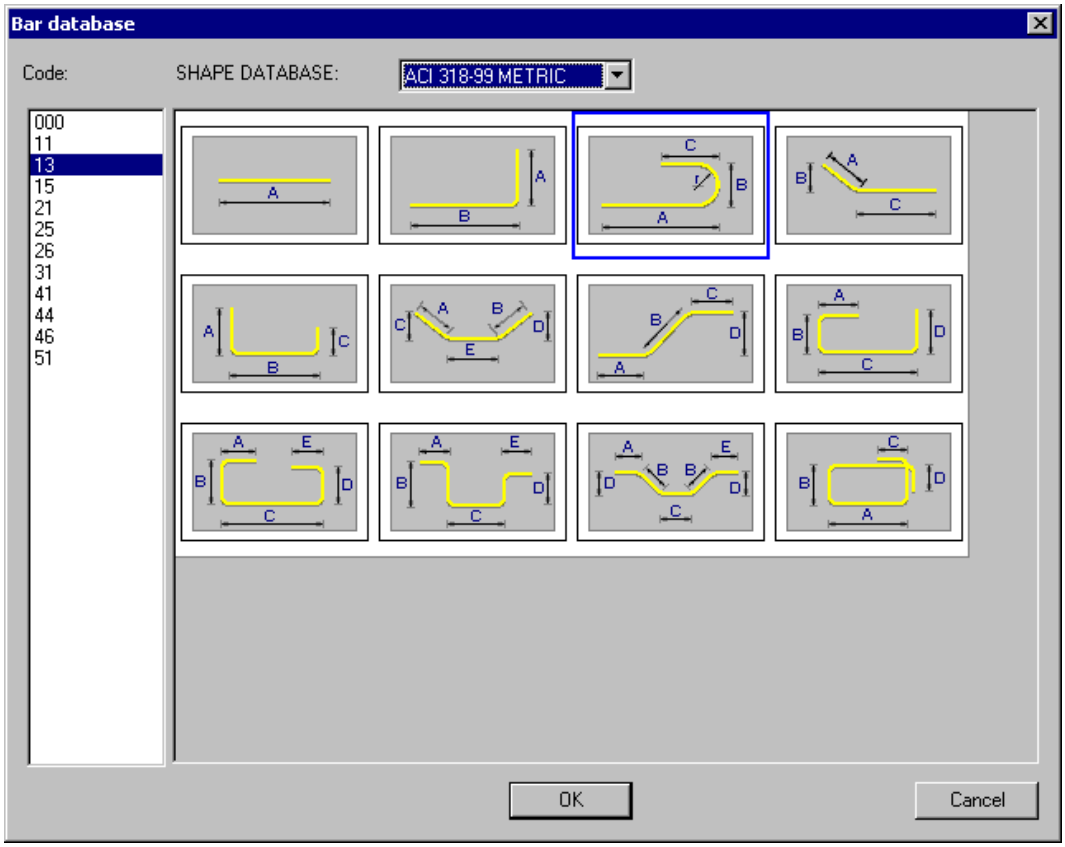
After clicking the **Shape database…** button, the ***Bar database*** dialog opens.

 *NOTE:*
The database of reinforcing bar shapes and corresponding shape codes depend on a selected code of RC structure design.

© 2010 Autodesk, Inc. All rights reserved

Structure of the shape database:

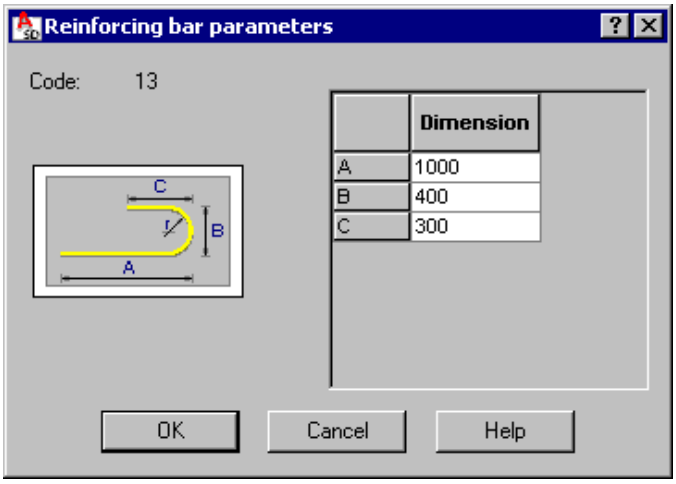
- A shape from the database is selected both by indicating directly a schematic drawing from the list of available shapes or by selecting a shape code number.
- The database contains shapes only, thus allowing you to complete the fields with the code (the code is displayed in the ***Shape definition*** dialog).
- The database contains the field with reference to the active code.
- The database comprises the basic shapes (repeated) which can be selected directly from the ***Shape definition*** dialog.



To define bars from the database, select from the available shape list, and define successive bar segments by indicating next bar characteristic points presented in a schematic drawing (you may also enter dimensions of individual segments).
Once a bar is selected from the database, bar segments are defined individually based on the indicated points (there apply rigid rules of defining successive segments so that the bar shape is maintained). While defining, the bar length is calculated automatically. The bar dimensions proposed by default in the dialog are the dimensions of the most recently-defined bar.
A bar defined in the bar shape database remembers the shape of a selected bar type. You may replace this bar with a regular bar (which does not remember the bar geometrical shape) by applying the EXPLODE option.

There is also another method to define bars. Once the **Shape parameters…** button is clicked, the additional dialog appears on the screen in which (see the drawing below) a table containing dimensions of individual bar segments is available. After determining bar dimensions, a completed bar may be added to the formwork.

© 2010 Autodesk, Inc. All rights reserved



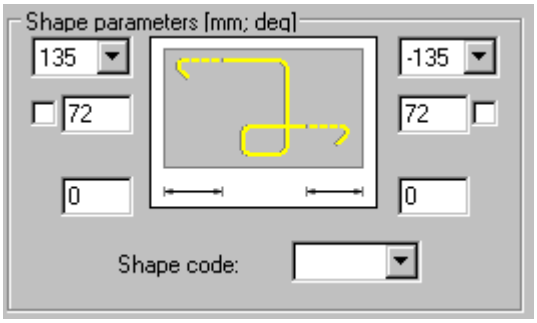
The above dialog contains a table that displays dimensions of bar segments. If the dialog is open while a bar is being defined, then dimensions that are not yet defined are assigned a zero value. You can change the bar segment lengths and to complete the missing dimensions. The field with a shape code is filled out automatically depending on a typical shape selected.

Both modes of reinforcement definitions are synchronized with each other. Both definition modes can be used alternately.

See also:
Commands from the command line - definition of longitudinal reinforcement

6.10. Arbitrary shape of a bar

This option is used to define an arbitrary shape of a bar. Access this option by clicking . The following dialog displays:



You can select a type of hook at the beginning and end of the defined reinforcement and lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with a locked hook length, the hook length does not change.
Define the successive characteristic points with the cursor. On these points the transversal reinforcement of any shape will be based. When defining a bar graphically, it is possible to change its location with respect to the insertion points (formwork), a value of the bar cover and a location of hooks.
The field with a shape code is filled out (a unique code of the bar shape should be entered there). This code is presented in the reinforcement table; it will be also included in the information about the bar.

While generating reinforcement, bent radiuses will be drawn automatically on the basis of the conditions determined in a selected code. This information is provided in the bar database.

© 2010 Autodesk, Inc. All rights reserved

The following icons are active for bar definition:

Points

Select - it enables changing indicated arcs and open polylines to a reinforcing bar.

The remaining icons are unavailable.

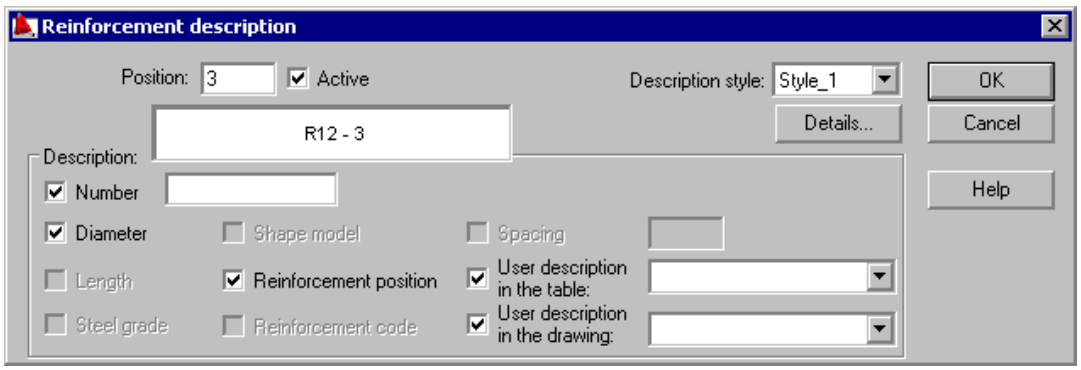
See also:

Commands from the command line - definition of longitudinal reinforcement

6.11. Reinforcement description

This option is used to enable the final selection of a reinforcement description.

The following dialog displays:



NOTE:

If you click *(Modify reinforcement description), two additional options are available:*

- *Description style (used to modify a description style of the reinforcement chosen),*
- *and the* ***Details*** *button, which when clicked, opens the dialog used for modifying a style of reinforcement description (shape).*

The options provided in this dialog enable final selection of a reinforcement description. It can be performed by switching off active variables initialized based on the syntax defined.

Notes:

- A reinforcement shape can be described only for a single position, in other words, two or more bars cannot be described simultaneously.
- The *Number* edit field allows you to enter an ultimate number of reinforcing bars that are used directly in the reinforcement summary tables.
  The amount of reinforcement specified during bar definition is a superior quantity with respect to the amount resulting from the subsequent distribution of this bar and that reinforcement amount is provided in the table; the number of bars may be represented as an equation, e.g. 2*(8+4);
- In the *Spacing* edit field, you may enter spacing values, despite reinforcement distribution not being defined yet. This field is editable on condition that the "%spa" variable is contained in the style of reinforcement description. It is only a static parameter that serves informative purposes and may be applied in reinforcement tables which include the spacing parameter. However, it should be remembered that if you have entered a spacing value in this field, then regardless of real values of bar spacing in the structure element, the value provided in the dialog will be assumed in the table.
- If the *Active* option is selected, it results in including the reinforcement being described in the reinforcement table. Reinforcement that is described for the first time will be active. When the same reinforcement is described twice, the option will be switched off on its own. It is possible to prevent (when describing the same reinforcement twice) the number of reinforcing bars calculated when preparing a bar table to be doubled; description of active and not active reinforcement may differ in a generated drawing – the options used for this purpose are provided in the Description of reinforcement shape dialog.

© 2010 Autodesk, Inc. All rights reserved

- *User description in the drawing* and *User description in the table* fields are used to add any text to a reinforcement description; the description is presented in drawings (included in bar descriptions in the drawing) and in the table (included only in the reinforcement table); the added text will be remembered (on the selection list) and you will be able to use it later; text taken from the library of standard descriptions may also be applied. These descriptions assume the style of the text describing the reinforcement. The user description is presented on the screen in several lines; then the mechanisms accessible in the AutoCAD® program are applied. A user description together with an extension line and label make up one object. Such an object may be edited (translation, rotation); by clicking the EXPLODE option.
- A style of reinforcement description is chosen from the *Description style* selection list; the list contains all description styles defined for that type of reinforcement (the first on the selection list is a default description style chosen in the ***Description of reinforcement shape*** dialog); before a reinforcement description is inserted in a drawing, parameters of the description style can be changed; pressing the **Details...** button opens the ***Reinforcement description*** dialog where modifications of the style can be made (NOTE: modifications of the description style refer only to that one reinforcement description).

 *NOTE:*
Whether any of the options listed above are selected depends on the defined description syntax that is available in styles of reinforcement description. If for example, a bar symbol is to be included in the bar description, you should open the ***Description of reinforcement shape*** *dialog, select reinforcement description (e.g. Bar shape), click* ***Modify****, switch on the Reinforcement symbol option provided on the Description syntax tab, click the button with the arrow; the variable containing a bar symbol will be added in the Description edit field; to end the operation, click* ***Add****.*

6.12.User description - AutoCAD program mechanisms

While defining a user description, you can apply formatting by introducing format codes, i.e. the mechanisms available in AutoCAD®. To apply formatting, format codes presented in the table below should be used.
Format codes for paragraphs

Format code	*Purpose*
\0...\o	Turns overline on and off
\L...\l	Turns underline on and off
\~	Inserts a nonbreaking space
\\	Inserts a backslash
\{...\}	Inserts an opening and closing brace
\Cvalue;	Changes to the specified color
\File name;	Changes to the specified font file
\Hvalue;	Changes to the text height specified in drawing units
\Hvaluex;	Changes the text height to a multiple of the current text height
\S...^...;	Stacks the subsequent text at the \, # or ^ symbol
\Tvalue;	Adjusts the space between characters, from .75 to 4 times
\Qangle;	Changes obliquing angle
\Wvalue;	Changes width factor to produce wide text
\A	Sets the alignment value; valid values: 0, 1, 2 (bottom, center, top)
\P	Ends paragraph

Multiline text objects use word wrap to break long lines into paragraphs. For AutoCAD to break lines automatically and not to create a new paragraph, the line should end with either a backslash (\) or a space character.

© 2010 Autodesk, Inc. All rights reserved

6.13.Commands from the command line - definition of longitudinal reinforcement

The following parameters can be specified in the command line while defining a longitudinal bar:
Bar diameter or [Cover / Bar type / Define] <12>: 16
Select option [Diameter / Cover / Bar type / Define] <Define>:
Reinforcement diameter <12>:
Cover <5.5> : 6
Bar type: [Straight / Anchored / 1bent / 2bent / Base / Any] <Straight>:

For straight and anchored bar the following parameters are defined:
Beginning point
End point or [Side]
where:
Side - it determines a change of a bar position with respect to the formwork line (with hooks included)

For bent bars the following parameters are defined:
First corner
Second corner
Segment location or [Back]:

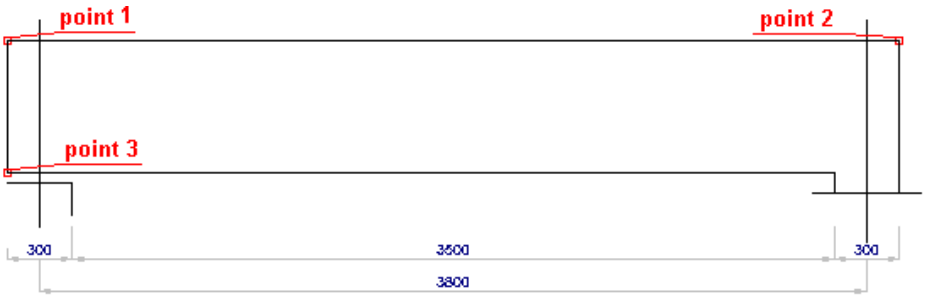
For bars from database the following parameters are defined:
Bar code or [Select from database]
Beginning point
Next point or [Side / Cover / Mirror / Back]
where:
beginning point - first point determining shape of a bar (bar beginning)
next point - next points determining shape of a bar
side - determines on which side of a cross section contour of an RC element the current segment of reinforcement is to be located (change of a bar position with respect to the line - points of definition to the opposite one)
cover - value of a cover for the current segment of reinforcement
mirror - determines the mirror reflection of the current reinforcement segment
back - cancels the last command.

For bar of arbitrary shape the following parameters are defined:
Beginning point
Next point or [Side / Cover / 1hook / 2hook / Back]
Cover <6>: 7
where:
beginning point - first point determining shape of a bar (bar beginning)
next point - next points determining shape of a bar
side - determines on which side of a cross section contour of an RC element the current segment of reinforcement is to be located
cover - value of a cover for the current segment of reinforcement
1 hook - direction of hook bending
2 hook - direction of hook bending (opposite to hook 1)
back - cancels the last command.

© 2010 Autodesk, Inc. All rights reserved

6.14. Example of definition of longitudinal reinforcement

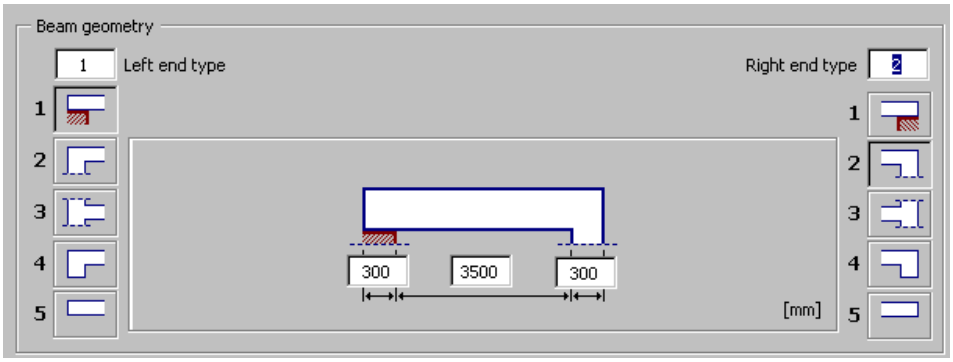
This option is used to define longitudinal reinforcement of the RC beam.
The following dialog displays:



To define longitudinal reinforcement of the RC beam, follow the steps below:

DEFINITION OF THE BEAM FORMWORK

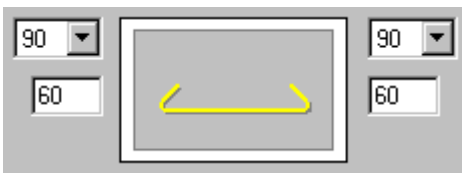
1. Click the option 
2. In the ***Formworks – Beam*** dialog specify the following parameters:
   - Section type: 1 (rectangular)
   - Beam type: 1 (single-span beam)
   - Dimensions of the beam cross section: height = 600 mm, width = 300 mm
   - Beam geometry as shown in the drawing below



3. Click **Insert**, and indicate the location of the beam formwork in the drawing

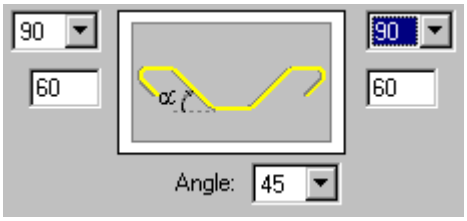
DEFINITION OF THE BEAM REINFORCEMENT

1. Click the Reinforcement - elevation  option
2. In the ***Reinforcement – elevation*** dialog, specify the following parameters:
   - Type of reinforcing bars: straight bar 
   - Bar diameter: 12 mm; cover of reinforcing bars: 30 mm
   - Steel grade: R
   - Shape parameters as shown in the drawing below



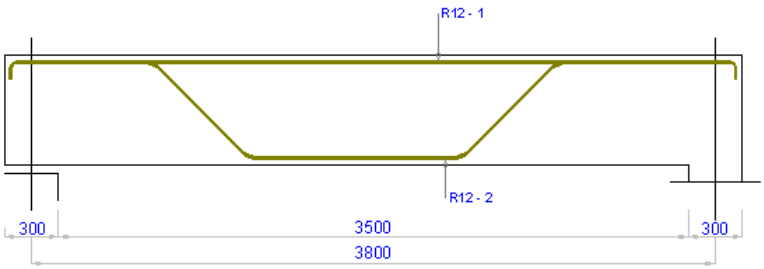
© 2010 Autodesk, Inc. All rights reserved

3. Click  (2 Points), located in the right-hand side of the dialog.
4. In the drawing of the beam formwork, indicate point 1 and point 2 (see the drawing at the beginning of the example).
5. Accept the deafult reinforcement description proposed in the ***Reinforcement description*** dialog by clicking **OK**.
6. Indicate the position of the reinforcement description in the drawing by clicking **Enter** or right-clicking *Enter* from the context menu.
7. Click the Reinforcement - elevation  option again.
8. In the ***Reinforcement – elevation*** dialog, specify the following parameters:
    a. type of reinforcing bars: bent bar 
    b. bar diameter: 12 mm; cover of reinforcing bars: 30 mm
    c. steel grade: R
    d. shape parameters as shown in the drawing below



9. Click  (Diagonal), located on the right-hand side of the dialog.
10. In the drawing of the beam formwork, indicate point 2 – the first corner and point 3 – the second corner (see the drawing at the beginning of the example).
11. In the drawing of the beam formwork, indicate points that determine location of straight segments of the longitudinal reinforcement.
12. Accept the deafult reinforcement description proposed in the ***Reinforcement description*** dialog by clicking **OK.**
13. Indicate the position of the reinforcement description in the drawing by clicking **Enter** or right-clicking the *Enter* option from the context menu.

The defined longitudinal reinforcement is displayed below.



© 2010 Autodesk, Inc. All rights reserved

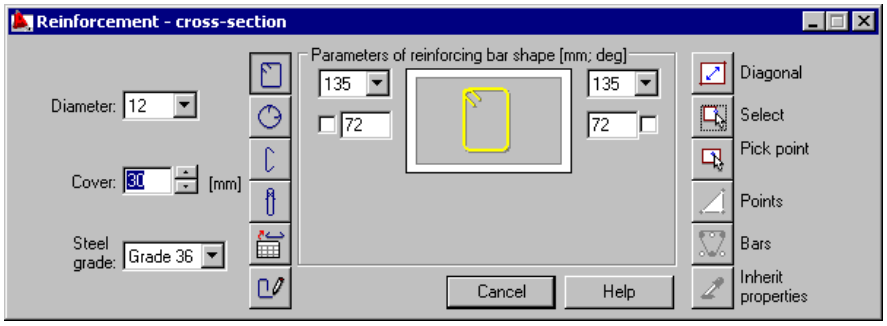
7. DEFINITION OF REINFORCEMENT - TRANSVERSAL REINFORCEMENT

7.1. DEFINITION OF BAR REINFORCEMENT - bar section (transversal reinforcement)

Use this option to define reinforcing bars (transversal reinforcement) in a cross section of an RC structure element. There are three ways to access this option from:

- Menu: Reinforcement / Reinforcement - section
- Ribbon: ASD - Reinforcement / Reinforcement - Definition / Reinforcement – section
- Toolbar: Definition - bars / Reinforcement - section 
- Command line: RBCR_DEF_BAR_BS.

Once activated, the following dialog displays:
NOTE: While reinforcement is being defined this dialog remains visible.



The dialog is split into three parts:

- The left side of the dialog contains basic information concerning reinforcement: diameter, cover and reinforcing steel grade adopted from preference settings
- The middle of the dialog displays icons that symbolize basic shapes of transversal reinforcement and allow selection of the transversal reinforcement type; once transversal reinforcement type is selected, contents of the field with parameters of reinforcement shape changes
- The right side of the dialog includes several icons which are used to select the mode of graphical definition of reinforcement; if they are clicked, the graphic interface mode is selected according to the specific manner of contour definition. NOTE: Bars can only be displayed after one of these icons is selected.

The dialog opens and displays the transversal reinforcement type defined and the parameters adopted for it. The following types of transversal reinforcement are available:

-  rectangular stirrup - closed
-  round stirrup
-  pin
-  shackle
-  bars from database
-  any shape of a bar belonging to transversal reinforcement.

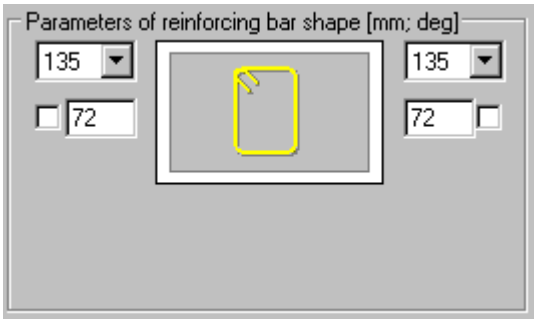
Once definition of a reinforcement shape is complete, the Reinforcement description dialog displays and allows you to select elements of reinforcement description.

See also:
Example of definition of transversal reinforcement

© 2010 Autodesk, Inc. All rights reserved

7.2. Rectangular (closed) stirrup

After clicking , the following dialog displays:



To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Cover of a reinforcing bar (the cover defined in the dialog is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for bar ends, that is hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

The shape of a bar presented in a schematic drawing is adjusted dynamically to the specified values of a hook bending angle. Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

The following icons display in the dialog when a rectangular stirrup is defined (the remaining icons are unavailable):

- ***Select*** - is used to indicate directly the contour formed from a polyline. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' - phase of selecting the object to be copied). After selecting any point on the screen, the ACAD object is detected, and the transversal reinforcement (stirrup) is drawn within the indicated object.
- ***Diagonal*** - is used to create a rectangular contour by defining a diagonal. After selecting, the dialog closes, and while the cursor is moved, a defined rectangular stirrup is presented dynamically.
- ***Pick point*** - is used to search a closed contour by clicking inside the contour. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'hatch'). After selecting any point on the screen, the minimum closed contour is detected. The detected contour is changed to a stirrup shaped like the detected contour, but decreased by the cover value.

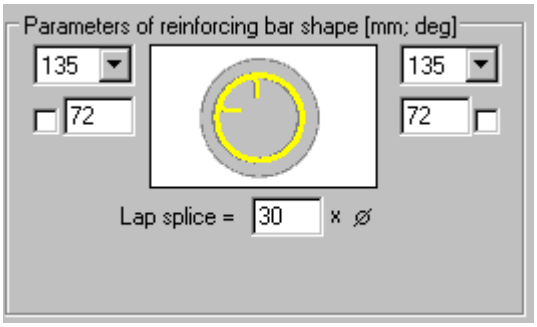
The ***Select*** and ***Pick point*** options apply to all figure types.
Once the stirrup shape is defined initially, a question displays regarding the places where hooks are to be located. They may be selected by indicating a stirrup corner.

See also:
Commands from the command line - definition of transversal reinforcement

© 2010 Autodesk, Inc. All rights reserved

7.3. Round stirrup

After clicking , the following dialog displays:



To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Cover of reinforcing bars (the cover defined recently in the dialog box is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for reinforcing bar ends, i.e. hook angle, length and lap splice length. You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible; if you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

The following icons display in the dialog while a round stirrup is being defined (the remaining icons are unavailable):

- ***Select*** - is used to indicate directly the contour formed from a circle or polyline. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' - the phase of selecting the object to be copied). After selecting any point on the screen, the ACAD object is detected and the stirrup is drawn within the indicated object.
- ***Pick point*** – is used to search a closed contour by clicking inside the contour. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'copy' - phase of indicating the beginning and end points). After selecting any point on the screen, the program detects the minimum concave round contour that results from inscribing it in the detected contour. NOTE: round stirrups are defined by indicating the following geometrical figures: a regular polygon and a circle - other cases are not supported.
- ***Points*** – is used to define a closed contour by specifying a circle center and radius (or diameter).

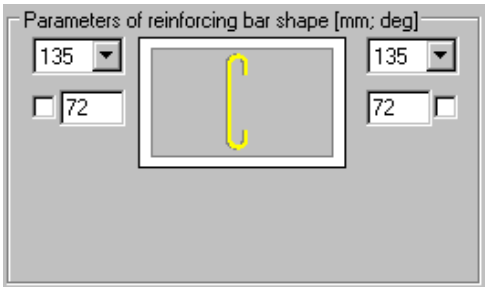
The definition **ALWAYS** creates a ROUND stirrup which is inscribed in the indicated contour. Once the stirrup shape is defined initially, a question displays regarding the points where hooks are to be located.

See also:
Commands from the command line - definition of transversal reinforcement

© 2010 Autodesk, Inc. All rights reserved

7.4. Pin

After clicking  , the following dialog displays:



To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Cover of reinforcing bars (the cover defined in the dialog is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible then; if you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

The following icons are available while a pin is being defined (the remaining icons are unavailable):

-  ***Points*** - is used to indicate directly two points located on a contour edge. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'line'). After defining the first point determining a bar position, bar length changes dynamically on the screen depending on the cursor position. Bar location depends on a direction of point definition. The principle that holds when defining reinforcement consists in determining the order of points clockwise (along the EXTERNAL part of an object). The defined bar will always be positioned in the inner part of an object. In the case of bar with hooks of a bending angle greater than zero degrees, the hooks will always be located on the side opposite to the side where points defining the bar length are placed, thus they will be turned towards the middle of an object.
  Command line:
  Side - d
  First / second hook
  Cover

-  ***Bars*** - is used to define the existing point reinforcement (point reinforcement, i.e. presentation of longitudinal reinforcement in a cross section). After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'select obj.'). A bar definition is completed when another point reinforcement bar is indicated. In this case, a cover value is not considered.
  Command line:
  Side
  First / second hook.

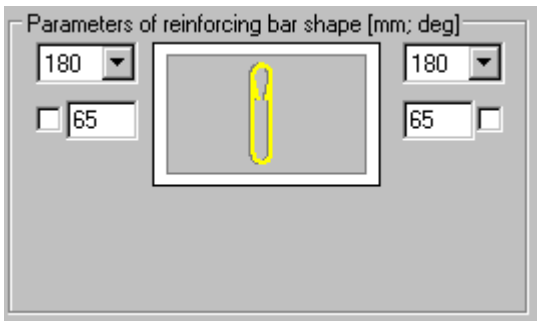
© 2010 Autodesk, Inc. All rights reserved

A definition is **ALWAYS** completed the moment a second point in the form of a point reinforcement bar is indicated.

See also:
Commands from the command line - definition of transversal reinforcement

7.5. Shackle

After clicking , the following dialog displays:



To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Cover of reinforcing bars (the cover defined in the dialog is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

The following icons are available while a shackle is being defined (the remaining icons are unavailable):

- ***Points*** - is used to indicate directly two points located on a contour edge. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'line'). After defining the first point determining the bar position, bar length changes dynamically depending on the cursor position.
  Bar location depends on a direction of point definition. The principle that holds when defining reinforcement consists in determining the order of points clockwise (along the EXTERNAL part of an object). The defined bar will always be positioned in the inner part of an object. In the case of bar with hooks of a bending angle greater than zero degrees, the hooks will always be located on the side opposite to the side where points defining the bar length are placed, thus they will be turned towards the middle of an object.
  Command line identical as for pin
- ***Bars*** - is used to define the existing point reinforcement (point reinforcement, i.e. presentation of longitudinal reinforcement within a cross section). After clicking this icon, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'polyline'). Once a bar is indicated, the position of the bar with hooks is shown

© 2010 Autodesk, Inc. All rights reserved

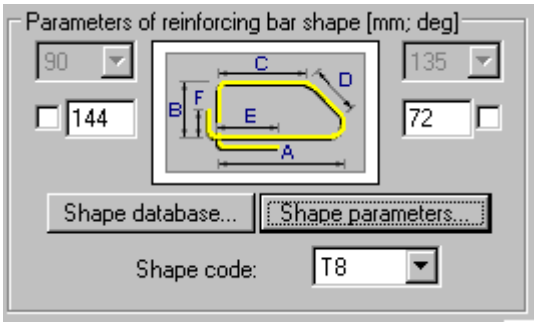
dynamically. A bar definition is completed when another point reinforcement bar is indicated. In this case, a cover value is not considered.
Command line:
Side.

A definition of a bar shape is **ALWAYS** completed at the moment a second point in the form of a point reinforcement bar, is indicated.

See also:
Commands from the command line - definition of transversal reinforcement

7.6. Bar from database

After clicking  , the following dialog displays:



NOTE: Bar shapes define a bar and assign an appropriate identification code.

The *Parameters of reinforcing bar shape* field include the following options:

- Schematic drawing of a reinforcement shape
- Edit fields where hook parameters are specified; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible, and if you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change
- Selection list containing codes - they affect bending diameters (French code)
- Two buttons: **Shape database** and **Shape parameters**.

In the dialog, only the ***Insert*** and ***Points*** icons are available. When clicked, a definition of a bar is created from the database. The remaining icons are unavailable.

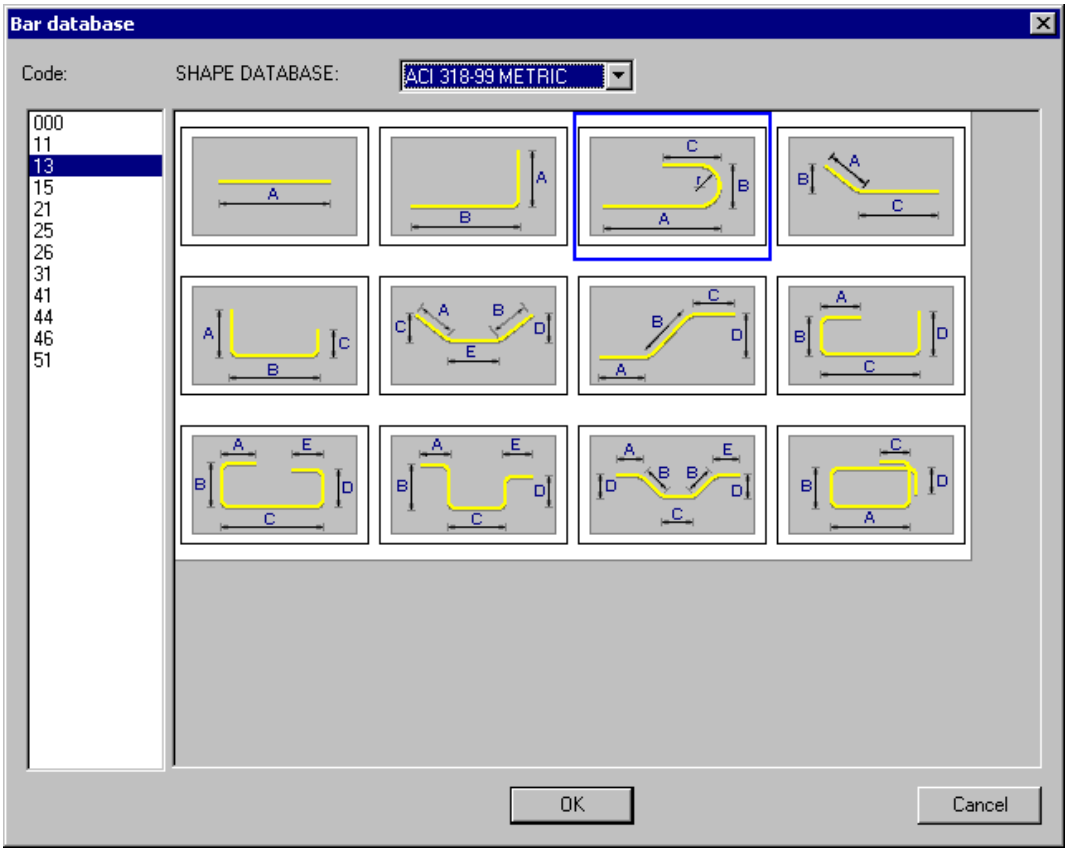
After clicking **Shape database…**, the ***Bar database*** dialog opens.

NOTE:
The databases of reinforcing bar shapes together with corresponding shape codes depend on a selected code of RC structure design.

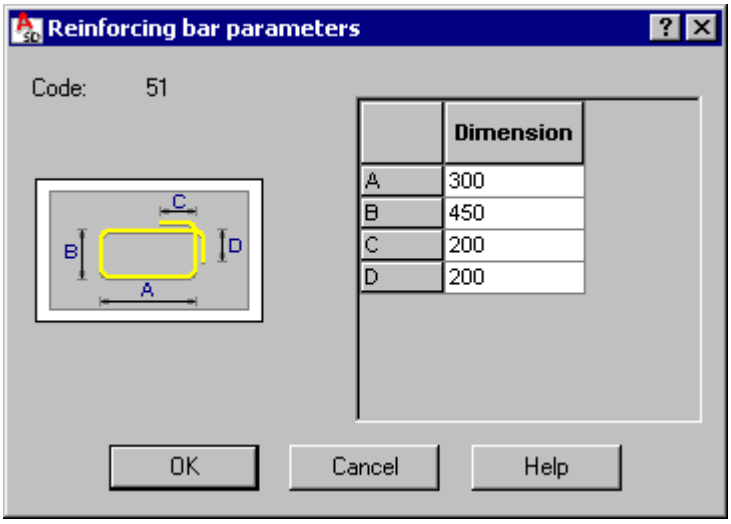
Structure of the shape database:

- A shape can be selected from the database both by indicating directly a schematic drawing from the list of available shapes or by selecting a shape code number
- The database includes the field with a reference to the active code
- The database comprises the basic shapes repeated which can be selected directly from the ***Shape definition*** dialog (closed and open stirrups, pin, shackle - it allows a different manner of definition by means of dimensions).

© 2010 Autodesk, Inc. All rights reserved



To define bars from the database, select a bar from the available shape list, then define the next bar segments by indicating next bar characteristic points presented in a schematic drawing (you may also enter dimensions of individual segments from the keyboard).
Once a bar is selected from the database, the bar segments are defined individually based on the indicated points (there apply rigid rules of defining successive segments so that the bar shape is maintained). While defining, the bar length is calculated automatically. The bar dimensions proposed by default in the dialog are the dimensions of the recently-defined bar.
A bar defined in the bar shape database remembers the shape of a selected bar type. You can replace the bar with a regular bar which does not remember the bar geometrical shape - to do that, use the EXPLODE option.
There is also another method for defining bars. Once the **Shape parameters…** button is clicked, the additional dialog displays, and a table containing dimensions of individual bar segments is available. After determining bar dimensions, a completed bar may be added to a formwork.



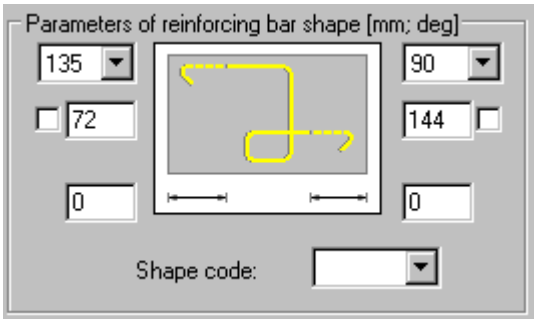
© 2010 Autodesk, Inc. All rights reserved

The above dialog contains a table that displays dimensions of bar segments.
The field with a shape code is filled out automatically depending on a typical shape selected. Both modes of reinforcement definition are synchronized with each other; both definition modes can be used alternately.

See also:
Commands from the command line - definition of transversal reinforcement

7.7. Arbitrary bar shape

After clicking , the following dialog displays:



This dialog allows you to define any reinforcement shape. You can select a hook type at the beginning and end of a defined reinforcement and define bar anchors on its both ends; a default value of the anchor for an arbitrary bar equals zero. You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.
Successive characteristic points include the bars of point reinforcement or characteristic points.
Transversal reinforcement of arbitrary shape will be based on these points. You can specifiy the field with a shape code (a unique code of the bar shape). This code is presented in the reinforcement table; it will be also included in the information about the bar.

Four icons are active when defining this reinforcement type (the remaining icons are unavailable):

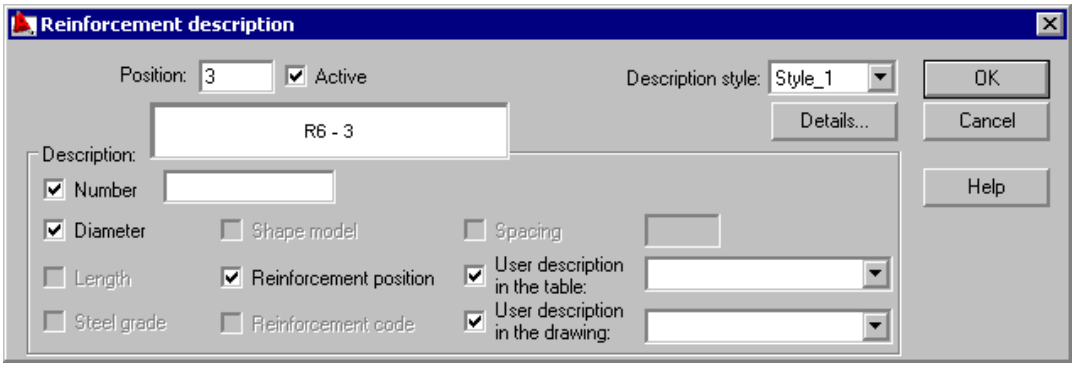
- ***Select* -** is used to define reinforcement on an open polyline (arcs may be included there)
- ***Pick point*** - is used to detect a contour (identically as for a polygon-shaped stirrup); a contour may include arc elements
- ***Points*** - is used to indicate directly any points. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'line'). After defining the first point determining a bar position, the bar length changes dynamically depending on the cursor position. While indicating next bars, the defined bar is 'wound' around these points, whereas the condition of a bending diameter is maintained automatically.
- ***Bars*** - is used to define a bar on the existing point reinforcement (point reinforcement, i.e. presentation of longitudinal reinforcement within a cross section). After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'select'). A bar definition is completed when another point reinforcement bar is indicated.

See also:
Commands from the command line - definition of transversal reinforcement

© 2010 Autodesk, Inc. All rights reserved

7.8. Description of reinforcement

Use this option to enable final selection of the reinforcement description. Selections can be performed by switching off active variables based on the syntax defined. Once you define the reinforcement shape, the following dialog displays:



REMARKS:

- A reinforcement shape is described only for a single position. Two or more bars cannot be described simultaneously.
- In the *Number* edit field, enter the number of reinforcing bars used directly in the reinforcement summary tables. The number of bars are represented as an equation, e.g. 5*(3+7).
- In the *Spacing* edit field, enter spacing values (despite reinforcement distribution not being defined yet). This field is editable on condition that the "%spa" variable is contained in the style of reinforcement description. It is only a static parameter used for informative purposes. It can be applied in reinforcement tables which include the spacing parameter. However, if you entered a spacing value in this field, then regardless of real values of bar spacing in the structure element, the value provided in the dialog will be assumed in the table.
- Select the *Active* option to include the reinforcement being described in the reinforcement table. This option will be active by default for reinforcement that is described for the first time. When the same reinforcement is described twice, the option will be cleared on its own. It is possible to prevent (when describing the same reinforcement twice) the number of reinforcing bars calculated when preparing a bar table to be doubled; description of active and not active reinforcement may differ in a generated drawing – the options used for that purpose are located in the Description of reinforcement shape dialog.
- The *User description in the drawing* and *User description in the table* fields enable adding any text to a reinforcement description; the description is presented in drawings (included in bar descriptions in the drawing) and in the table (included only in the reinforcement table); the added text will be remembered (on the selection list) and you will be able to use it later on; a text taken from the library of standard descriptions may also be applied. These descriptions assume the style of the text describing the reinforcement. The user description may be presented on the screen in several lines; then the mechanisms accessible in AutoCAD® are applied. A user description together with an extension line and label make up one object. Such an object may be edited (translation, rotation) using available grips – these are small squares that appear at characteristic points of indicated objects; by means of the *Explode* option. A number of grips in descriptions may be increased
- A style of reinforcement description is chosen from the *Description style* selection list; the list contains all description styles defined for that type of reinforcement (the first on the selection list is a default description style chosen in the ***Description of reinforcement shape*** dialog); before a reinforcement description is inserted in a drawing, parameters of the description style can be changed; click **Details...** to open the ***Reinforcement description*** dialog where modifications of the style can be made (NOTE: modifications of the description style refer only to that one reinforcement description).

© 2010 Autodesk, Inc. All rights reserved

NOTE:
Whether any of the options listed above are selected, depends on the defined description syntax available in styles of reinforcement description. If for example, a bar symbol is to be included in the bar description, you should open the ***Description of reinforcement shape*** *dialog, select reinforcement description (e.g. Bar shape), click* ***Modify****, switch on the Reinforcement symbol option provided on the Description syntax tab, click the arrow button; the variable containing a bar symbol is added in the Description edit field; to end the operation, click* ***Add****.*

7.9. Commands from the command line - definition of transversal reinforcement

The following parameters are specified in the command line while defining a transversal bar:
Bar diameter or [Cover / Stirrup type / Define] <6>: 8
Select option [Diameter / Cover / Stirrup type / Define] <Define>:
Reinforcement diameter <8>:
Cover <5.5> : 6
Stirrup type: [Polygon / Round / Pin / Shackle / Base / Any] <Polygon>:

For a polygon-shaped stirrup the following parameters may be defined:

Select option [DIagonal / Selection / INternal point] <Diagonal>:
First corner
Second corner or [Side / Back]
Select object
Hook location or [Side / Back]
Internal point
Hook location or [Side / Back]

For a round stirrup the following parameters may be defined:
Select option [2points / Selection / Internal point] <Selection>:
Circle center;
Circle diameter or [Diameter / Side / Back]<33>:
Hook location
Select object
Hook location or [Side / Back]
Internal point
Hook location or [Side / Back]

For a pin and shackle the following parameters may be defined:
Select option [Points / BArs] <BArs>:
Beginning point
End point or [Side / Back]:
First point
Second point or [Side / Back]:}
where:
beginning point - the first point determining the shape of a bar (bar beginning)
end point - the last point determining the shape of a bar
side - determines on which side of a cross section contour of an RC element the current segment of reinforcement is to be located
back - cancels the last command.

For bars from database the following parameters are defined:
Bar code or [Select from database]
Beginning point
Next point or [Side / Cover / 1hook / 2hook / Back]
where:
beginning point - the first point determining the shape of a bar (bar beginning)

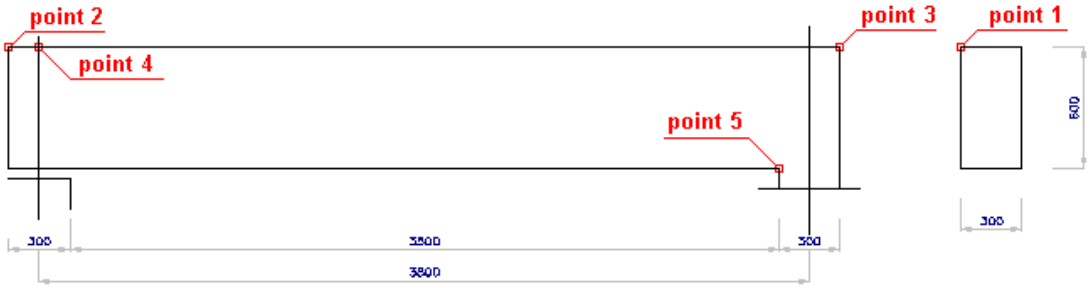
© 2010 Autodesk, Inc. All rights reserved

next point - next points determining the shape of a bar
side - determines on which side of a cross section contour of an RC element the current segment of reinforcement is to be located
cover - value of a cover for the current segment of reinforcement
1 hook - direction of the hook bending
2 hook - direction of the hook bending (opposite to hook 1)
back - cancels the last command.

For a bar of arbitrary shape the following parameters may be defined:
Beginning point
Next point or [Side / Cover / 1hook / 2hook / Back]
where:
beginning point - the first point determining the shape of a bar (bar beginning)
next point - next points determining the shape of a bar
side - determines on which side of a cross section contour of an RC element the current segment of reinforcement is to be located (change of a bar position with respect to the line - points of definition to the opposite one)
cover - value of a cover for the current segment of reinforcement
1 hook – changes the direction of hook bending to the opposite
2 hook - direction of hook bending
back - cancels the last command.

7.10. Example of definition of transversal reinforcement

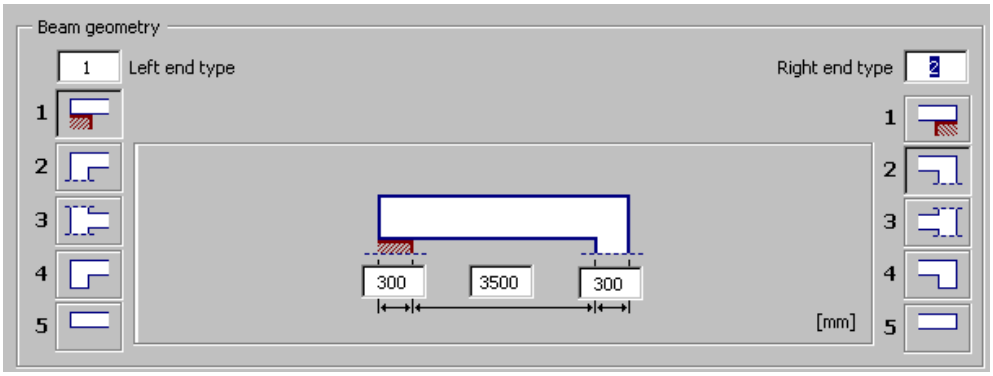
The following drawing illustrates the definition of transversal reinforcement in the cross section of the beam. For definition of the beam contours the ***Formworks - Beam*** macro has been used.



To define transversal reinforcement of the RC beam, follow the steps below:
DEFINITION OF THE BEAM FORMWORK

1. Run the ***Formworks – Beam*** macro by clicking  icon.
2. In the ***Formworks – Beam*** dialog specify the following parameters:
   - section type: 1 (rectangular)
   - beam type: 1 (single-span beam)
   - dimensions of the beam cross section: height = 600 mm, width = 300 mm
   - beam geometry as shown in the drawing below:

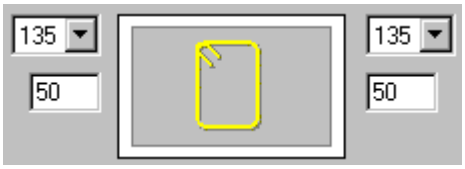
© 2010 Autodesk, Inc. All rights reserved



3. Click **Insert** in the ***Formworks – Beam*** dialog, and indicate the location of the beam formwork in the drawing.

DEFINITION OF THE BEAM REINFORCEMENT

1. Click the Reinforcement - section icon 
2. In the ***Reinforcement – cross-section*** dialog, specify the following parameters:
   - type of reinforcing bars: polygon-shaped (closed) stirrup 
   - bar diameter: 8 mm; cover of reinforcing bars: 30 mm
   - steel grade: R
   - shape parameters as shown in the drawing below

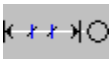


3. Click  (*Pick point*), located on the right side of the dialog.
4. In the drawing of the beam formwork, indicate a point within the beam cross section and point 1 that determines the position of stirrup hooks.
5. Accept the default reinforcement description proposed in the ***Reinforcement description*** dialog by clicking **OK.**
6. Indicate the position of the reinforcement description by clicking **Enter** or right-clicking the *Enter* option from the context menu.

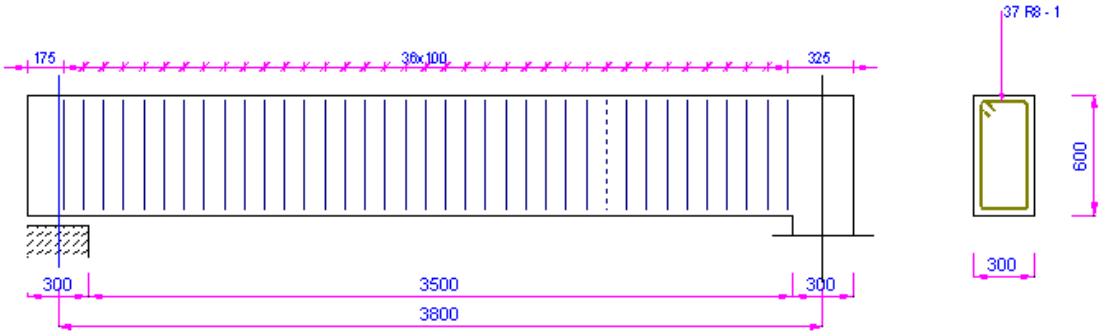
The reinforcement in the beam cross section has been defined. To define the transversal reinforcement distribution along the beam length, follow these steps:

1. Click the Reinforcement distribution icon 
2. Indicate the previously-defined stirrup and click ENTER; the ***Reinforcement detailing*** dialog displays. Select the following options:
   - Distribution TYPE: linear (press the icon )
   - Distribution METHOD: zone (press the icon )
   - Viewing DIRECTION: click 
   - click **OK.**
3. Indicate the start distribution point (point 2 in the drawing presented at the beginning of the example) and the end distribution point (point 3 in the drawing presented at the beginning of the example).
4. Indicate the points of the zone beginning (point 4 in the drawing presented at the beginning of the example) and the zone end (point 5 in the drawing presented at the beginning of the example); click **Enter.**
5. Accept the default reinforcement distribution by clicking **OK.**

© 2010 Autodesk, Inc. All rights reserved

6. Adopt the following parameters of description of the reinforcement distribution
   - Type of reinforcing bar presentation: all 
   - Position: the *Active* option switched on
   - Type of distribution description: 
   - Click **OK**.
7. Indicate the location of the reinforcement description in the drawing by clicking **Enter,** or right-clicking the *Enter* option from the context menu.

The defined transversal reinforcement with its distribution along the beam length is illustrated below.



© 2010 Autodesk, Inc. All rights reserved

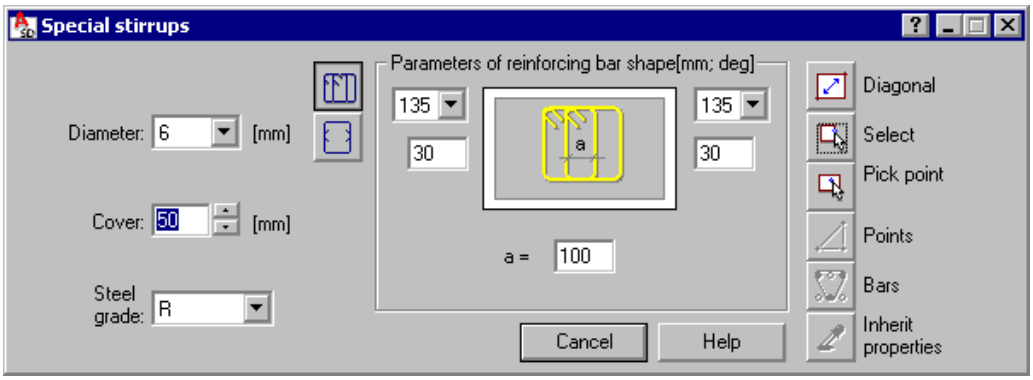
8. DEFINITION OF REINFORCEMENT - SPECIAL STIRRUPS

8.1. DEFINITION OF BAR REINFORCEMENT - bar section (special stirrups)

Use this option to define stirrups (transversal reinforcement) in the cross-section of an RC structure element. There are three ways to access this option from:

- Menu: Reinforcement / Special stirrups
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Special stirrups
- Toolbar: Definition-bars / Special stirrups 
- Command line: RBCR_DEF_STIRRUP_SPEC.

Once activated, the following dialog displays:



The ***Special stirrups*** dialog is split into three parts:

- The left side of the dialog contains basic information concerning the reinforcement: diameter, cover and reinforcing steel grade adopted from preference settings
- The middle of the dialog includes icons that represent basic shapes of the transversal reinforcement and allow selection of the stirrup type; once the transversal reinforcement type is selected, contents of the field with parameters of the reinforcement shape changes
- The right side of the dialog includes several icons which are used to select a mode of graphical reinforcement definition; if they are clicked, the graphic interface mode is selected according to a specific way of contour definition. NOTE: Bars can only be displayed after one of these icons is selected.

The dialog opens and displays the transversal reinforcement type defined and the parameters adopted.

The following types of special stirrups are available:

-  four-leg stirrups
-  stirrups made of bars in the shape of the double U-letter.

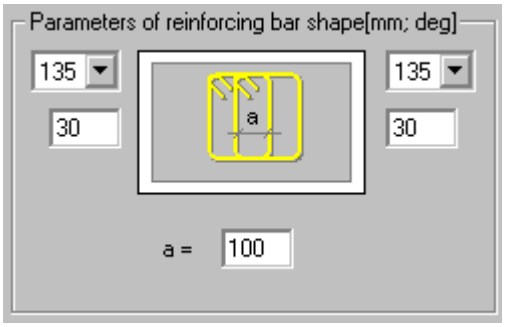
Once you define the reinforcement shape, the Reinforcement description dialog displays.

NOTE:
After defining the four-leg stirrups, the description command is run automatically. The command works for a selection and describes bars one by one moving from the first one to the second without the necessity to reactivate the command. It is possible to interrupt bar description and describe only one bar.

© 2010 Autodesk, Inc. All rights reserved

8.2. Special stirrups - four-leg stirrups

After clicking , the following dialog displays:



To define a bar, define the following parameters:

- A bar diameter (the diameter defined in the dialog is adopted by default)
- A cover of reinforcing bars (the cover defined in the dialog is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for bar ends, i.e. hook angle, length and value of the a parameter which defines a clear distance between middle stirrup legs.

The shape of a bar presented in a schematic drawing is adjusted dynamically to the specified values of a hook bending angle. Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

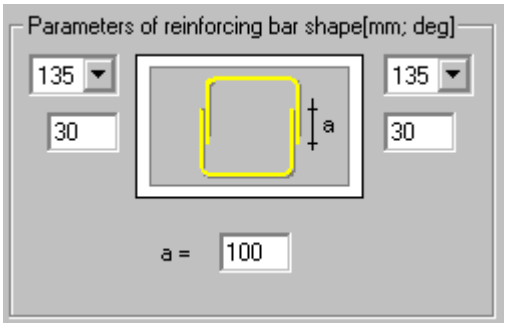
The following icons display on the right side of the dialog while a rectangular stirrup is defined (the remaining icons are unavailable):

- ***Diagonal*** - is used to create a rectangular contour by defining a diagonal. After selecting, the dialog closes, and while the cursor is moved, a defined rectangular stirrup is presented dynamically
- ***Select*** - is used to indicate directly a rectangular contour. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' - the phase of selecting the object to be copied). After selecting any point on the screen, the ACAD object is detected and a transversal reinforcement (stirrup) is drawn within the indicated object
- ***Pick point*** - function that allows searching a closed contour (rectangle) by clicking inside the contour. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'hatch'). The detected rectangle is changed to a stirrup shaped like a detected contour, but decreased by the cover value.

© 2010 Autodesk, Inc. All rights reserved

8.3. Special stirrups - bars in the shape of the double U-letter

After clicking  , the following dialog displays:



To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Cover of reinforcing bars (the cover defined in the dialog is adopted by default)
- In the *Parameters of reinforcing bar shape* field - anchor parameters for bar ends, i.e. hook angle, length and value of the a parameter which defines a length of overlapping bars.

The shape of a bar presented in the schematic drawing is adjusted dynamically to the specified values of a hook bending angle. Standard hook angle values include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

The following icons are available in the right part of the dialog box while a rectangular stirrup is defined (the remaining icons are unavailable):

-  ***Diagonal*** **-** is used to create a rectangular contour by defining a diagonal. After selecting, the dialog box closes, and while moving the cursor, a defined rectangular stirrup is presented dynamically
-  ***Select*** - is used to indicate directly a rectangular contour. After selecting, the dialog box closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' - the phase of selecting the object to be copied). After selecting any point on the screen, the ACAD object is detected and a transversal reinforcement (stirrup) is drawn within the indicated object
-  ***Pick point*** – is used to search a closed contour (rectangle) by clicking inside the contour. After selecting, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'hatch'). The detected rectangle is changed to a stirrup shaped like a detected contour, but decreased by the cover value.

© 2010 Autodesk, Inc. All rights reserved

9. DEFINITION OF REINFORCEMENT - POINT REINFORCEMENT

9.1. Point reinforcement

Use this option to define distribution of reinforcing bars in an element of an RC structure. There are two ways to access this option from:

- Menu: Reinforcement / Reinforcement - point
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Reinforcement - point
- Toolbar: Definition - bars / Reinforcement - point 
- Command line: RBCR_DISTRIBUTION_POINT.

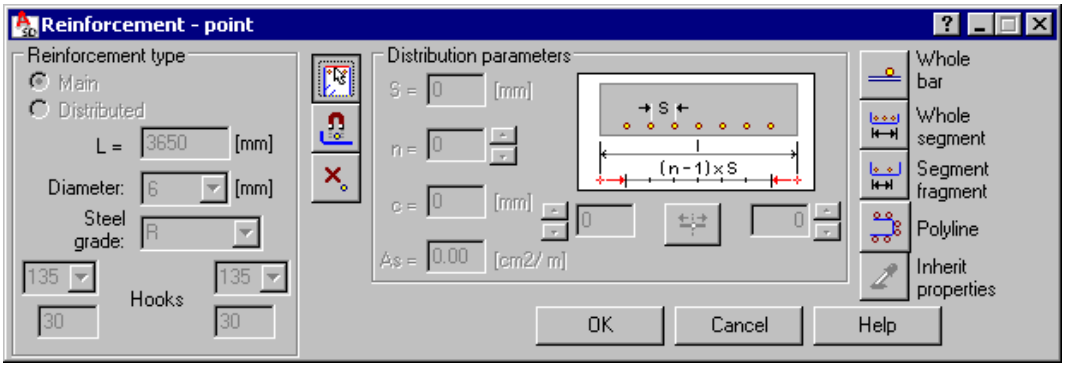
The dialog displays if reinforcement has been selected or if a number of a reinforcement positions have been specified in the command line (by default, the number of the recently-defined bar is suggested):

- If *Main Reinforcement* has been selected, the following data displays:
  - diameter,
  - position number,
  - appropriate bar length.
- If *Distributed Reinforcement* has been selected, the following data displays:
  - diameter,
  - position number (both parameters are not accessible),
  - edit field (used for definition of the reinforcement length).

NOTE:
When defining the point reinforcement (which does not refer to the existing reinforcement, e.g. when defining distributed reinforcement), the dialog opens after clicking ESC.

The dialog is opened automatically from the level of the dialog for reinforcement distribution. Then the dialog opens in the mode of main reinforcement definition with an appropriate diameter, position number, and appropriate bar length (the parameters are not accessible).

After selecting the option, the following dialog displays:



The above dialog is divided into three principal parts:

- The left side of the dialog (the *Reinforcement type* field) contains basic information concerning the reinforcement:
  - Reinforcement type: main, distributed
  - Edit field where reinforcement length can be defined
  - Reinforcement diameter

  There is also information concerning hooks on ends of a reinforcing bar (beginning and end of a bar).

© 2010 Autodesk, Inc. All rights reserved

The middle of the dialog includes three icons, which when clicked, change the content of the *Distribution parameters* fie - regular distribution of reinforcement

- automatic distribution of reinforcement

- any distribution of reinforcement

Note: The Automatic and Any distribution of reinforcement parameters are coupled. Regular distribution of reinforcement cannot be combined with Automatic or Any distribution of reinforcement.

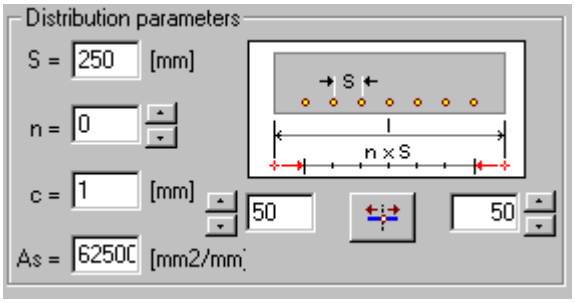
- The right side ld with parameters of reinforcement distribution:
- of the dialog provides a group of icons which are used for selecting the graphic definition mode; clicking these icons activate different modes of graphic interface.

The dialog remains visible throughout the process of defining reinforcement distribution, which enables you to change the distribution parameters of reinforcement while defining it. All methods of bar distribution are applied with respect to one reinforcement position.
The distribution of a given reinforcement position is completed by clicking **OK**. Afterwards, the distribution description is defined.

See also:
Example of definition of point reinforcement

9.2. Regular distribution of reinforcement

Access this option by clicking , the Reinforcement - point dialog displays:



The left side of the dialog contains the parameters controlling reinforcement distribution within one zone:

- S - reinforcement spacing
- n - number of spacings between bars in a given zone
- c - distance (cover) between bars and reinforcement or polylines along which reinforcement is distributed (the default value equals zero).
  The cover is always interpreted as perpendicular to a bar or formwork line.
- As - area of reinforcement per length unit.

A drawing of reinforcement distribution is provided, whereas directly underneath, the options that allow positioning displays.

The following methods of reinforcement distribution are available:

1. - along the whole indicated bar
2. - along the whole indicated segment of a bar
3. - along the fragment of the indicated bar segment
4. - along the indicated polyline (arc, circle, line i.e. between 2 points).

When defining the distribution applying the methods 1 or 2, you should indicate a bar or segment of reinforcement; the cursor assumes the shape of a square. After selection, and

© 2010 Autodesk, Inc. All rights reserved

initial positioning of reinforcement (according to the distribution parameters defined in the dialog), you specify (by means of the options available in the command line) the followimg parameters:

- Change of the side on which the distributed reinforcement is positioned - with respect to the bar (the Side command)
- Change of the parameter spacing / number (the Spacing / Number command)
- Justify - positioning the distribution centrally or justified to the left or right side of the distribution
- Adjust - uniform distribution of reinforcement along the whole distribution length
- Cover - change of a cover value = offset.

If distribution is defined by means of method 3, the extreme points are specified. In the case of distribution defined with the use of method 4, reinforcement is distributed on the whole selected objects such as **line, polyline, circle**.
You may change values of the parameters using the options available in the dialog, however, the side on which reinforcement is positioned cannot be changed.

The method of reinforcement distribution consists in specifying the number of reinforcing bars/spacing or reinforcement area per one running meter. Hooks are not considered in case of distribution along the bar. For distribution along the segment, the length between fillets is taken into account.

Command line (regular distribution)

Distribution type: [Regular / Automatic / Any] **Regular**

Regular
Select Bar or [Segment / Segment fragment / Polyline]

Bars
Select bar or [Side / Back]

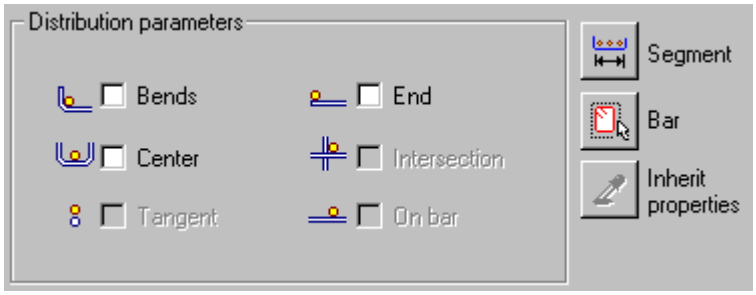
Segment
Select bar segment or [Side / Back]

Segment fragment
Select bar segment
Select beginning point or [Back]
Select end point or [Side / Back]

Polyline
Select object or [Side / Back]

9.3. Automatic distribution of reinforcement

After clicking  , the Reinforcement - point dialog displays:



© 2010 Autodesk, Inc. All rights reserved

NOTE: The options: bar intersection, tangent to bar, and on bar are not currently available.

The method is intended only for defining bar distribution for the existing reinforcement. It has been designed so that in typical cases, you can easily arrange bars based on the following characteristic points of reinforcement (not all the options are available):

- hook bending
- end of bar or segment
- center of bar or segment
- intersection of bars - this option is not currently available
- tangentially to bar - this option is not currently available
- on bar - this option is not currently available.

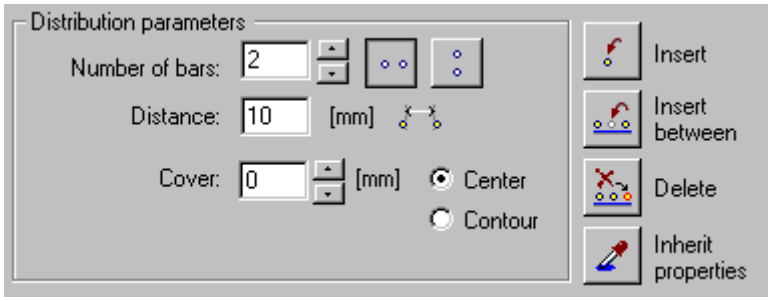
Bars may be distributed along the following:

- A selected bar segment -
- A defined bar shape (whole bar) - .

Commands (of the command line) are set so you can select one or several bars/segments simultaneously. You can also change position of the reinforcement being distributed with respect to a bar / segment axis.

9.4. Any reinforcement distribution

After clicking , the Reinforcement - point dialog displays:



The distribution method is intended for all cases where standard methods of reinforcement distribution prove ineffective. This method allows you to position a bar or a bar group freely, based on the distribution carried out earlier; the distribution may also be defined independently.
The method described enables distribution of one or more bars simultaneously. For at least two bars that are inserted concurrently, you can determine the distance between bars and their orientation (horizontally or vertically) while inserting.
Precise arrangement of bars are facilitated by the use of characteristic points (characteristic points of ***AutoCAD***®).

For bars defined as vertical, and when applying points characteristic for reinforcement, bar orientation will always be perpendicular to the bar / segment axis.

The right side of the dialog contains the following distribution methods:

Insert
This options allows you to define the distribution; the definition consists of successive positions of reinforcement. The only assistance available while defining distribution is offered the characteristic points - snap points within ***AutoCAD***®.
Distribution may also be defined from the level of the command line.

© 2010 Autodesk, Inc. All rights reserved

Insert between
The option allows you to indicate two point bars and insert 1 bar or a group of bars between them. When inserting a bar, the order between the indicated bars changes; if the two selected bars had been inserted using the characteristic points, then the bars inserted should behave identically as base bars; if not, the bars added are inserted along a straight line between the existing bars.

Delete
The option permits deleting an indicated bar.

Command line (any distribution)

Distribution type: [Regular / Automatic / Any]: **Any**

Select attachment point or [Modify properties / Insert between / Delete / Snap / Back]

Modify parameters [Number of bars / Spacing / Orientation]
Number of bars <2> : 1
Spacing <0.12> : 0.18
Orientation <V> : H

Insert Between
Select initial bar
Select end bar or [Back]

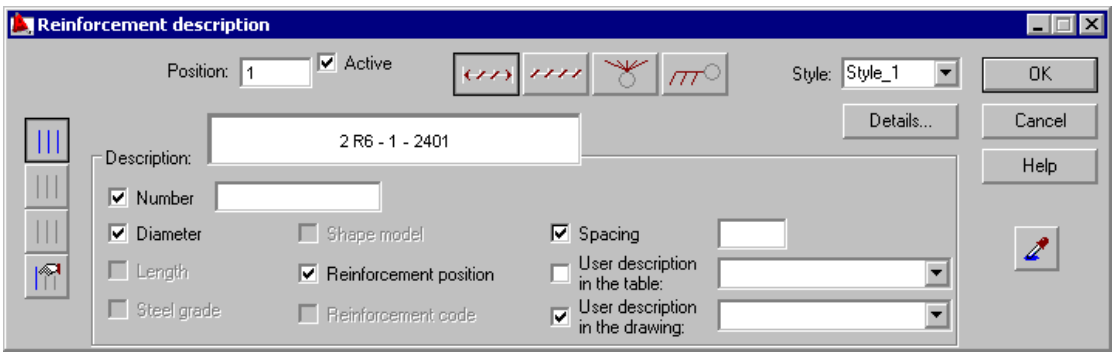
Delete
Select bar or [Back]

9.5. Reinforcement description

This option is used to define the final selection of reinforcement description and distribution.

The way to access this option is to click Modify reinforcement description option .
The following dialog displays:

*NOTE: Two additional options are available in the dialog as shown below: Description style (used to modify a description style of the reinforcement chosen) and the **Details** button, which when clicked, opens the dialog used for modifying a style of reinforcement description (shape).*



The options provided in this dialog, enable final selection of reinforcement description and distribution by switching off active variables initialized based on the syntax defined.

© 2010 Autodesk, Inc. All rights reserved

The dialog contains the following options:

- The *Active* option is used to assign a description to a reinforcement which already has a description. This is used when the same reinforcement is included in multiple calculations when preparing a reinforcement table
- The following icons are used to define the manner of presenting the distribution:
  - all elements are presented in a drawing showing given reinforcement distribution
  - only the middle representative of the distribution in a given zone is presented (the remaining elements are not visible)
  - only the extreme elements of the distribution in a given zone are presented (the remaining elements are not visible)
  - indicate graphically distribution elements to be presented
- The fields: *User description in the drawing* and *User description in the table* allows you to add any text to a reinforcement description. The description will be presented in drawings (included in bar descriptions in the drawing) and in the table (included only in the reinforcement table). The added text is saved (on the selection list) and you will be able to use it later on; a form of the displayed description is closely connected with the appropriate and default style of reinforcement description. The user description displays on several lines; then the mechanisms accessible in AutoCAD® are applied. A user description together with an extension line and label make up one object. Such an object may be edited (translation, rotation) using available grips – these are small squares that appear at characteristic points of indicated objects; by means of the ***AutoCAD® Structural Detailing*** *Explode* option, it is possible to increase a number of grips in descriptions
- A style of reinforcement description is chosen from the *Style* selection list; the list contains all description styles defined for that type of reinforcement (the first on the selection list is a default description style chosen in the ***Description of reinforcement shape*** dialog); before a reinforcement description is inserted in a drawing, parameters of the description style can be changed. Clicking **Details,** opens the ***Reinforcement description*** dialog where modifications of the style can be made (NOTE: modifications of the description style refer only to that one reinforcement description).

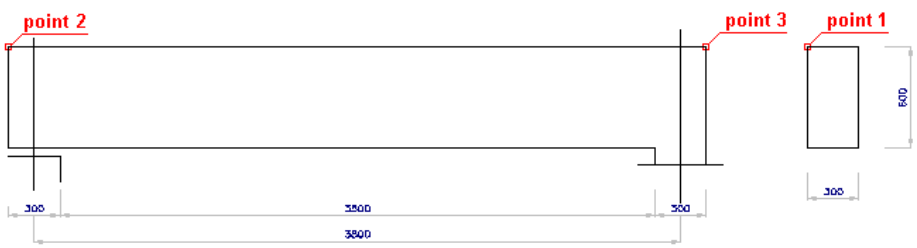
NOTE:
To include a bar symbol in the bar description:

1. *Open the* ***Description of reinforcement shape*** *dialog.*
2. *Select reinforcement description (e.g. Bar shape).*
3. *Click* ***Modify****.*
4. *Select the Reinforcement symbol option provided on the Description syntax tab.*
5. *Click the button with the arrow; the variable containing a bar symbol will be added in the Description edit field;*
6. *To end the operation, click* ***Add****.*

NOTE: You may clear the active description components. The additional description allows entering an additional text. The comments entered are remembered and may be reused later on.

9.6. Example of definition of point reinforcement

The following example illustrates the definition of point reinforcement in the cross section of the beam. For definition of the beam contours the ***Formworks - Beam*** macro has been used.



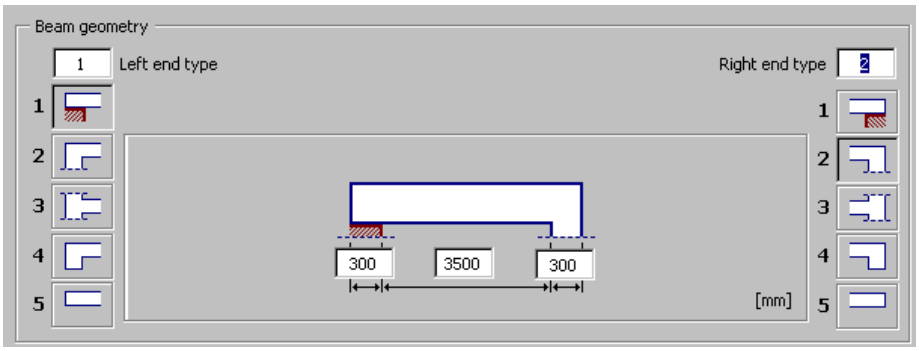
© 2010 Autodesk, Inc. All rights reserved

To define point reinforcement in the beam:

1. Define transversal and longitudinal reinforcement

DEFINITION OF THE BEAM FORMWORK

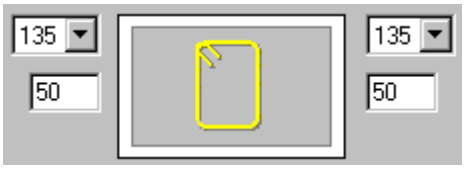
1. Run the ***Formworks – Beam*** macro by clicking  .
2. In the ***Formworks – Beam*** dialog, specify the following parameters:
   - section type: 1 (rectangular)
   - beam type: 1 (single-span beam)
   - dimensions of the beam cross section: height = 600 mm, width = 300 mm
   - beam geometry displays as follows:



3. Click **Insert** in the ***Formworks – Beam*** dialog.
4. Indicate the location of the beam formwork in the drawing

DEFINITION OF THE BEAM REINFORCEMENT

1. Click the Reinforcement – cross-section icon 
2. In the ***Reinforcement – cross-section*** dialog, specify the following parameters:
   - type of reinforcing bars: polygon-shaped (closed) stirrup 
   - bar diameter: 8 mm; cover of reinforcing bars: 30 mm
   - steel grade: R
   - shape parameters as shown in the drawing below



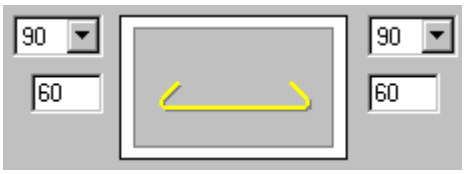
3. Click  (*Pick point*).
4. In the drawing of the beam formwork indicate a point within the beam cross section and point 1 that determines the position of stirrup hooks.
5. Accept the deafult reinforcement description proposed in the ***Reinforcement description*** dialog by clicking **OK**.
6. Indicate the position of the reinforcement description in the drawing by clicking **Enter**, or right-clicking the *Enter* option from the context menu.

Define the straight longitudinal reinforcement (with the reinforcement in the beam cross section already defined), as follows:

1. Click the Reinforcement - elevation icon 
2. In the ***Reinforcement – elevation*** dialog, specify the following parameters:
   - type of reinforcing bars: straight bar 
   - bar diameter: 12 mm; cover of reinforcing bars: 30 mm

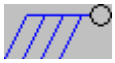
© 2010 Autodesk, Inc. All rights reserved

- steel grade: R
- shape parameters as shown below

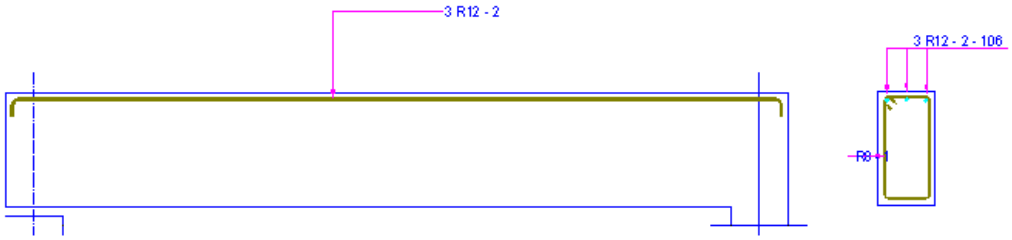


3. Click  (2 points).
4. In the drawing of the beam formwork, indicate point 2 and point 3.
5. Accept th***e deafult reinforcement d***escription proposed in the ***Reinforcement description*** dialog by clicking **OK**.
6. Indicate the position of the reinforcement description in the drawing by clicking **Enter** or right-click the *Enter* option from the context menu.

Once the transversal and longitudinal reinforcement is defined, define the point reinforcement as follows:

1. Click the Reinforcement - point icon 
2. Indicate the defined longitudinal bar.
3. Specify the following parameters; bar d***istribution: regular*** 
4. Click  (*Whole segment*), indicate t*he upper part* of the defined stirrup, and click **Enter.**
5. Specify the following parameters:
   - number of bars n = 3
   - leave default values of the remaining parameters
6. Click **OK**.
7. Adopt the following parameters of the description of reinforcement distribution:
   - type of reinforcing bar representation: all 
   - position: the *Active* option switched on
   - type of distribution description: 
8. Click **OK**.
9. Indicate the position of the reinforcement description in the drawing by clicking **Enter** or right-clicking the *Enter* option from the context menu.

The defined point reinforcement is presented in red in the drawing below.



© 2010 Autodesk, Inc. All rights reserved

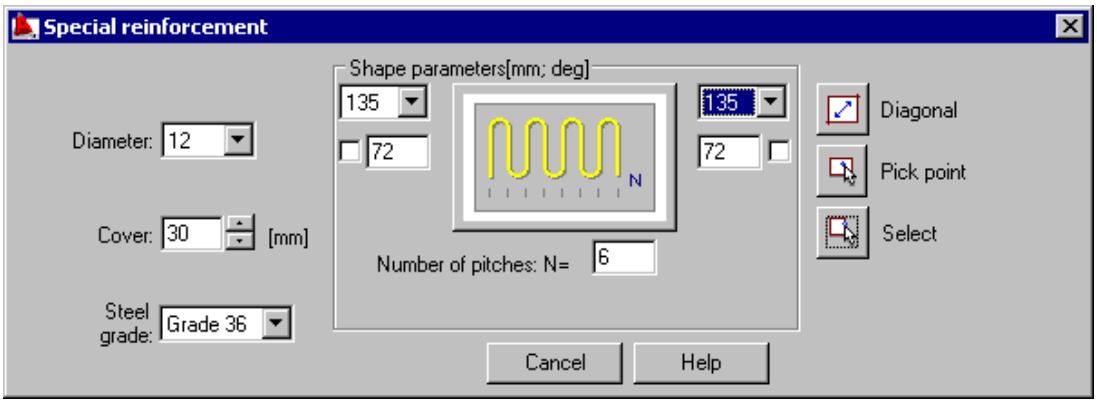
10. DEFINITION OF REINFORCEMENT - SPECIAL BARS

10.1.Special reinforcement

Use this option to define reinforcing bars used in different elements of RC structures (e.g. crest-shaped reinforcement, corbel reinforcement, transport handles). There are three ways to access this option from:

- Menu: Reinforcement / Special reinforcement
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Special reinforcement
- Toolbar: Definition - bars / Special reinforcement 
- Command line: RBCR_DEF_BARLIBSPECIAL.

Once activated, the following dialog displays:



The dialog is divided into three parts:

- The left side of the dialog contains basic information concerning reinforcement: diameter, cover and steel grade adopted from the preference settings
- The middle of the dialog includes parameters of a selected type of special reinforcement; left-clicking the field containing the drawing of the special reinforcement opens an additional dialog where reinforcement type (shape) are chosen; selection of special reinforcement type changes the contents of the field with parameters of reinforcement shape
- The right side of the dialog comprises a few icons used for selecting a mode of graphical reinforcement definition (the number of icons depends on a chosen type of special reinforcement); clicking an icon indicates selection of the graphical interface mode according to the specific character of region definition. NOTE: Bars can only be displayed after one of these icons is selected.

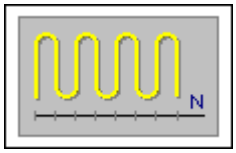
The following types of special reinforcement are available:

- 3D reinforcement (defined in the drawing plane): corbel reinforcement, goalposts reinforcement and helix of RC structure elements with round cross-section
- transport handles
- Remaining reinforcement types: crest-shaped reinforcement, arc-shaped reinforcement, vertical loop.

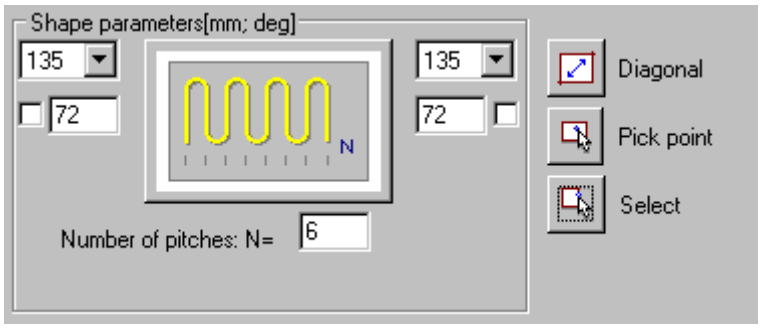
Once definition of reinforcement shape is complete, the Reinforcement description dialog displays and allows you to select elements of reinforcement description. Reinforcing bars can also be defined by means of the commands available.

© 2010 Autodesk, Inc. All rights reserved

10.2.Crest-shaped reinforcement



After selecting crest-shaped reinforcement, the Special reinforcement dialog displays:



NOTE:
Crest-shaped reinforcement can be defined only within a rectangular region.

To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – anchorage parameters of reinforcing bar ends, i.e. hook angle and length as well as number of legs in crest-shaped reinforcement; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

While defining the crest-shaped reinforcement, the following icons are available in the dialog:

- ***Diagonal*** - is used to create a rectangular region by defining a diagonal. After selecting, the dialog closes, and when the cursor is moved, the defined reinforcement is presented dynamically.

  Command line:
  First corner
  Second corner or [Orientation / First hook / Second hook / Cover]

  where:
  First corner – indicates the initial apex of a rectangle within which crest-shaped reinforcement is to be defined
  Second corner - indicates the second apex of a rectangle (along the rectangle diagonal) within which crest-shaped reinforcement is to be defined
  Orientation – rotates (changes position) of reinforcement within the contour
  First hook – changes the hook bend at the beginning of a reinforcing bar (first corner) to the opposite
  Second hook - changes hook bend at the end of a reinforcing bar to the opposite
  Cover – defines a cover value globally for the entire region of a rectangle

- ***Pick point*** – is used to search a closed region in the shape of a rectangle by clicking inside the region. After selecting any point, the dialog closes, and the cursor assumes the form of a cross (see the ACAD command 'copy' - the stage of indicating the beginning and end points), and the minimal contour is detected.

© 2010 Autodesk, Inc. All rights reserved

- ***Select*** – is used to indicate a rectangle-shaped contour. After selecting this option, the dialog closes, and the cursor assumes the form of a square (see the ACAD command 'copy' - the stage of selecting an object for copying). After selecting any point on the screen, an ACAD object is detected and reinforcement is drawn within the indicated object.

  Command line (for the options: *Pick point* and *Select*)
  Select internal point of the object (for the *Pick point* option)
  Select object (for the *Select* option)
  Orientation / First hook / Second hook / Cover

  where:
  orientation - rotation of reinforcement within the contour by indicating a contour side
  first hook - change of the hook bend at the beginning of a reinforcing bar (first corner) to the opposite
  second hook - change of hook bend at the end of a reinforcing bar to the opposite
  cover - definition of a cover value globally for the entire region of a rectangle

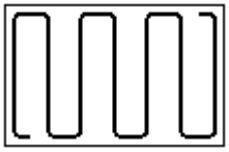
See also:
Example definition of crest-shaped reinforcement

10.3. Example definition of crest-shaped reinforcement

Use this option to define the crest-shaped reinforcement within the rectangle as shown below:

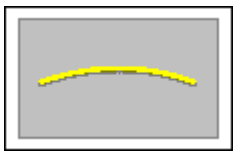
To define the crest-shaped reinforcement follow these steps:

1. In the ***Special Reinforcement*** dialog choose the reinforcement type – crest-shaped reinforcement.
2. Define the following values in the dialog (the *Shape parameters* field):
   - hook bend angles at the bar beginning and end 90 degrees,
   - hook lengths 0.06 m,
   - number of legs n = 7
3. Click (*Diagonal).*
4. Indicate a first rectangle apex (see the above drawing).
5. In the command line, choose the Second hook command (by entering the capital letter) – it changes a hook position on the bar end.
6. In the command line, choose the Orientation command – it rotates reinforcement within the contour
7. Indicate a second rectangle apex (see the above drawing) – the reinforcement obtained is shown below.

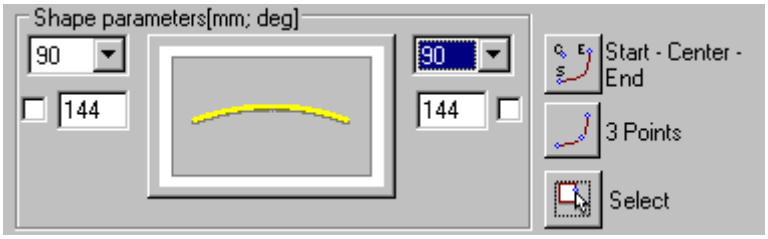


© 2010 Autodesk, Inc. All rights reserved

10.4. Arc-shaped reinforcement



After selecting the arc-shaped reinforcement, the Special reinforcement dialog displays:



To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – anchorage parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

While defining the arc-shaped reinforcement, the following icons are available:

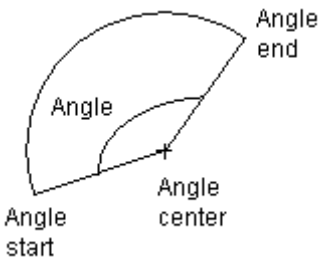
- ***Start - Center - End*** – is used to define an arc by specifying three snap points of the arc: arc beginning point, arc center and arc end point. After selecting any point, the dialog closes, and as the cursor is moved, the reinforcement is presented dynamically

  Command line:
  Select start point
  Select arc center
  Select arc end

  or

  Select arc center
  Select arc start
  Select arc end or [Angle / Arc length]

  where:
  start point – arc beginning
  arc end - end point
  arc center – point being arc center
  angle – value of arc angle
  length – value of arc length

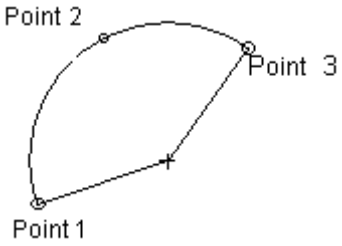


© 2010 Autodesk, Inc. All rights reserved

- ***3 Points*** – the function which enables arc definition by specifying three points belonging to the arc. The dialog box closes; while moving with the cursor the reinforcement being defined is presented dynamically

  Command line:
  Select first point
  Select second point
  Select third point

  where:
  first, second and third points denote successive points belonging to an arc

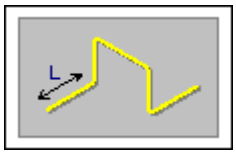


- ***Select*** – is used to indicate directly an arc-shaped object. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' – the stage of selecting an object for copying). Once any element is selected, an ACAD object is detected on the screen and reinforcement is drawn within the indicated object.

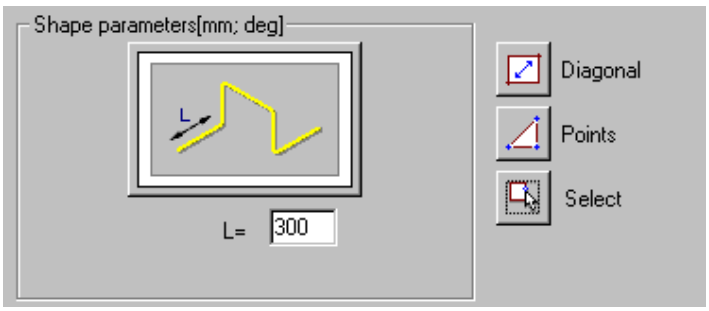
  Command line:
  Select object
  Side
  1 Hook
  2 Hook

  where:
  object – arc or polyline segment
  side – modifies reinforcement position with respect to an object (formwork)
  1 hook – direction of hook bend
  2 hook - direction of hook bend (opposite in relation to hook 1)

10.5.'Goalposts' reinforcement



After selecting the 'goalposts' reinforcement, the Special reinforcement dialog displays:



© 2010 Autodesk, Inc. All rights reserved

To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – reinforcement leg length (dimension perpendicular to the drawing plane).

While defining the 'goalposts' reinforcement, the following icons are available in the dialog:

- ***Diagonal*** – is used to define a rectangular region by defining a diagonal. After selecting, the dialog closes, and while moving the cursor, the reinforcement being defined is presented dynamically.

  Command line:
  First corner
  Second corner or [Orientation / Cover]

  where:
  first corner - indicates the initial apex of a rectangle within which reinforcement is to be defined
  second corner - indicates the second apex of a rectangle (along the rectangle diagonal) within which reinforcement is to be defined
  orientation - rotates (changes position) of reinforcement within the contour; indicates location of the bar open segment
  side - modification of reinforcement position with respect to an object (formwork)

- ***Points*** – is used to define the reinforcement by specifying positions of reinforcement snap points

  Command line:
  Select first point
  Select second point or [Cover]
  Select third point or [Cover]

  where:
  first, second and third points – successive snap points of reinforcement (see the drawing below)
  cover – determines cover value for individual segments of reinforcement

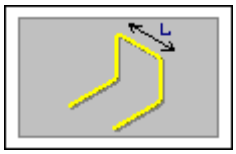
- ***Select*** – is used to indicate the object of reinforcement shape. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' – the stage of selecting an object for copying). Once any point is selected, the ACAD object is detected on the screen and a stirrup is drawn within an indicated object

  Command line:
  Select object
  Orientation

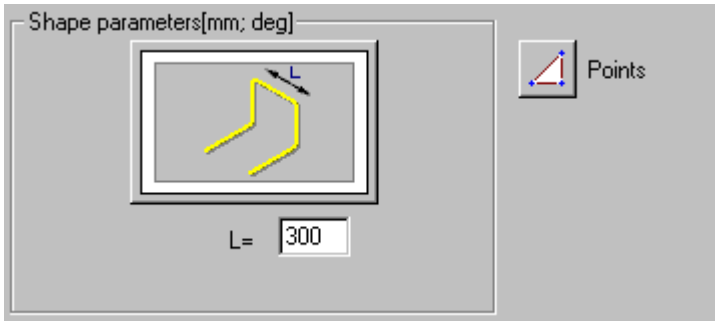
  where:
  object – rectangle-shaped contour
  orientation – rotates (changes position) of reinforcement inside the contour; indicates location of bar open segment

© 2010 Autodesk, Inc. All rights reserved

10.6.Corbel reinforcement



After selecting the corbel reinforcement (e.g. short cantilevers to be placed under a crane girder), the Special reinforcement dialog displays:



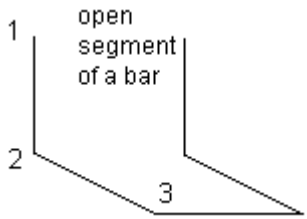
To define a bar, specify the following:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – reinforcement leg length ('depth') (dimension perpendicular to the drawing plane).

While defining the corbel reinforcement, click  (*Points)*, to define successive snap points for this type of reinforcement.

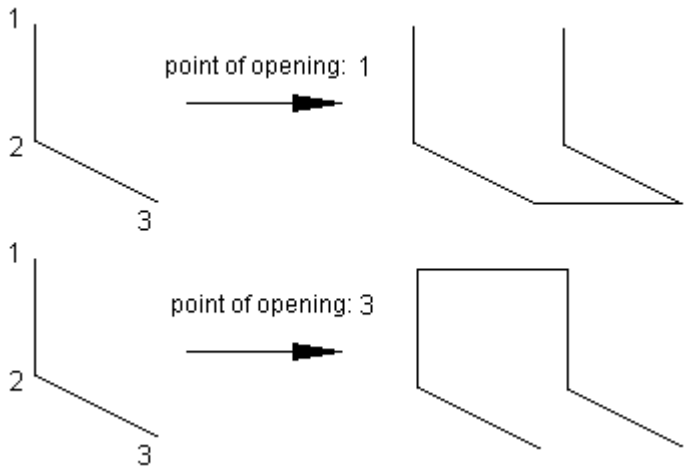
Command line:
Select first point
Select second point or [Side / Cover]
Select third point or [Side / Cover]
Indicate location of open segment of a bar

where: first, second and third points – successive reinforcement snap points (see the drawing below)



Cover – determines a cover value for individual segments of reinforcement
Side – changes position of reinforcement with respect to an object (formwork)
Location of open segment of a bar – indicates a point (in the plane) at which bar opening is located – see the drawing below.

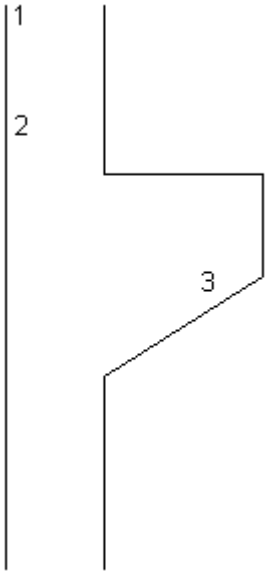
© 2010 Autodesk, Inc. All rights reserved



See also:
Example definition of corbel reinforcement

10.7.Example definition of corbel reinforcement

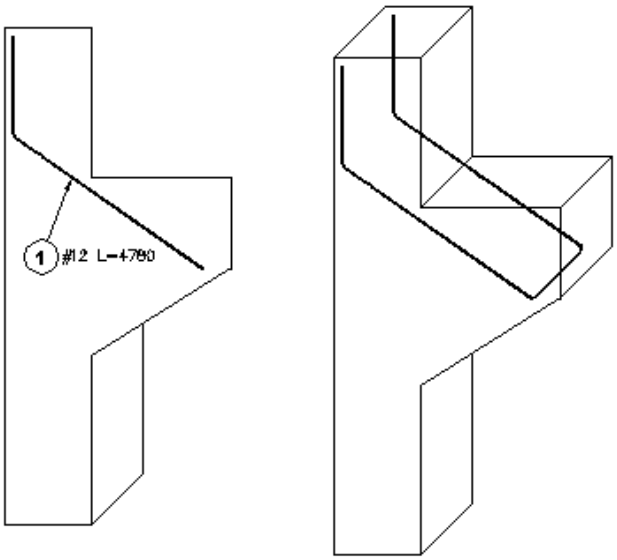
The following figure displays the reinforcement of a cantilever (to be provided under a crane girder): shown in the figure below, the user should follow the steps below, for example:



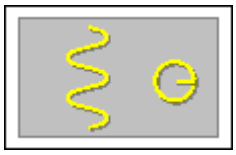
To define the reinforcement of a cantilever, specify the following:

- In the ***Special reinforcement*** dialog, select the reinforcement type – corbel reinforcement
- Define the value (in the *Shape parameters* field) of leg length equal to 30 cm
- Click (*Points)*
- Indicate point 1
- In the command line select the Side command – it modifies position of reinforcement with respect to the object (formwork)
- Indicate successive points: 2 and 3 (see the figure above)
- Indicate point 1 as a point of reinforcement opening; the defined reinforcement displays in the figure below.

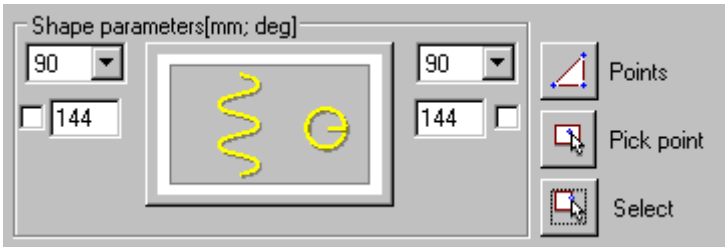
© 2010 Autodesk, Inc. All rights reserved



10.8.Helix



After selecting reinforcement in the form of helix, the Special reinforcement dialog displays:



NOTE:
The helix is defined for two types of cross-section of an RC structure element (contour): circle or regular polygon.

To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – anchorage parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

The helix is a three-dimensional reinforcement. This reinforcement type is defined in the drawing plane. The helix is defined in two stages:

- Definition of reinforcement within the cross-section of an RC structure element (e.g. column)
- Definition of reinforcement along the length of RC structure element.

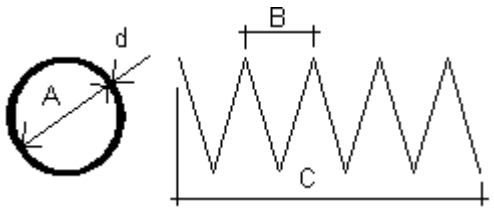
© 2010 Autodesk, Inc. All rights reserved

NOTE:
It is possible to modify a helix pitch during definition of this reinforcement type.

Total length of this reinforcement type is calculated according to the following formula:

$L = C / B * \pi * (A + d) +$ hook lengths

where (see the drawing below):
L – total helix length
C – helix length in plane
B – helix pitch
A – helix internal diameter
d – bar diameter.



While defining the helix, the following icons are available in the right part of the dialog:

- ***Points*** – used to define a closed region by specifying circle center and circle radius (or diameter) as well as indicating a region of reinforcement distribution - beginning and end of the region within which reinforcement is distributed (e.g. along the column length)

  Command line:
  Definition of reinforcement within a cross-section
  Circle center {2Points / 3Points]
  Circle radius [Diameter]

  Definition of reinforcement along the length of reinforced element
  Select first point
  Select second point [Spiral pitch]

  where:
  a circle is defined within the cross-section by specifying: circle center and circle radius/diameter or by determining 2 or 3 points belonging to a circle
  first point – beginning point of the helix along the length of an RC element
  second point – end point of the helix along the length of an RC element
  spiral pitch – value of the helix pitch

- ***Pick point*** – is used to search a closed region by clicking inside the region. After selecting, the dialog closes, and the cursor assumes the form of a cross (see the ACAD command ‘copy’ - the stage of indicating the beginning and end points). Once any point is selected, the minimal contour is detected; the helix is defined by indicating the following geometric figures: regular polygon and circle; to conclude the operation, you have to indicate the region of reinforcement distribution – beginning and end of the region within which reinforcement is distributed (e.g. along the column length)

  Command line
  Definition of reinforcement within a cross-section
  Select internal point of the object
  Orientation

  Definition of reinforcement along the length of reinforced element
  Select first point
  Select second point [Spiral pitch]

© 2010 Autodesk, Inc. All rights reserved

where:
a circle is defined within the cross-section by specifying an internal point of a circle or regular polygon and indicating positions of hooks (orientation)
first point – beginning point of the helix along the length of an RC element
second point – end point of the helix along the length of an RC element
spiral pitch – value of the helix pitch

- ***Select*** – is used to indicate a contour directly. After selecting, the dialog closes, and the cursor assumes the shape of a square (see the ACAD command 'copy' – the stage of selecting an object for copying). Once any point is selected, the ACAD object is detected on the screen and reinforcement is drawn within an indicated object.

  Command line:
  Definition of reinforcement within a cross-section
  Select object
  Orientation

  Definition of reinforcement along the length of reinforced element
  Select first point
  Select second point [Spiral pitch]

  where:
  a circle is defined within the cross-section by selecting a contour (of a circle or regular polygon) and indicating positions of hooks (orientation)
  first point – beginning point of the helix along the length of an RC element
  second point – end point of the helix along the length of an RC element
  spiral pitch – value of the helix pitch

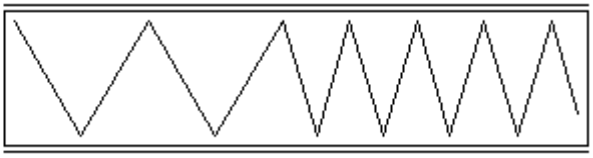
See also:
Example of helix definition

10.9.Example of helix definition

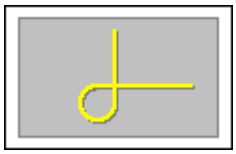
A helix (with varying pitch) in a column of round cross-section is shown below:

To define a helix:
1. In the ***Special reinforcement*** dialog select the reinforcement type – helix.
2. Define the following values in the dialog (the *Shape parameters* field):
   - angles of hook bend at the bar beginning and end: 90 degrees,
   - hook length 0.06 m.
3. Click (*Points).*
4. In the drawing, indicate circle center and radius (definition of a helix within the column cross-section).
5. Indicate point 1 (shown in the drawing above).
6. Indicate point 2 (shown in the drawing above - it completes definition of the helix with default helix pitch over the segment 1-2).
7. Select the Spiral pitch option by entering the letter S into the command line.
8. Specify a new value of the spiral pitch, e.g.: 200 mm.
9. Indicate point 3 (shown in the drawing above); the reinforcement defined is illustrated in the drawing below.

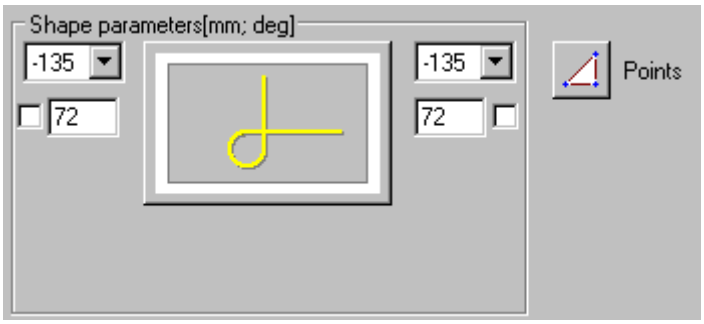
© 2010 Autodesk, Inc. All rights reserved



10.10. Vertical loop



After selecting 'vertical loop' reinforcement (used in retaining walls or tanks), the Special reinforcement dialog displays:



To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – anchorage parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

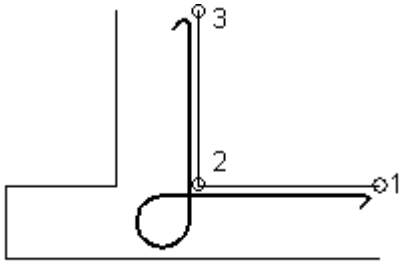
While defining this reinforcement type, only one icon  (*Points)* is available in the dialog. After selecting it, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'line'). During reinforcement definition, you should specify three snap points of this reinforcement type.

NOTE:
Once definition of this reinforcement type is completed, reinforcing bar parameters can be modified (in particular, a radius of bar bend) by means of the options provided in the Reinforcement -> Modify menu (a radius of bar bend can be changed by activating the Reinforcement -> Modify -> Bent diameters option).

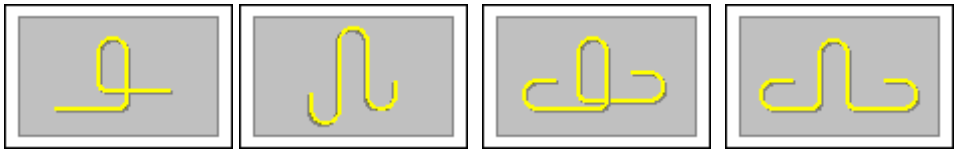
Command line:
Select bar attachment point
Select second bar point
Select bar node
Cover / Side / Mirror

© 2010 Autodesk, Inc. All rights reserved

where:
first (attachment point), second and third point as shown in the drawing
cover – determines a cover value for each segment of reinforcement separately
side – changes reinforcement position with respect to an object (formwork)
mirror – mirror reflection of the defined reinforcement with respect to the first segment of reinforcement



10.11. Transport handles



Once any of the transport reinforcement types is selected, the Special reinforcement dialog displays:

To define a bar, the following should be specified:

- Bar diameter (the diameter defined in the dialog is adopted by default)
- Reinforcing bar cover (the cover defined in the dialog is adopted by default)
- In the *Shape parameters* field – anchorage parameters for reinforcing bar ends, i.e. hook angle and length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears). The edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

While defining this reinforcement type, only one icon  (*Points)* is available in the dialog. After selecting this icon, the dialog closes, and the cursor assumes the shape of a cross (see the ACAD command 'line'). During definition of transport reinforcement, the user should specify three or four snap points of this reinforcement type.

Command line:
Select bar attachment point
Select second bar point
Select bar node
If need be, fourth point
Cover / Side / Mirror

© 2010 Autodesk, Inc. All rights reserved

where:
first (attachment point), second, third and if need be, fourth reinforcement snap point
cover – determines a cover value for each segment of reinforcement separately
side – changes reinforcement position with respect to an object (formwork)
mirror – mirror reflection of the defined reinforcement with respect to the first segment of reinforcement

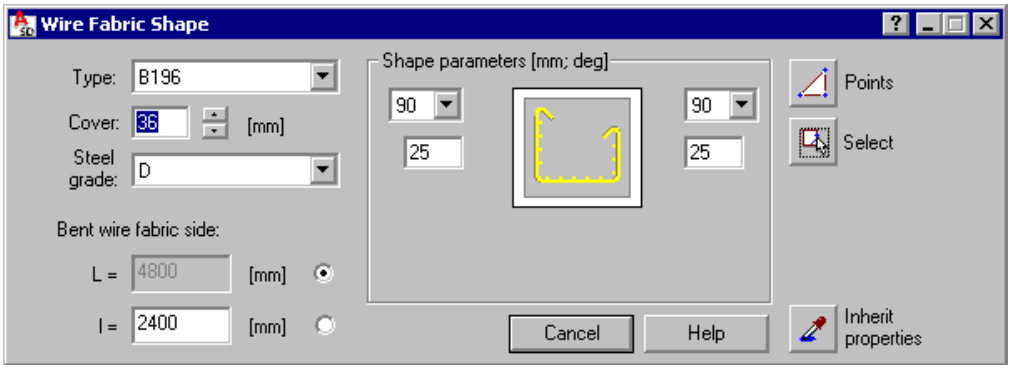
11. WIRE FABRICS IN CROSS SECTION

11.1. Wire fabrics in cross section – wire fabric shape

Use this option to define the wire fabric in a cross section (of a wire fabric shape) of an RC structure element. There are three ways to access this option from:

- Menu: Reinforcement / Wire fabrics in cross section
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Wire fabrics in cross section
- Toolbar: Definition - wire fabrics / *Wire fabrics in cross section* 
- Command line: RBCR_DEF_NET_SIDE.

After selecting the *Wire fabrics in cross section* option, the following dialog displays:



The ***Wire Fabric Shape*** dialog is be divided into three parts:

- The left-hand side of the dialog contains basic information about a wire fabric: wire fabric type, cover and reinforcing steel grade adopted from the settings in the preferences
- The center of the dialog provides options used to define the geometrical parameters of a wire fabric
- The right-hand side of the dialog includes icons that are used to select a mode of graphic definition of a wire fabric; NOTE: wire fabrics may be defined only after selecting these icons.

The dialog displays the last-defined type of a wire fabric and parameters adopted for it.
The icon  is used to assume parameters of the earlier-defined wire fabric.

To define a wire fabric in the cross section, it is necessary to specify the following parameters in the dialog:

- Wire fabric type (by default, the last type defined is adopted)
- Wire fabric cover (by default, the last cover defined is adopted)
- Reinforcing steel grade
- Bent wire fabric side (a shorter or longer side of the wire fabric should be chosen)
- In the *Shape parameters* field – parameters of the hook ending of a wire fabric, i.e. a hook angle and length (the hook length defined in the dialog box is a length of the straight segment of the hook).

© 2010 Autodesk, Inc. All rights reserved

The list of standard values (see: the method of measuring the angle of bar bending) of hook angles include:

⇒ 0°
⇒ 90°
⇒ 135°
⇒ 180°
⇒ -90°
⇒ -135°
⇒ -180°.

While defining a wire fabric shape in the cross section, the following icons are available:

Points – click to define the points that determine the wire fabric shape

Select - click to select an object (line, polyline, arc, etc.) whose shape will determine the wire fabric shape.

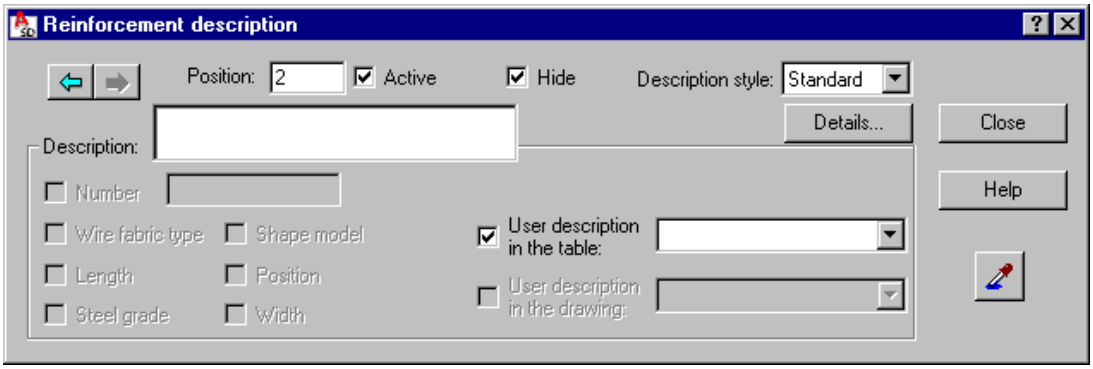
NOTE:
Wire fabric location depends on the direction of point definition. The rule that holds while defining a wire fabric is identical as in definition of a reinforcing bar: determining the order of points clockwise (along the EXTERNAL part of an object).

Once definition of a reinforcement shape is complete, the Reinforcement description dialog, used to select elements of reinforcement description, displays.

11.2.Reinforcement description - wire fabric shape

Use this option to define the reinforcement for a wire fabric shape. You can access this option clicking the Modify Reinforcement description icon.

NOTE: There are two additional options accessible in the dialog: Description style (used to change a description style for selected reinforcement) and the ***Details*** *button, when selected, the following dialog (for modification of the style of the reinforcement description (shape)) displays:*

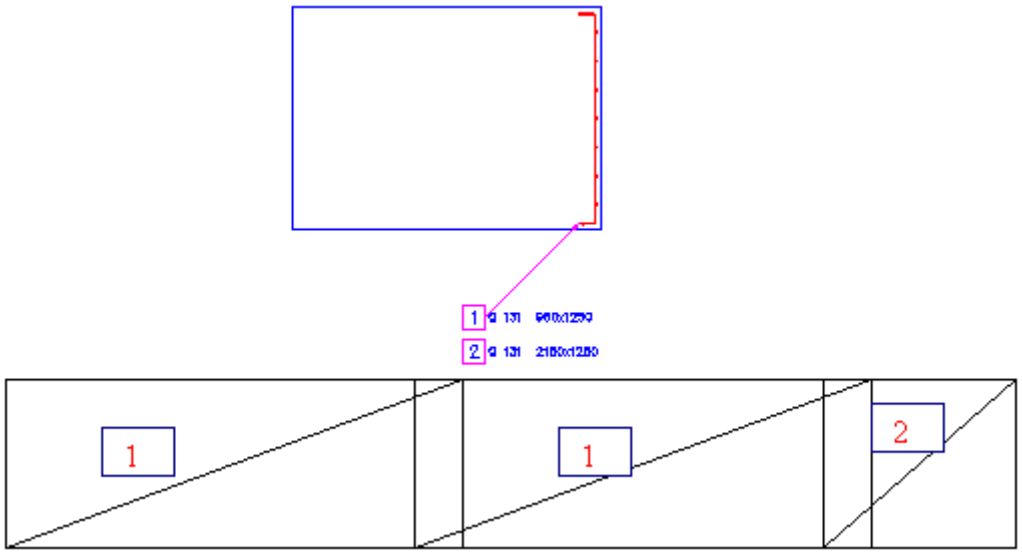


The options in this dialog are used to specify the final selection of a reinforcement description. Selections can be achieved by clearing active variables initialized on the basis of a defined syntax.

© 2010 Autodesk, Inc. All rights reserved

REMARKS:

- Description of a reinforcement shape is possible only for a single position, i.e. two or more wire fabrics cannot be described simultaneously
- The *Number* edit field is used to enter the final number of wire fabrics that will be included directly in a table
- The *Active* option. If the option is selected, then the described reinforcement should be considered in the reinforcement table. This option will be active by default, for reinforcement that is described for the first time. When the same reinforcement is described for the second time, the option clears. In this way it is possible to prevent (when describing the same reinforcement twice) doubling the number of reinforcement elements calculated when preparing a reinforcement table; a description of active and not active reinforcement may differ in a generated drawing – the options used for this purpose are provided in the ***Description of reinforcement shape*** dialog.
- In the case of the linear distribution, 2 different wire fabrics (with two different numbers) can be placed in a region; a description of the distributed wire fabric in cross-section, after its distibution is performed, shows a number of wire fabrics (see the drawing below); while modifying such a description of the wire fabric in cross section, it is possible to hide one of the wire fabrics (the *Hide* option should be used); the arrows allow switching between two wire fabrics included in the distibution



- The fields: *User description in the drawing* and *User description in the table* enable adding any text to a reinforcement description (by entering it from the keyboard); the description will be presented correspondingly in drawings (included in wire fabric descriptions in the drawing) and in the table (included only in the reinforcement table); since that moment the added text will be remembered (on the selection list) and you will be able to use it later on; a text taken from the library of standard descriptions may also be applied. These descriptions assume the style of the text describing the reinforcement. The user description is displayed in several lines; then the mechanisms accessible in AutoCAD® are applied. The user description together with an extension line and a label make up one object. Such an object may be edited (translated, rotated); to do that, first use the EXPLODE option.

© 2010 Autodesk, Inc. All rights reserved

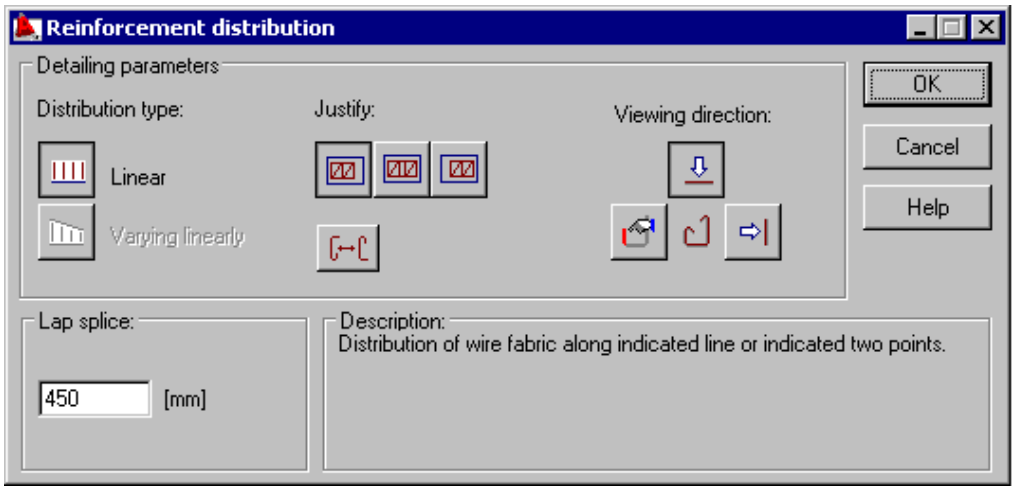
12. WIRE FABRIC DISTRIBUTION

12.1. Wire fabric distribution

Use this option to define wire fabric distribution. There are several ways to access this option from:

- Menu: Reinforcement / Wire fabric distribution
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Wire fabric distribution
- Toolbar: Definition - wire fabrics / Wire fabric distribution 
- Command line: RBCR_NETD_RECT.

Once the *Wire fabric distribution* option is selected, the following dialog displays:



The options in the left side of the dialog, in the *Detailing parameters* field, are used to specify a type of reinforcement distribution:
- Linear (bar distribution along a selected line or indicated two points)
- Varying linearly (this option is not available in the current program version).

The following parameters are defined for the selected distribution type:

- *Justify* – determines to which edge created wire fabrics will be justified:
   – justify to 1st edge
   – after selecting this option, one edit field for definition of a lap splice of wire fabrics is inaccessible; automatic lap splice lengths will be increased in such a way so that wire fabrics are justified to both edges without trimming wire fabric sheets
   – justify to 2nd (opposite) edge
-  - refers to created 3D cross-sections; using it, you can position wire fabric bars in the cross-section in accordance with the principles of projecting and making cross-sections; this way you can determine the side of the bar (beginning or end) on which the selected bar end types are provided.

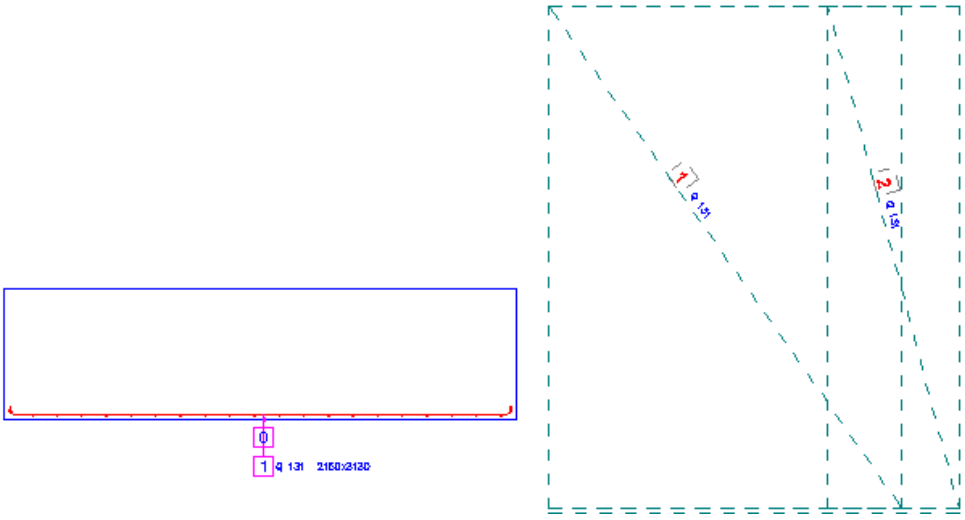
You should also specify how a wire fabric is to be presented in distribution:

-  top view
-  side view
-  as an indicated segment; once this option is selected, a selected bar is distributed, whereas the drawing of the distribution will present a selected segment of the bar in its total dimension (in its current geometry).

© 2010 Autodesk, Inc. All rights reserved

The option at the bottom of the dialog is used to define a value of the lap splice of wire fabrics.

Click **OK**, to close the dialog. After indicating a line or two points, the defined distribution of the wire fabric is performed. The linear distribution will include at the most 2 different wire fabrics (two different wire fabric numbers).
In a description of the distributed wire fabric in cross section, once its distribution is performed, a number of wire fabrics is updated and another – additional label is provided (see the drawing below).



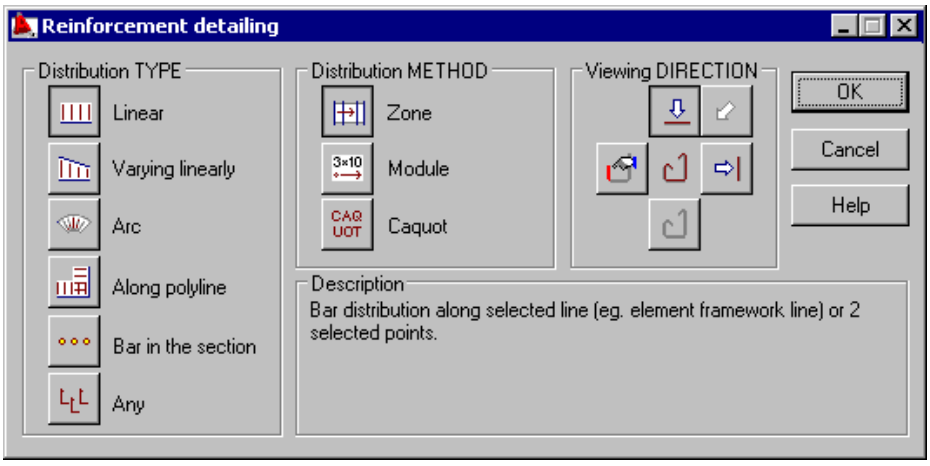
13. REINFORCEMENT DISTRIBUTION - REINFORCING BARS

13.1.Reinforcement distribution

This option is used to define the distribution of reinforcement. There are three ways to access this option from:

- Menu : Reinforcement / Reinforcement distribution
- Ribbon : ASD - Reinforcement / Reinforcement - definition / Reinforcement distribution
- Toolbar: Reinforcement - definition / Reinforcement distribution 
- Command line: RBCR_DEF_BAR_DISTRIBUTION.

The following dialog displays:



© 2010 Autodesk, Inc. All rights reserved

The dialog is divided into three primary parts:
On the left side of the dialog, in the *Distribution type* field, specify the type of reinforcement distribution.

-  linear - bar distribution along a selected line (e.g. the line of an element formwork) or along two indicated points
-  varying linearly - bar distribution within the region indicated (e.g. a formwork element of variable height); the height of a bar being distributed will be adjusted automatically to the formwork shape (prior to distribution, you can indicate reinforcement segments whose length changes during distribution)
-  arc - bar distribution along the indicated arc
-  along polyline - bar distribution along the indicated broken line (polyline)
-  distribution: reinforcement as a point (bar in a section) - graphical representation of a bar in a section
-  any (all options in the right part of the dialog are not available); you can distribute a selected bar or bars; in the latter case, bars are distributed as a group.

Once the distribution type is selected, the method of reinforcement distribution is defined. The only exception constitutes the point reinforcement which requires neither defining a distribution method nor the direction of viewing the reinforcement. The following methods of reinforcement distribution are available:

-  zone method - a formwork element is divided into several regions (zones); in each of the designated zones, you define reinforcement spacing independently
-  module distribution - reinforcement spacing is defined by specifying the order of spacing in the following form, e.g. 3x25, 5, 6x15, etc. with respect to the base point, and next, with respect to the bar defined recently in the distribution
-  Caquot distribution - a simplified method of reinforcement distribution which consists in specifying the length of distribution as well as initial spacing and maximum spacing; spacing values are calculated based on a simple method maintaining the spacing values obtained as a result of applying the method.

Finally, a manner of presenting the reinforcement distribution should be determined:

-  top view
-  side view
-  as an indicated segment; once this option is activated, the selected bar is distributed and the distribution drawing shows the actual geometry of the chosen bar segment
-  projection
-  any.

Click **OK**; the dialog closes and reinforcement is distributed according to the definition.

For the distribution types: linear and varying linearly all the options provided in the dialog are available. For the distribution type: any, the distribution methods are inaccessible, whereas the viewing direction is available identically as in the case of the linear distribution.
For the bar distribution as a point, both the methods and view direction are unavailable. Once the **OK** button is clicked, the Reinforcement - point dialog opens.
The bottom part of the dialog displays the description of an option selected in the dialog.

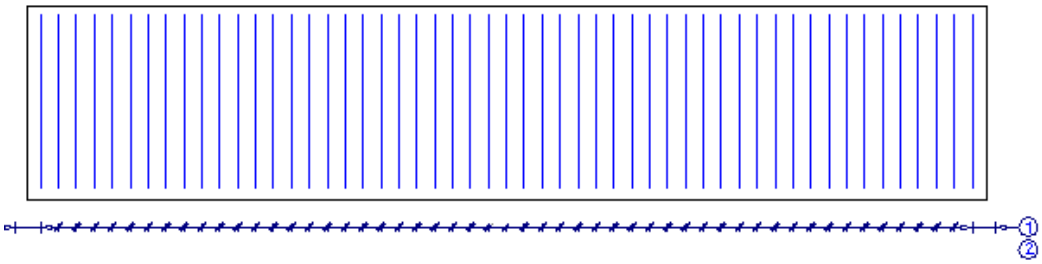
© 2010 Autodesk, Inc. All rights reserved

NOTE:
You can distribute several reinforcing bars simultaneously. After running the Reinforcement distribution option, indicate several bars; a number of bars are recognized automatically and distributed according to the adopted parameters defined (similarly as for a single bar) - see: Distribution of several bars simultaneously.

See also:
Generation of distribution varying linearly and detailed table - example

13.2.Distribution of several bars simultaneously

The distribution of several bars simultaneously is possible only for the linear distribution.



Two bars distributed simultaneously are represented by one line whose length equals the height of the larger stirrup.
Distribution parameters are defined for a single bar. If distributed bars differ in diameter or steel grade, then the fields for selection of these parameters will be blank.
A description of a distribution of several bars simultaneously looks similar to that for a distribution of one bar. If different bars are distributed, then a description of the distribution will include all bar numbers (a number of descriptions will equal a number of distributed bars).

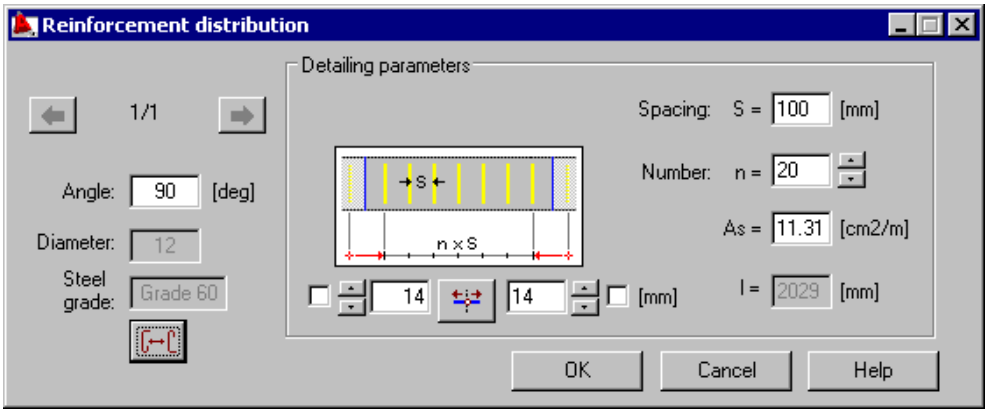
13.3.Linear distribution

After selecting the linear distribution , three distribution methods are accessible in the Reinforcement distribution dialog:
zone
module
Caqout.

13.4.Linear distribution (zone)

To define the linear distribution, you need to determine 2 points or line with respect to which the reinforcement will be distributed. The side of a distribution segment the reinforcement is positioned, depends on the segment sense. The rule of clockwise movement applies (as during reinforcement definition).
The distance between the bars being distributed and the distribution line is assumed by default to be the cover adopted from the bar shape. A direction of distribution is parallel to the defined distribution line.
Once the definition of zones is complete, the dialog opens; which is used to manage distribution within each of the defined zones.
Click (refers to created 3D cross-sections). Once selected, you can position reinforcing bars in the cross-section in accordance with the principles of projecting and making cross-sections. This way you can determine the side of the bar (beginning or end) on which the selected bar end types are provided.

© 2010 Autodesk, Inc. All rights reserved



Distribution parameters are defined by:

- Specifying the value of reinforcement spacing in a given zone
- Determining the value of parameter n - it corresponds to the number of reinforcement spacings (NOTE: this value should nor be confused with a number of reinforcement bars which equals n+1)
- Determining reinforcement area.

If any of the parameters list changes, the values of the remaining parameters will be updated. The parameters listed above are illustrated by a schematic drawing provided in the dialog. The options located next to the drawing enable you to position precisely the distribution of reinforcement in a given zone:

- Two edit fields define the value of the distance between the extreme reinforcement bars and the zone limit
- The button placed between the edit fields enables centering the distribution
- The options located on both sides of the drawing (selection options) determine the element from which the distance to the extreme reinforcement bars is measured (this may be zone limit or adjacent reinforcement from the previous zone).

Command line

Select distribution type : [Linear / varying Linearly / Arc / Point] <Linear>

Distribution method : [Zone / Module / Caquot] **< Zone >**
Direction of projection - viewing a bar [X / Y / Any / Segment] <Y>
Any – Determine direction of viewing a bar
Segment – Select bar segment
Dialog box closing

Start distribution point or [Line]
End distribution point or [Back]

Beginning of 1 zone or [Side / Cover / Angle / N-zones / Back]
Cover <5.5> : 6

Angle
Reinforcement inclination angle [Select / Points] <90>

Number of zones <1> : 3

End of 1 zone or [Back]

End of 2 zone or [Back]

Next zone or change [Spacing / Number / Alignment]
Spacing <0.12> : 0.18
Number <7> : 6
Alignment: [Center / Left / Right] <Center>

© 2010 Autodesk, Inc. All rights reserved

13.5.Linear distribution (module)

To define the linear distribution, you should determine 2 points or lines with respect to which the reinforcement will be distributed. The side of a distribution segment the reinforcement is positioned, depends on the segment sense. The rule of clockwise movement applies (as during reinforcement definition).
The distribution is carried out only along the length of a segment defined. The distribution start point corresponds to the first point indicated while defining a segment or to the closest point during definition with the use of a line.
All operations are carried out ONLY along a selected line within the distribution region.
The modular distribution starts with defining a position of a first bar to be distributed (the position may be determined graphically or by entering the value from the keyboard). A unit of the value entered is the unit of the ***AutoCAD® Structural Detailing*** set in preferences. While defining distribution, the following options are available:

- Direction - changes the direction of distribution to the opposite
- Mirror - provides mirror reflection of the distribution already carried out
- Insert between - when distribution is carried out on one side and then the direction changes and the reinforcement is distributed on the other side, you can introduce the reinforcement in the area between these both distributions defining maximal spacing or number of bars.

Command line

Select distribution type: [Linear / varying Linearly / Arc / Point] <Linear> :

Distribution method: [Zone / Module / Caquot] **< Module>**
Direction of projection - viewing a bar [X /Y/ Any/ Segment] <Y>
Any – Determine direction of viewing a bar
Segment – Select bar segment

Dialog box closing

Start distribution point or [Line]
End distribution point or [Back]
Position of first bar or [Side / Direction / Cover / Attachment / Cover] <5>:
Cover <5.5> : 6
Angle
Reinforcement inclination angle [Select / Points] <90>

<Number> x <Spacing> or [Direction / Insert between / Mirror / Back]
Insert between
Emax or [Number]
Defined spacing = 22.23 cm
End or [+1 / -1 / Back]

13.6.Linear distribution (Caquot)

Distribution is ALWAYS symmetrical with respect to the length of a segment in which distribution is performed. The designations:
L - length of a segment of distribution
s1- initial spacing
Smax - maximum spacing
n = L/2 - spacing module rounded upwards to a whole value
so =s1/2 - position of the first point at the beginning and end of a distribution line.

The set of available CAQUOT spacing values includes: 7, 9, 11, 13, 16, 20, 25, 35, 60 cm

© 2010 Autodesk, Inc. All rights reserved

Command line

Select distribution type : [Linear / varying Linearly / Arc / Point] <Linear>

Distribution method : [Zone / Module / Caquot] < Caquot>
Direction of projection - viewing a bar [X / Y / Any / Segment] <Y>
Any – Determine direction of viewing a bar
Segment – Select bar segment

Dialog box closing

Start distribution point or [select Line]
End distribution point or [Back]
Initial spacing or [Side / Cover / Back] <9>
Maximum spacing <35>

13.7.Distribution varying linearly

After selecting the linear distribution  , three distribution methods are accessible in the Reinforcement distribution dialog:
zone
module
Caqout.

See also:
Generation of distribution varying linearly and detailed table - example

13.8.Distribution varying linearly (zone)

After defining the linear distribution, you should determine bar segments whose length changes in the course of distribution as follows :

- Cut (with a line) through the bar segments, thus indicating that their length is to be variable in the course of distribution.
- Define a region of reinforcement distribution and a cover value (by default, it is adopted from a bar shape) have to be defined.

A direction of reinforcement distribution are defined by indicating:
- 2 points
- contour edge.

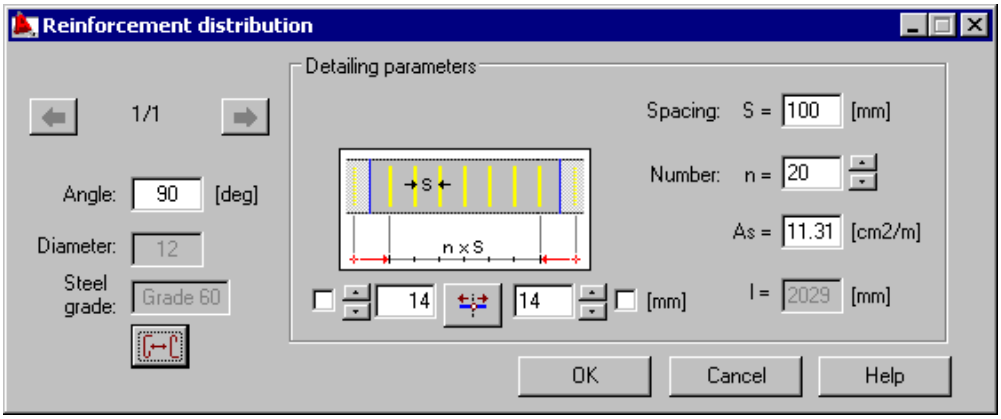
By default, the distribution direction is parallel to 1 defined distribution line (region edge) - it is presented by means of two arrows.

In the next stage, the distribution region is divided into zones. If definition of zones is completed, then the dialog box opens, and is used to manage distribution within each of the defined zones.

When the distribution varying linearly is applied, it is necessary to define a region. There are three methods available: Select, Pick point and X-points.
For the X-points method, the region is defined by means of a closed broken line. By default, first two indicated points will determine the distribution line.
When applying Selection (select), a selected edge will be the distribution line (the closest edge, if it is selected by means of a window); it works similarly when the Pick point option is selected: the closest edge from the indicated point is the distribution line.
Once the region is identified, the program draws a CONTOUR of the distribution region with a cover included. Points (zone boundaries) may be indicated only within the distribution region.
A cover is ALWAYS defined as the distance measured from reinforcement, and perpendicular to the distribution line. The zone length is ALWAYS measured along the distribution line.

© 2010 Autodesk, Inc. All rights reserved

The  icon refers to created 3D cross-sections. When selected, you can position reinforcing bars in the cross-section in accordance with the principles of projecting and making cross-sections. You can then determine the side of the bar (beginning or end) on which the selected bar end types are provided.



Distribution parameters are defined by:

- Specifying the value of reinforcement spacing in a given zone.
- Determining the value of parameter n - it corresponds to the number of reinforcement spacings (NOTE: this value should not be confused with a number of reinforcement bars which equals n+1).
- Determining the reinforcement area.

If any of the parameters change, the values of the remaining parameters are updated.
The parameters are illustrated by a schematic drawing provided in the dialog. The options located next to the drawing enable you to position precisely the distribution of reinforcement in a given zone:

- Two edit fields define the value of the distance between the extreme reinforcement and the zone limit; for extreme zones the distance value indicates a distance of the extreme bar in the distribution to the zone limit, whereas for intermediate zones this is a distance between the extreme bars of the neighboring zones
- The button placed between the edit fields enables centering the distribution.

Command line

Select distribution type: [Linear / varying Linearly / Arc / Point] **<varying linearly>**

Distribution method: [Zone / Module / Caquot] **< Zone >**
Direction of projection - viewing a bar [X / Y / Segment] <Y>
Segment – Select bar segment

Dialog box closing

Select segment(s) of varying length : *(this text appears ONLY for X and Y)*
Region of reinforcement distribution [Select / Pick point / Define] : <Select>
Define
Start point
Next point or [Cover / Back]
Cover <5>
Next point or [Close / Cover / Back]
Reinforcement distribution direction or [Select / Points / Angle]
Select object

Start point
End point

Angle <90>

© 2010 Autodesk, Inc. All rights reserved

Beginning of 1 zone or [N-zones / Back]
Number of zones <1>
End of 1 zone or [Back]
End of 2 zone or [Back]

Next zone or change [Spacing / Number / / Alignment]
Spacing <0.12>
Number <7>

Alignment: [Center / Left / Right] <Center>

13.9.Distribution varying linearly (module)

After defining the linear distribution, you should determine bar segments whose length changes in the course of distribution as follows :

- Cut (with a line) through bar segments, thus indicating that their length is to be variable in the course of distribution.
- Define a region of reinforcement distribution and a cover value (by default, it is adopted from a bar shape).

A direction of reinforcement distribution are defined by indicating:
- 2 points
- contour edge.

By default, the distribution direction is parallel to 1 distribution line defined (region edge) - it is presented by means of two arrows.

Next, you should determine a bar attachment point (by default, the bar is attached in the distance equal to the cover value defined for a bar shape). The distribution start point corresponds to the first point indicated while defining a segment or to the closest point if the line is selected.
A region is defined and the distribution line is assumed in the identical manner as in case of the distribution varying linearly (zone distribution).
Once the region is defined, a contour with a representative bar is drawn. This bar is attached to the cursor and responds to changes in its position. The cursor may move only along the distribution line and determines the position of a newly-defined bar.
The modular distribution starts with defining a position of a first bar to be distributed (the position may be determined graphically or by entering the value from the keyboard). A unit of the value entered is the unit as specified in the program preferences. While defining distribution, the following options are available:

- Direction - changes the direction of distribution to the opposite
- Mirror - provides mirror reflection of the distribution already carried out
- Insert between - when distribution is carried out on one side and then the direction changes and the reinforcement is distributed on the other side, you should introduce the reinforcement in the area between these both distributions defining maximal spacing or number of bars.

Command line

Select distribution type: [Linear / varying Linearly / Arc / Point] **<varying Linearly>**

Distribution method : [Zone / Module / Caquot] **< Module>**
Direction of projection - viewing a bar [X / Y / Segment] <Y>
Segment - Select bar segment

Dialog box closing

Select segment(s) of varying length : *(this text appears ONLY for X and Y)*
Region of reinforcement distribution [Select / Pick point / Define] : <Select>

© 2010 Autodesk, Inc. All rights reserved

Define
Start point
Next point or [Cover / Back]
Cover <5>
Next point or [Close / Cover / Back]
Reinforcement distribution direction or [Select / Points / Rotation]

select object

Start point
End point

Angle <90>

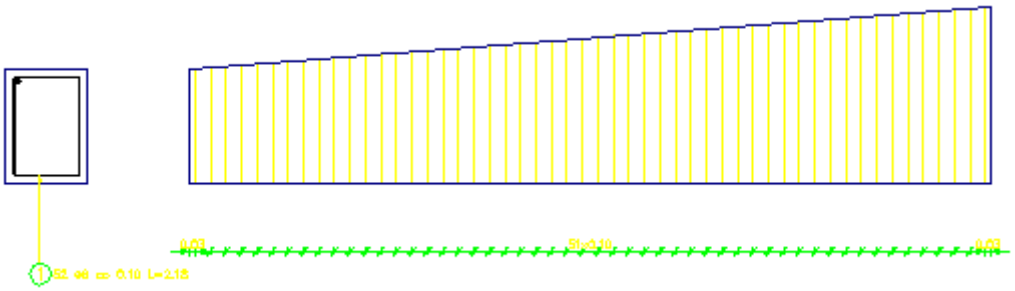
Position of first bar or [Direction] <5>
<Number> x <Spacing> or [Direction / Mirror / Insert between / Back]
Insert between
Emax or [Number]
Defined spacing
End or [+1 / -1 / Back]

13.10. Distribution varying linearly (Caquot)

The distribution type is defined identically as the linear distribution. Only a contour with a distribution line displays.

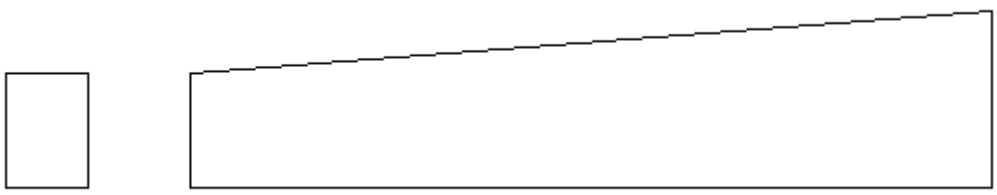
13.11. Generation of distribution varying linearly and detailed table

The definition of distribution varying linearly of transversal reinforcement for a tapered beam is displayed below. For such reinforcement distribution a detailed table is prepared.



To obtain reinforcement distribution shown in the drawing, you should:

- Define transversal and longitudinal beam section (as in the figure below) using the options available in AutoCAD® (rectangle, line)

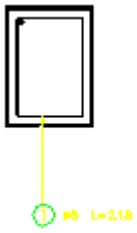


© 2010 Autodesk, Inc. All rights reserved

- Define transversal reinforcement in the beam cross section as follows :

  - Click  (*Reinforcement – cross-section).*

  - In the dialog, click  , and click  (*Diagonal*).
  - Indicate the top left and bottom right corners of the rectangle designating the cross section.
  - In the ***Reinforcement description*** dialog, click **OK** (acceptance of the default description).
  - Select the description position in the drawing (see the figure below)

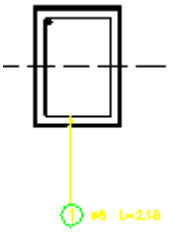


- Click  (*Reinforcement distribution)* (the definition of reinforcement distribution begins; varying linearly).
- Indicate the stirrup (defined earlier) and click ENTER; the ***Reinforcement detailing*** dialog opens; the following options are selected in the dialog:

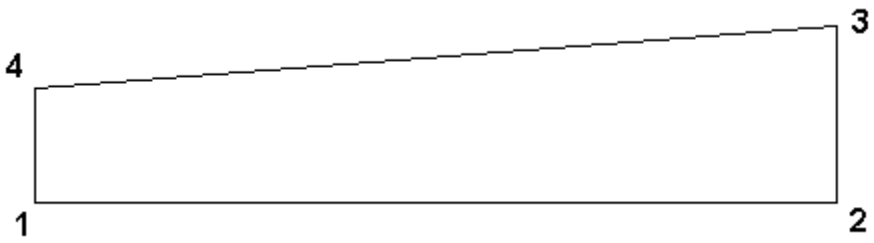
  - Distribution TYPE: varying linearly (press the  icon)

  - Distribution METHOD: zone (press the  icon)

  - Viewing DIRECTION: press the  icon
  - Click **OK.**
- Determine successive reinforcement segments (in this case, these are vertical legs of the stirrup) whose length changes in the course of distribution - see the figure underneath.



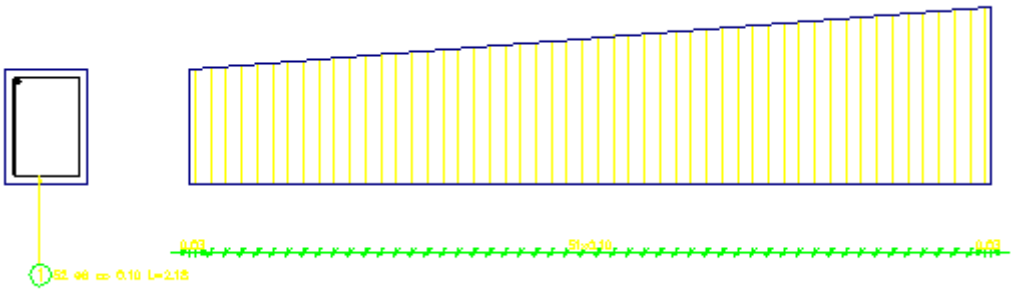
- Select the beginning point and successive points within which the varying distribution is to be contained; indicate one by one the points: 1, 2, 3, 4 and finally indicate 1 again; click ENTER.



© 2010 Autodesk, Inc. All rights reserved

- Determine the direction of distribution; click ENTER.
- Select the beginning and end of the zone (begining and end of the beam, if the distribution concerns the whole beam); click ENTER.
- Click **OK** in the ***Reinforcement detailing*** and the ***Reinforcement description*** dialogs – default values will be adopted.

- Indicate the position of reinforcement description and click ENTER (see the figure below).



To create a detailed table for the reinforcement distribution (varying linearly) as defined above:

- Click  (*Bars - Detailed table).*
- Indicate the generated reinforcement distribution (varying linearly).
- Select the location of the detailed table.

13.12. Arc distribution

This option defines the linear distribution along a defined / indicated part of an arc; the distribution along an arc is an extension of the linear distribution - this is the reason why a distribution angle is not defined.

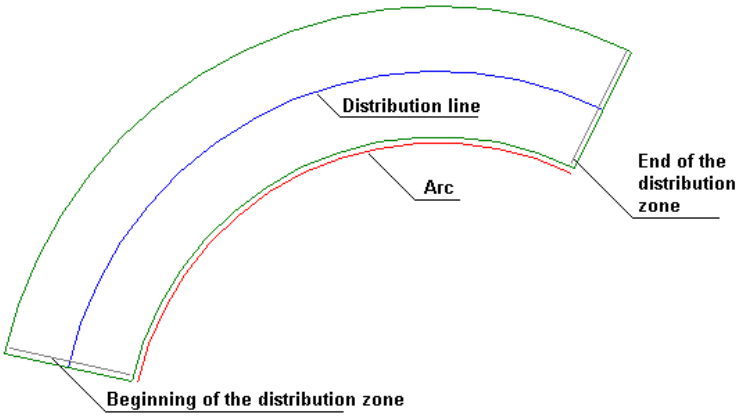
Reinforcing bars in distribution are perpendicular to the distribution line

To define a distribution region along an arc, (see the drawing below):

1. Indicate a curve defined using AutoCAD® options or indicate the position of three successive points belonging to an arc
2. Indicate the distribution line; there are three locations of the distribution line possible: inner, middle and outer.

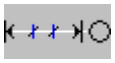
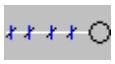
For the indicated distribution line bars in the distribution are arranged according to the parameters adopted in the dialog box.

 *NOTE:*
The location of the distribution line may be changed.



© 2010 Autodesk, Inc. All rights reserved

A description of the distribution is an arc-shaped line as for the radial distribution. This line always shows the spacing from the distribution line.
Four types of the line describing this distribution are possible:

- 
- 
- 
-  .

First two descriptions are arc-shaped lines, the latter are for straight distributions.

Command line

Select distribution type: [Linear / varying Linearly / Arc / Point] **<Arc>** :

First point of distribution or [Circle / Select] :
Circle - a circle is selected as a basis for the arc distribution
Select - successive three points belonging to an arc are indicated

Second point of distribution [Side]

Third point of distribution [Side]

Select location of distribution line

Beginning of zone [Side / Cover / N-zones]

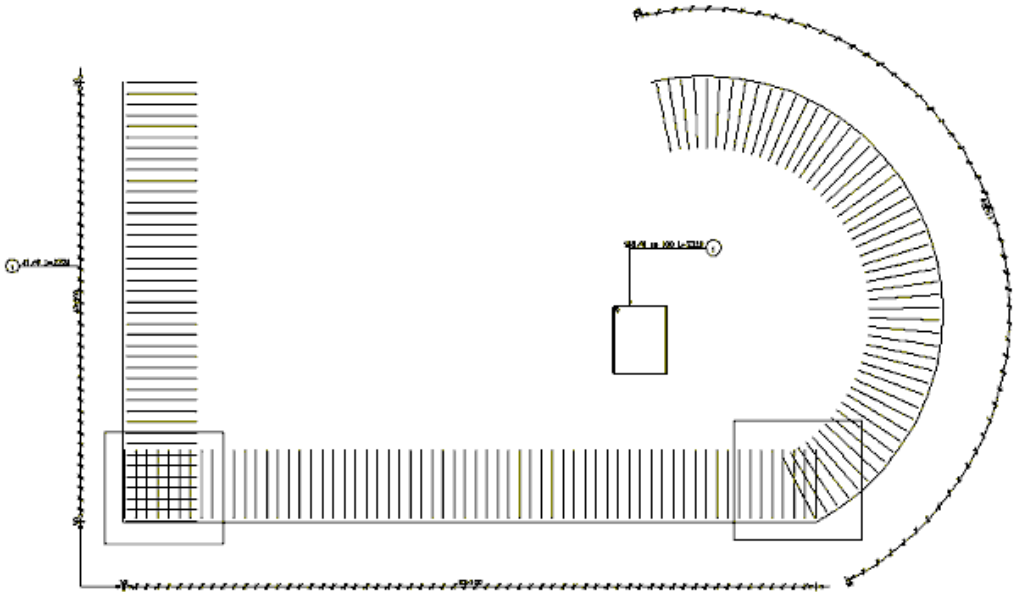
End of zone [Back]

13.13. Distribution along the polyline

Linear distribution can be specified along a defined / selected broken line (polyline). Distributed reinforcing bars are placed perpendicular to the distribution line.
One reinforcement distribution zone is generated for each segment of a broken line. The distribution of reinforcement is described by one description line.

You can modify this reinforcement distribution type exactly as the zone distribution.

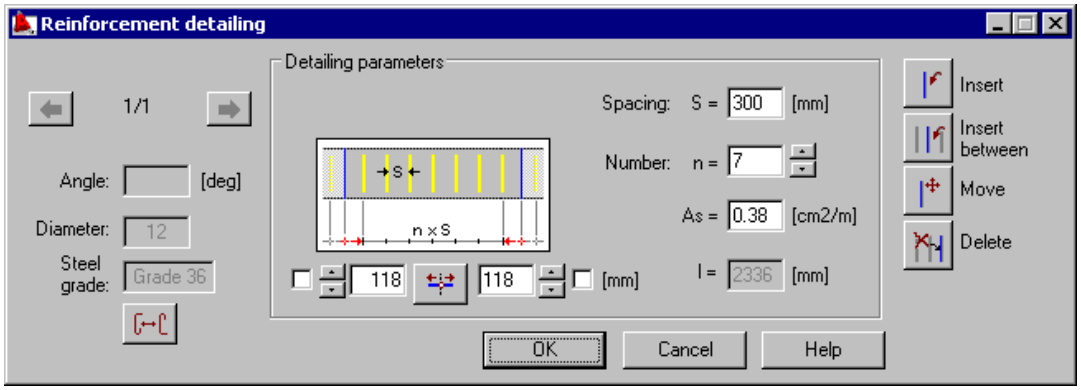
© 2010 Autodesk, Inc. All rights reserved



13.14. Reinforcement distribution - along polyline

The Reinforcement detailing dialog displays after you define the basic parameters of reinforcement distribution. A cover ALWAYS denotes the distance measured from the reinforcement and perpendicular to the distribution line. The zone length is ALWAYS measured along the distribution line.

Click  , to position reinforcing bars in the cross-section in accordance with the principles of projecting and making cross-sections; this way you can determine the side of the bar (beginning or end) on which the selected bar end types are provided.



You can define the distribution parameters by:

- Defining the reinforcement spacing in a given zone.
- Specifying a value of the n parameter - it corresponds to the number of reinforcement spacing (NOTE: Do not confuse this value with the quantity of reinforcement elements which is n+1).
- Specifying the reinforcement area.

Changing any of the parameters listed above will update the values of the remaining parameters.
The schematic drawing in the dialog illustrates the above-mentioned parameters. The options next to the drawing you are used to precisely position the reinforcement distribution in a given zone:

© 2010 Autodesk, Inc. All rights reserved

- Use the two edit fields to specify the distance between the extreme reinforcement and the zone border; for extreme zones, the distance value denotes the distance from the extreme bar in the distribution to the zone border, while for middle zones it is the distance between the extreme bars of adjacent zones.
- Use the button between the edit fields to center the distribution.

The following icons are located on the right side of the dialog:

 Insert - inserts a reinforcing bar at the selected location

 Insert between - inserts a reinforcing bar between 2 selected reinforcing bars

 Move - moves a reinforcing bar; you should specify a translation vector

 Delete - deletes a selected reinforcing bar.

13.15. Any distribution

After selecting the any distribution of bars, the ***Reinforcement detailing*** dialog closes.

To define the any distribution of bar:

- select the base point of distribution (this point does not have to be associated with the selected bar)
- select the attachment (insertion) point for the distribution.

Click Enter to finish defining the distribution.

After completing a definition of the distribution, the dialog displays where you can specify parameters of the distribution description. The options for the distribution description are the same as for the description of point reinforcement.

14. SURFACE REINFORCEMENT DISTRIBUTION - WIRE FABRICS

14.1. Surface reinforcement - wire fabrics

Use this option to define the distribution of wire fabrics for 2D contours (e.g. RC slab). There are several ways to access this option from:

- Menu: Reinforcement / Surface reinforcement - wire fabrics
- Ribbon: ASD - Reinforcement / Definition - reinforcement / Surface reinforcement - wire fabrics
- Toolbar: Definition - wire fabrics / Surface reinforcement - wire fabrics 
- Command line: RBCR_NETD_RECT.

 *NOTE:*

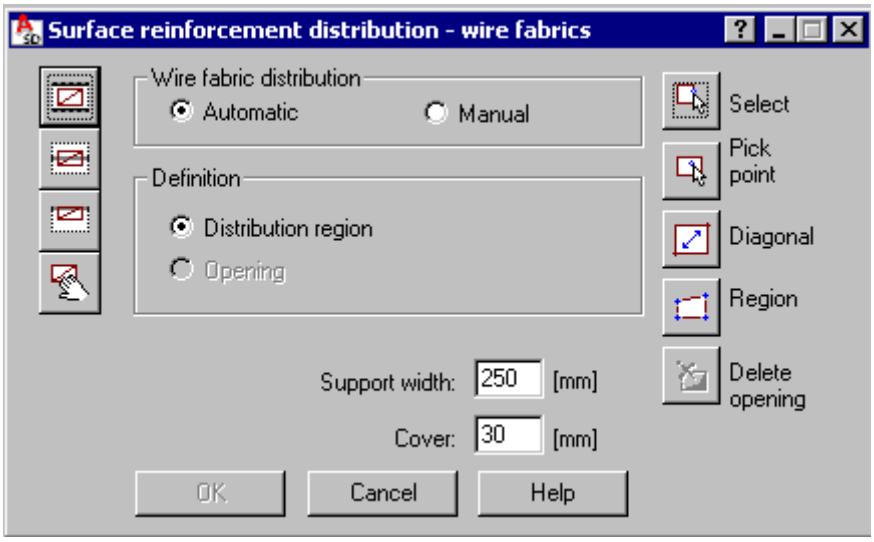
A total number of wire fabrics (panels) is calculated; cuttings obtained while trimming wire fabrics are not considered in reinforcement tables.

 *NOTE:*

Databases of wire fabrics (.xml files) used in the surface distribution are available. For example, the file name for the British code, is fabric_BS.xml (after the part 'fabric', the name of the code chosen in the Job preferences is added). Database files are available in the DATA folder. Wire fabric databases can be modified in order to adapt wire fabric parameters based on use.*

© 2010 Autodesk, Inc. All rights reserved

After selecting the *Surface reinforcement - wire fabrics* option, the following dialog displays:



NOTE:
A defined contour is a common contour for generation of reinforcing bar distribution and wire fabric distribution (bar distribution is generated in the contour for wire fabrics and vice versa).

The dialog is divided into three main parts:
The left side of the dialog contains four icons which specify the type of distribution:
- **Distribution A** - wire fabric distribution within a span (within the defined contour e.g. plate span or wall)
- **Distribution B** - wire fabric distribution above the intermediate support (with respect to the support axis)
- **Distribution C** - wire fabric distribution above the extreme support (along the support edge)
- **Distribution D** - any manner of wire fabric distribution (without the necessity to define a contour) without trimming wire fabrics.

There are two modes of defining surface distribution available:
- Automatic mode – an indicated contour is detected automatically and wire fabrics are trimmed to fit the contour
- Manual mode – wire fabrics are distributed manually and timmed automatically to fit the contour.

For both modes, identical methods of wire fabric definition are available.

In the middle of the dialog, the parameters used to define a selected distribution type are available:
Distribution A
The top of the dialog includes options used to define the distribution region or opening(s); there are edit fields available used to define values of cover for wire fabrics and support width. When starting definition of a distribution contour, the *Opening* option is inaccessible, whereas the *Distribution region* option is active and selected. Once the contour definition is complete, the *Distribution region* option is no longer active, whereas the *Opening* option becomes active and selected. You can then define an opening contour within the earlier-defined contour; a number of openings are determined.
Distribution B
The following options are available:
- Edit field used to define the support width
- Edit fields used to define the value informing how far the wire fabric extends outside the support face (in both directions).

© 2010 Autodesk, Inc. All rights reserved

Distribution C
The following options are available:

- Edit field used to define the cover value for wire fabrics
- Edit field used to define the support width
- Edit field used to define the value informing how far the wire fabric extends outside the support face.

Distribution D
The options in the middle of the dialog are inaccessible.

There are two reasons for defining support width:

- Contour within which wire fabric is to be distributed is an external contour of a slab or wall; definition of a support width value models the support (wall) – within the support region a wire fabric will not be generated
- After determining the support width, overhangs are defined automatically – when defining reinforcement above supports (distribution B or C), they are recognized automatically.

The right side of the dialog contains several icons used to specify a region of wire fabric distribution:
for **Distribution A**

 - *Select* (selects directly a region defined as rectangle, polygon, circle or indicates the existing defined distribution region)

 - *Pick point* (indicates an internal point for a closed region; as a result of the operation, the region contour is detected)

 - *Diagonal* (determines rectangular region by means of defining its diagonal)

 - *Region* (defines closed region by means of a broken line)

 - *Delete opening* (allows deleting an earlier-defined opening contour)

for **Distribution B** and **C**

 - *Select* (selects directly one edge of a region defined as line or support)

 - *2 Points* (indicates two points determining the axis of a rectilinear support)

In the dialog, you can define dimensions (apart from a cover value and width support) which inform how far a wire fabric extends outside the support face.

for **Distribution D**
Icons are inaccessible. Click **OK**, to switch to distribution definition (without definition of a region).

 *NOTE:*
*If **distribution A, B** or **C** is selected, then it is required to define a region in which wire fabrics will be distributed; therefore, the **OK** button is unavailable until the region is defined. The necessity of defining the region is imposed by the subsequent mode of wire fabric definition; wire fabrics distributed one by one are moved to the edges of a defined region or trimmed and adjusted to the region contour.*

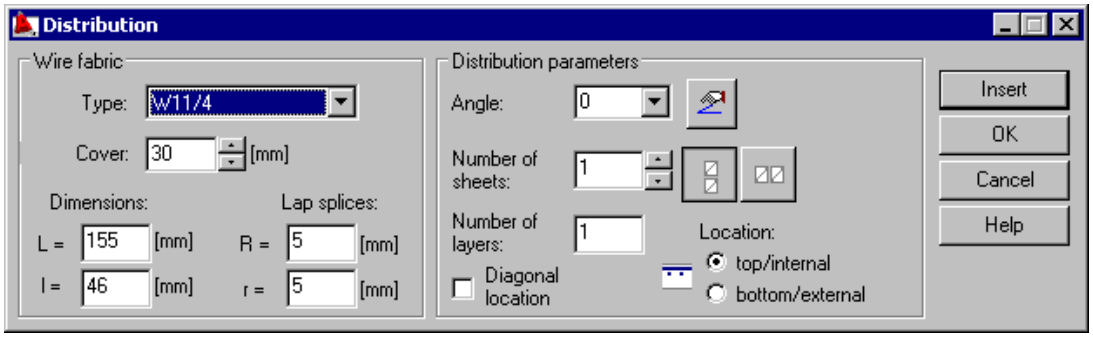
Once the **OK** button is clicked, the Wire fabric distribution – manual mode or the Wire fabric distribution – automatic mode dialog opens.
The bottom of the dialog displays a description of the option selected.

See also:
Example of definition of wire fabric surface distribution

© 2010 Autodesk, Inc. All rights reserved

14.2.Wire fabric distribution - manual mode

After choosing the manual mode of wire fabric definition and clicking **OK** in the Surface reinforcement distribution – wire fabrics dialog, the following dialog displays:



The options available in the dialog are used to parametrize distribution in the region defined:

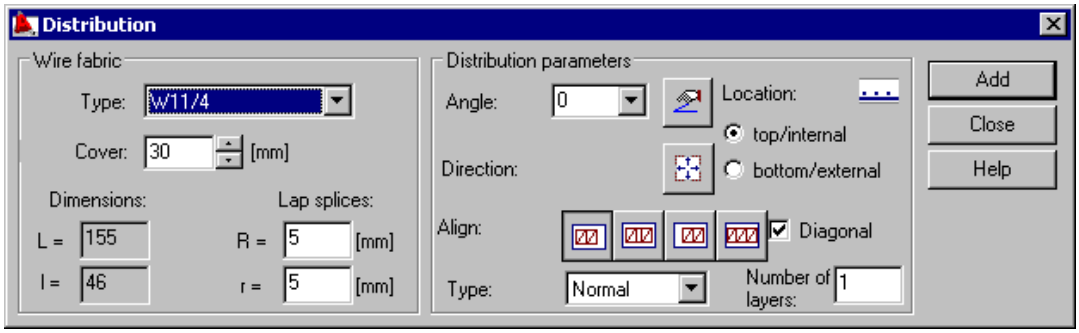
- In the *Wire fabric* field, you select a wire fabric type from the list; contents of the list depend on the RC code selected in the Job preferences dialog (similarly as for reinforcing bars); once the wire fabric type is selected, the fields are filled automatically with data from the fabric_xxxx.xml file (where xxxx stands for a name of wire fabric database) located in the DATA folder.
  NOTE: You can modify the wire fabric database or add user-defined types of wire fabrics in the file of wire fabric database - new records have to be given identical descriptions as records existing in the database:
  Wire fabric cover
  L and l - total dimensions of a wire fabric sheet (the dimensions may only be decreased - they cannot be increased)
  R and r - lap slices; these dimensions are ascribed to a given wire fabric and saved in the wire fabric database

- In the *Distribution parameters* field the following options are available:
  Angle - the selection list containing angle values (the angle value may be changed); clicking  enables reading the inclination angle of the indicated edge of a region contour directly from a drawing
  Number of sheets- use this option to insert simultaneously several wire fabric sheets; if a number of sheets is greater than 1, then the following become accessible:  and  (they are used to determine how the sheets are to be positioned with respect to each other) *Number of layers* - information only for the needs of the subsequent wire fabric table
  Location (*top/internal, bottom/external*) - parameter describing location of wire fabrics; it affects graphical representation of wire fabrics (see Job preferences).

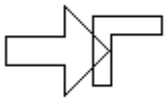
© 2010 Autodesk, Inc. All rights reserved

14.3.Wire fabric distribution - automatic mode

After choosing the automatic mode of wire fabric definition and clicking **OK,** the Surface reinforcement distribution – wire fabrics dialog displays:

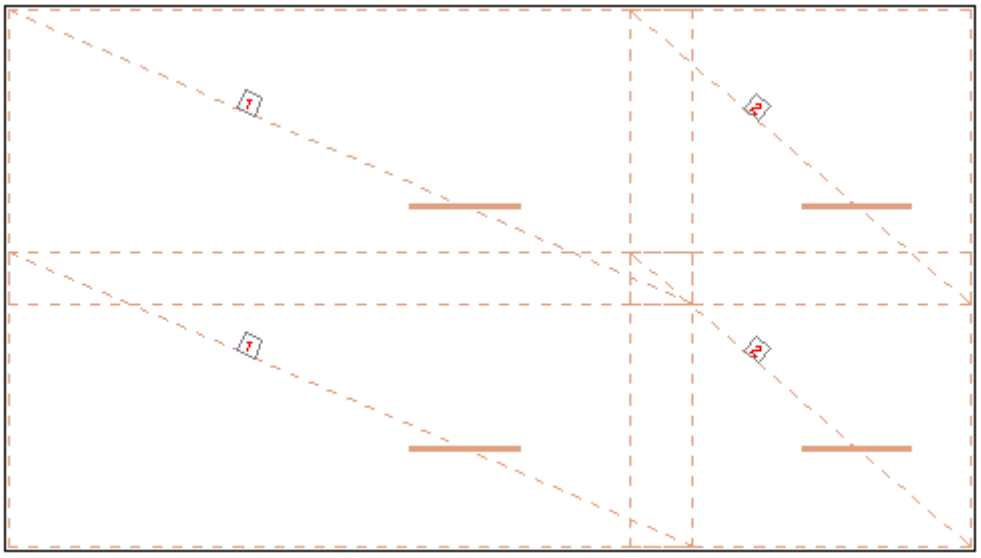


The options contained in the dialog are used to parametrize distribution in the region defined:

- In the *Wire fabric* field, you select a wire fabric type from the list; contents of the list depend on the RC code selected in the Job preferences dialog (similarly as for reinforcing bars); once the wire fabric type is selected, the fields are filled automatically with data from the fabric_xxxx.xml file (where xxxx stands for a name of wire fabric database) located in the DATA folder.
  NOTE: You can modify the wire fabric database or add user-defined types of wire fabrics in the file of wire fabric database - new records have to be given identical descriptions as records existing in the database:
  Wire fabric cover
  L and l - total dimensions of a wire fabric sheet (the dimensions may only be decreased - they cannot be increased)
  R and r - lap slices; these dimensions are ascribed to a given wire fabric and saved in the wire fabric database
- In the *Distribution parameters* field the following options are available:
  Angle - the selection list containing angle values (the angle value may be changed); clicking  enables reading the inclination angle of the indicated edge of a region contour directly from a drawing
  Direction – indicates the contour side from which wire fabric distribution will start; clicking  enables changing the direction wire fabric distribution; the side from which wire fabric distribution will begin, is identified in a drawing by means of the  symbol
  Align – determines the side with respect to which the generated wire fabrics will be aligned:
   – aligns to 1st edge
   – after selecting this option, one edit field for defining a lap splice of wire fabrics becomes inaccesible; it means that lap splice lengths will be increased automatically in such a manner so that wire fabrics are aligned on both sides without the necessity to trim wire fabric sheets
   – aligns to the 2nd (opposite) edge
   - aligns to both edges; after you select this option, the edit fields for defining the lap splice of wire fabrics become inaccessible
  After selecting the *Diagonal* option, the location of the diagonal changes in the wire fabric distribution (if the diagonal is displayed in the distribution)
  Number of layers - information only for the needs of the subsequent wire fabric table
  Location (*top/internal, bottom/external*) - parameter describing location of wire fabrics; it affects graphical representation of wire fabrics.

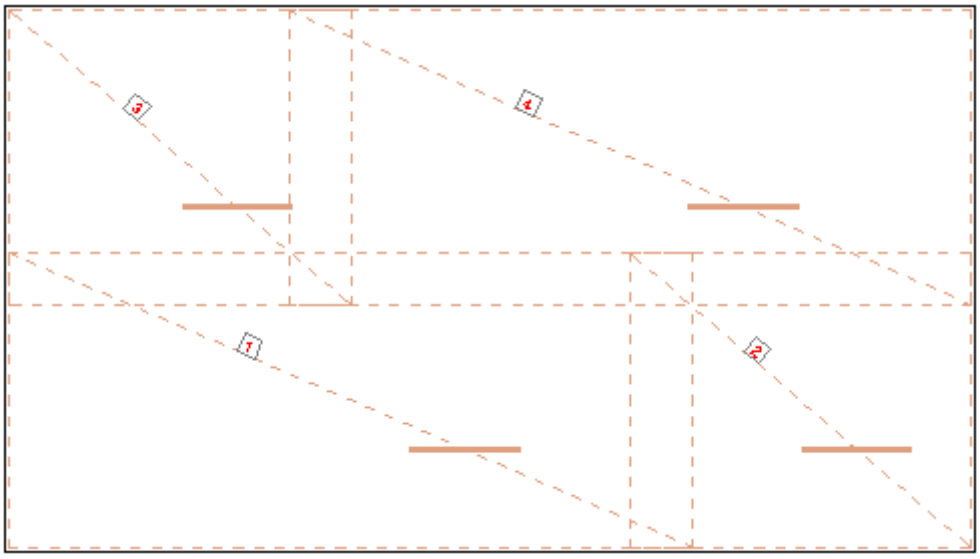
© 2010 Autodesk, Inc. All rights reserved

Grouping – if this option is selected, then wire fabrics of identical parameters positioned next to each other (i.e. with their edges touching) are presented as one object; it is an operation aimed at improving transparency and readability of a whole drawing
Type – allows selecting one out of three possibilities:
normal type – shown in the drawing below



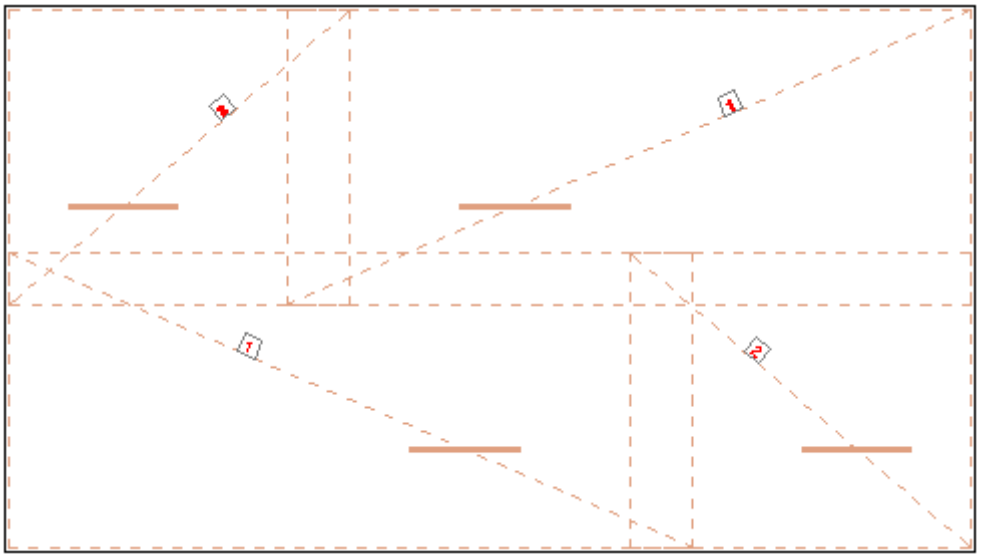
passing and half-way types - wire fabrics are shifted in relation to each other by half the length (to avoid concentration of lap splices of several wire fabrics at the same point) – shown in the drawings below

half-way type

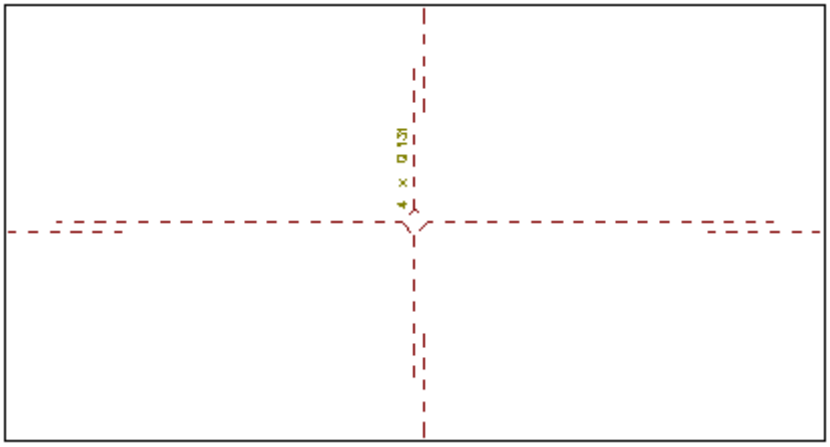


© 2010 Autodesk, Inc. All rights reserved

passing type



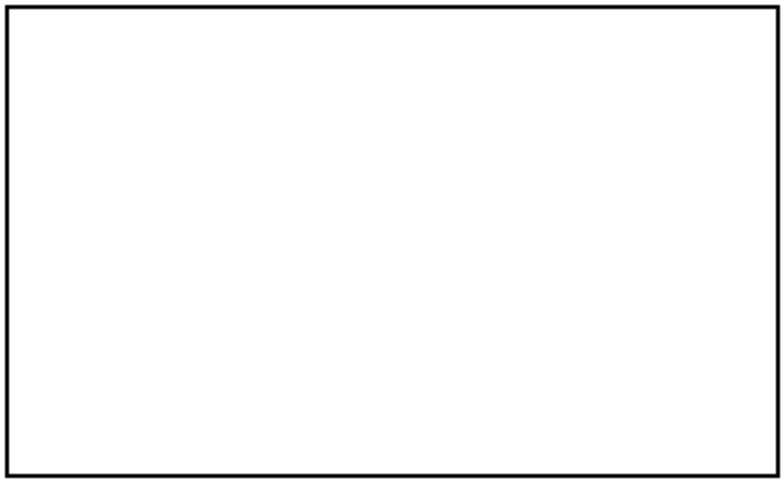
There is also a possibility of simplified presentation of wire fabrics; the drawing below shows the simplified method of presenting a generated wire fabric.



© 2010 Autodesk, Inc. All rights reserved

14.4. Example of definition of wire fabric surface distribution

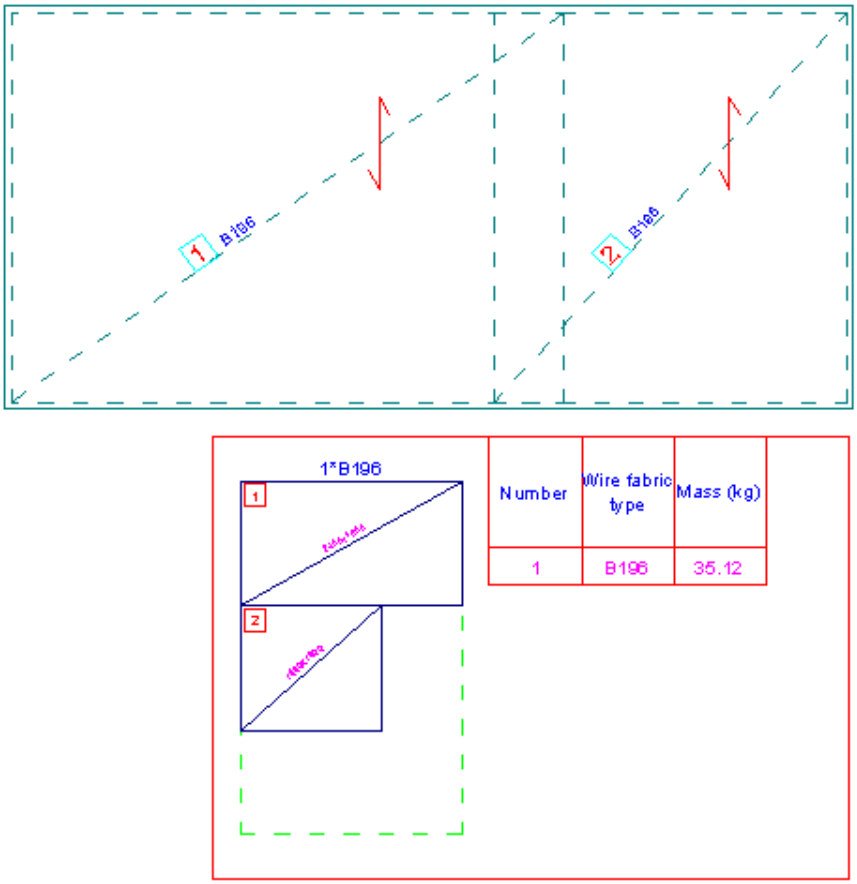
The following drawing illustrates the surface distribution of wire fabrics in a slab.



To define the surface distribution of wire fabrics in a slab, follow these steps:

1. Click the Surface reinforcement - wire fabrics icon 
2. Specify the parameters listed below:
   - wire fabric distribution: automatic
   - distribution type: 
   - support width = 250 mm
   - cover = 30 mm
3. Click  ***Pick point***, and indicate a point located within the slab contour
4. Select the *Distribution region* option and click **OK**.
5. In the ***Distribution*** dialog, specify the parameters listed below:
   Wire fabric field:
   type: B196
   lap splices: R = 450 mm, r = 300 mm
   Distribution parameters field:
   angle = 90
   location: top/internal
   align:  to 1st edge
   type: normal
   Grouping option: switched off
   number of layers: 1
6. Click **Add**; the generated surface distribution of wire fabrics is shown in the drawing below (a summary table for wire fabrics has been added; view the table by clicking the icon
   Wire fabrics - summary table ).

© 2010 Autodesk, Inc. All rights reserved



15. SURFACE REINFORCEMENT DISTRIBUTION - BARS

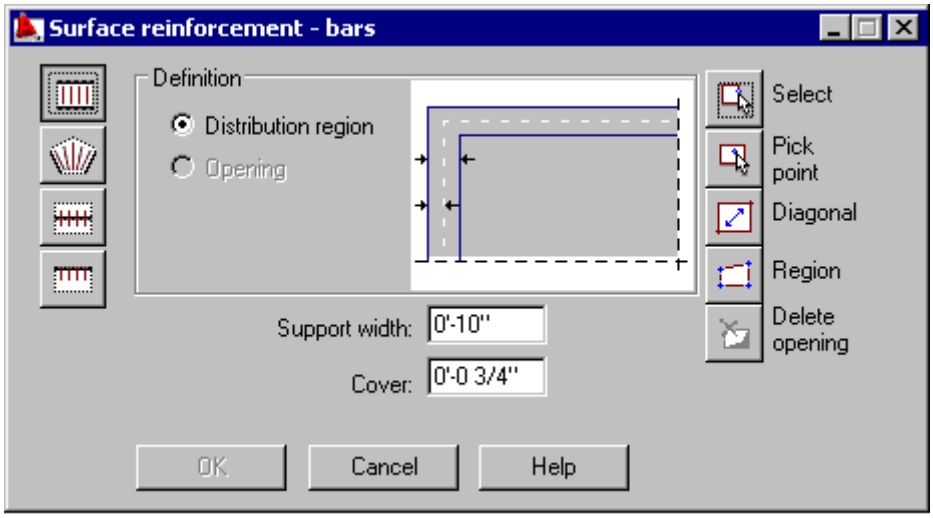
15.1.Surface reinforcement - bars

Use this option to define reinforcement distribution for reinforcing bars for 2D contours (e.g. wall or RC slab). There are three ways to access this option from:

- Menu: Reinforcement / Surface reinforcement - bars
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Surface distribution - bars
- Toolbar: Definition - bars / Surface reinforcement - bars 
- Command line: RBCR_DEF_BAR_SURF.

© 2010 Autodesk, Inc. All rights reserved

Once activated, the following dialog displays:



NOTE:
There are available databases of reinforcing bars (.xml files) used in the surface distribution. The file name, for example for the British code, is bar_BS 8666_2000.xml (after the part 'bar', the name of the code chosen in the Job preferences is added). Bar databases can be modified in order to adapt bar parameters.*

While defining distribution, an object contour (e.g. plate, wall with supports) is generated as a closed external contour. Into the defined region objects such as supports or unsupported edges are introduced. You can define (or remove) an opening in a defined region.

NOTE:
A defined contour is a common contour for generation of reinforcing bar distribution and wire fabric distribution (bar distribution may be generated in the contour for wire fabrics and vice versa).

There are two reasons for defining support width:

- Contour within which reinforcement is distributed is an external contour of a slab or wall; definition of a support width value models the support (wall) – within the support region reinforcement distribution will not be generated
- After determining the support width, automatically overhangs are defined – when defining reinforcement above supports (distribution B or C), they are recognized automatically.

The dialog is divided into three main parts:
The left side of the dialog contains four icons which determine the type of distribution (type of region):
- **Distribution A** – surface distribution of bars within a defined contour (e.g. span of slab or wall)
- **Distribution B** – surface distribution of bars above the intermediate support (with respect to the support axis)
- **Distribution C** - surface distribution of bars above the extreme support (along the support edge).
- **Distribution D** - surface distribution of bars within a defined contour (a distribution region is defined as distribution A, whereas bars are distributed radially ('fan-shaped' arrangement) between both edges).

© 2010 Autodesk, Inc. All rights reserved

The middle of the dialog includes parameters which are indispensable while defining a selected distribution type:

Distribution A
The top of the dialog contains options to define a distribution region or opening(s); additionally, there are edit fields available to define support width values and reinforcement cover.
When defining a contour of reinforcement distribution, the *Opening* option is inaccessible, whereas the *Distribution region* option is active and selected. Once definition of a contour is completed, the *Distribution region* option is no longer active, whereas the *Opening* option becomes active and selected. You may define an opening contour within the earlier-defined contour; a number of openings are determined.

Distribution B
The following options are provided in the middle of the dialog:

- Edit field defines support width
- Edit field defines a value indicating how far the reinforcement extends outside the support face (in both directions).

Distribution C
The following options are provided in the middle of the dialog:

- Edit field defines a reinforcement cover value
- Edit field defines support width
- Edit field defines a value indicating how far the reinforcement extends outside the support face.

Distribution D
Definition of a distribution region is similar to Distribution A, assuming that the radial distribution is distribution in one zone; bars are distributed radially ('fan-shaped' arrangement) between two edges. The bar spacing is constant only in one line (referred to as a distribution line).

The right of the dialog contains several icons used to choose the mode of graphical definition of distribution. The number of icons depends on a selected type of surface distribution.
for **Distribution A**

 - *Select* (direct selection of a region defined as rectangle, polygon, circle or indication of an existing region)

Command line:
Select object
Distribution direction
Select / 2Points

where:
select object – indicates an object defining the contour of distribution region
select – indicates the contour side determining distribution direction
2Points – indicates 2 points that determine distribution direction

 - *Pick point* (indicates an internal point of a closed region; as a result of the operation, the region contour is detected)

Command line:
Pick object internal point
Distribution direction
Select / 2Points

where:
object internal point – indicates a point positioned within the object defining a contour
select – indicates the contour side determining distribution direction
2Points – indicates 2 points that determine distribution direction

 - *Diagonal* (defines a rectangular region by determining its diagonal)

© 2010 Autodesk, Inc. All rights reserved

Command line:
First corner
Second corner
Distribution direction
Select / 2Points

where:
first, second corner – defines the opposite apexes of a rectangle defining the contour
select – indicates the contour side determining distribution direction
2Points – indicates 2 points that determine distribution direction

 - *Region* (defines a closed region by means of a broken line) – in this definition mode supports with different width values on contour edges may be defined

Command line:
First point
Next points [Cover / Support width]
Distribution direction
Select / 2Points

where:
first, second, …, next point – defines apexes of a polygon defining the contour
cover – determines cover values for each contour edge separately
support width – determines support width values for each contour edge separately
select – indicates the contour side determining distribution direction
2Points – indicates 2 points that determine distribution direction

 - *Delete opening* (allows deleting an earlier-defined opening contour)

for **Distribution B** and **C**
 - *Select* (selects directly one edge of a contour defined as line or support)

Command line:
Select support
Continue or change [Side / Support width / First overhang / Second overhang]

where:
select support – indicates a line denoting support of a slab or wall
side – determines on which support side reinforcement is to be located (refers to distribution C)
support width – determines a support width value
first and second overhang – determines an overhang value on both sides of the support (for distribution C – on one side of the support)

 - *2 Points* (indicates two points determining the axis of a rectilinear support)

Command line:
Select first point
Select second point or [Side / Support width / First overhang / Second overhang]

where:
first and second point – indicates first and second point of a line denoting the support of a slab or wall
side – determines on which support side reinforcement is to be located (refers to distribution C)
support width – determines a support width value

© 2010 Autodesk, Inc. All rights reserved

first and second overhang – determines an overhang value on both sides of the support (for distribution C – on one side of the support)

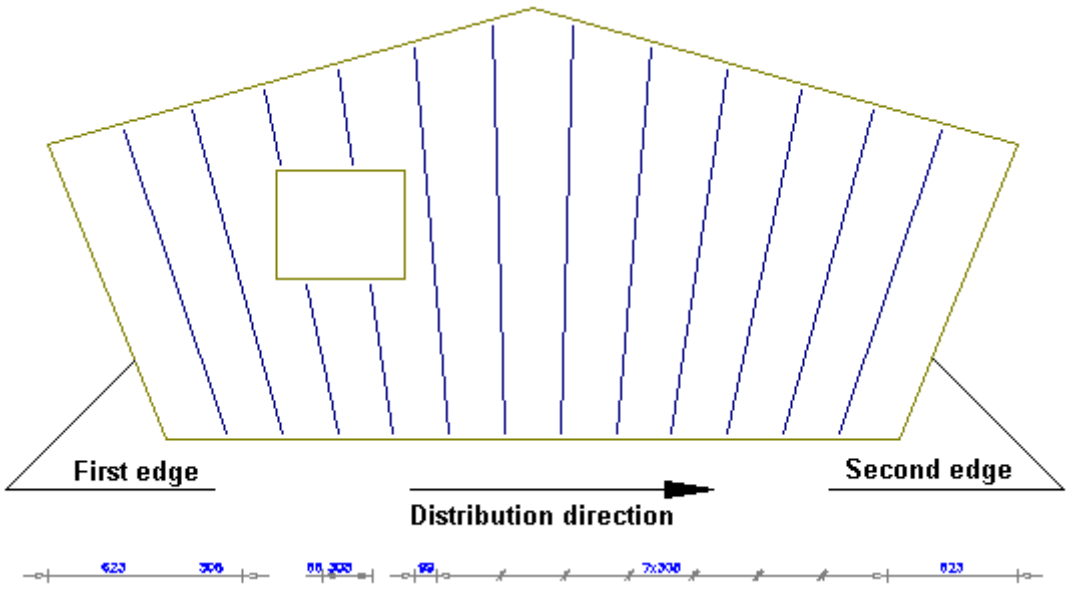
Furthermore, for distribution C it should be determined on which side of a support the reinforcement is to be located.
In the dialog, define dimensions (apart from a cover value and support width) for the distance that the reinforcement extends outside the support face. One or more supports may be selected.

for **Distribution D**
The list of icons located in the right-hand side of the dialog is identical as for distribution A.

Command line:
Distribution direction [Select / 2Points]
first edge
second edge
location of a distribution line (when determining the location of a description)

where:
distribution direction:
2 points – after indicating the points, a line is drawn that joins these points, which at the same time is the line of constant distribution; bars are distributed radially (‘fan-shaped’ arrangement) between two edges intersected by this line
select – indicate two edges; once they are selected, a line is drawn that joins the centers of these edges, which at the same time is the line of constant distribution of bars.
First, second edge – lines that limit the radial (‘fan-shaped") distribution
location of a distribution line – a dimension line of the distribution description which shows a bar spacing in the distribution line.

Below are presented elements needed to define the radial (‘fan-shaped") distribution for an example contour with the distribution.



Click **OK**, the Reinforcement: definition and detailing dialog displays.

NOTE:
For surface distribution of a bar, a DETAILED table is also available: table with total numbers of reinforcing bar consumption split into individual bar diameters.

© 2010 Autodesk, Inc. All rights reserved

NOTE:
Description of each reinforcing bar of the surface bar distribution is provided outside the formwork contour (Reinforcing bars – symbol).

See also:
Example definition of surface bar distribution

15.2. Reinforcement - definition and detailing

The Reinforcement – definition and detailing dialog consists of the following tabs:
Reinforcement
Shape
Openings
Reinforcement detailing
Detailing options
Reinforcement lap
Additional parameters.
Access the dialog by clicking OK, from the Surface reinforcement - bars dialog.

After defining a region, a direction of distribution is suggested automatically; the direction may be subject to modifications (by selecting an edge or by defining two points).
Reinforcement distribution is always perpendicular with respect to the distribution direction.
Length of bars in the distribution is adjusted to the shape of a region contour considering the cover and occurrence of openings, if need be.

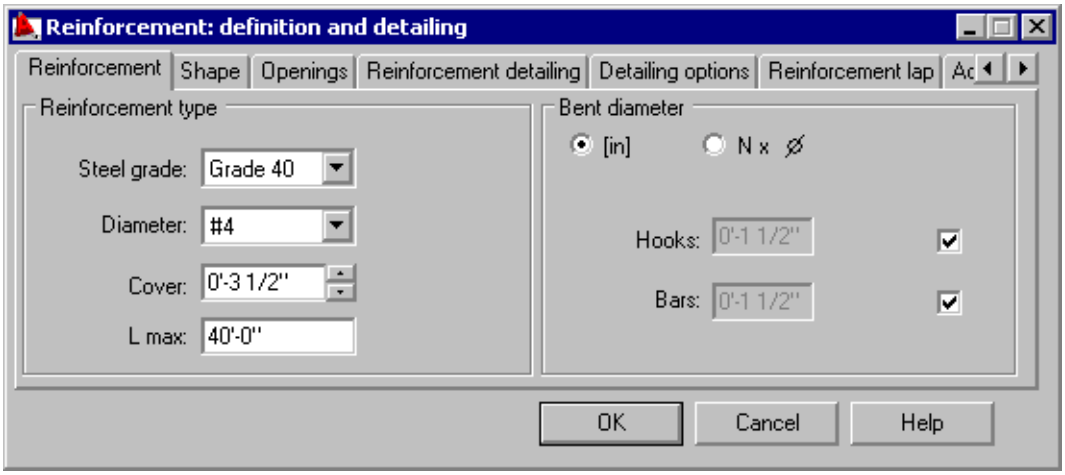
The distribution is divided automatically into sectors (in case of a fairly complicated contour shape). Reinforcement in each of the sectors is described separately.

After definition of reinforcement and its distribution within the defined region, the Reinforcement description dialog displays.

See also:
Example definition of surface bar distribution

15.3. Reinforcement

Access this dialog by selecting the *Reinforcement* tab from the Reinforcement: definition and detailing dialog. The following dialog displays:



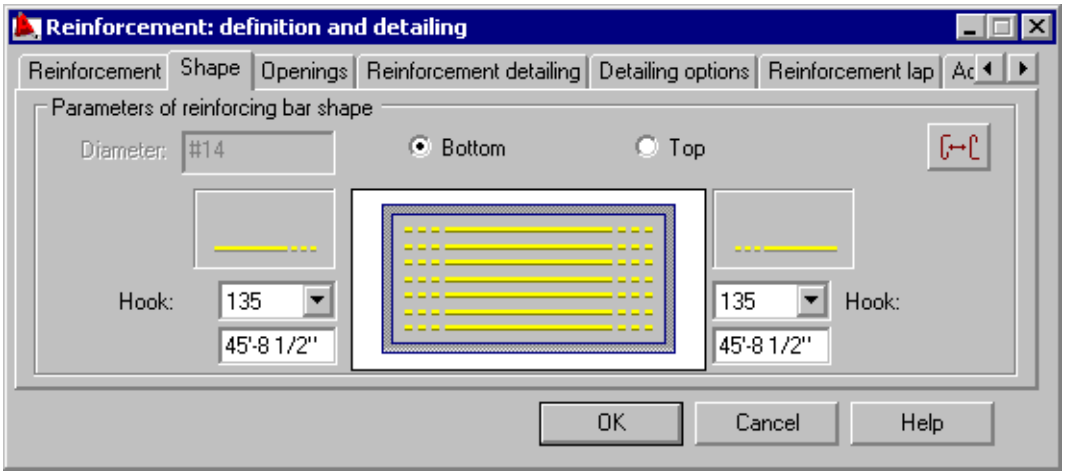
© 2010 Autodesk, Inc. All rights reserved

Specify the following parameters:

- In the *Reinforcement type* field:
  - steel grade
  - reinforcement diameter
  - reinforcement cover
  - maximum length of reinforcing bars
- In the *Bent diameter* field - bent diameters for bars and hooks; specify the diameter as a value (in units) or as the multiple of a bar diameter.
  To ensure that all generated bars or hooks in the distribution have the same bent diameters and equal values are entered in the *Bars* and/or *Hooks* fields, select the option (√) next to one and/or both these fields; NOTE: after selecting these options the *Bars* and *Hooks* fields are not available.

15.4.Shape

Select the *Shape* tab in the Reinforcement: definition and detailing dialog to display the following options.



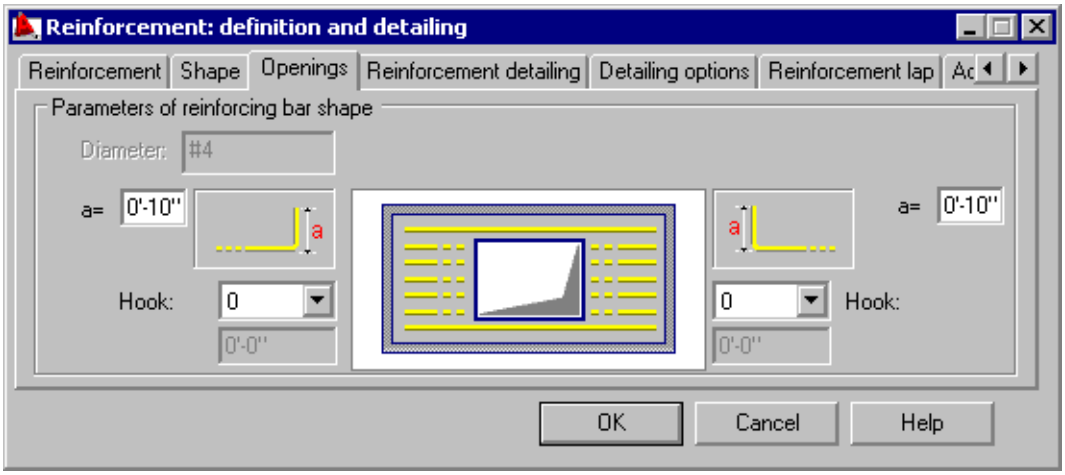
Specify the following parameters in the Shape parameters dialog:

- reinforcement location in the lower or upper part of the slab
- the orientation of asymmetrical reinforcement which may be set by clicking the icon ; it allows you to specify on which side of the bar (beginning or end) the selected types of bar ends are located.
- the geometry of bar ends (note that bar ends always have dimensions as defined in the dialog, whereas a length of the middle part of bars can be changed while defining a distribution). Cick the icon representing a bar end type to open the ***Shape definition*** dialog where you can select a bar end; using this dialog you can specify values of dimensions for the bar end; the problem of agreeing of the upper and the lower bars' endings is taken in consideration.
- moreover, you can define hook ends with specified angles for bars.

15.5.Openings

Select the *Openings* tab in the Reinforcement: definition and detailing dialog to display the following options.

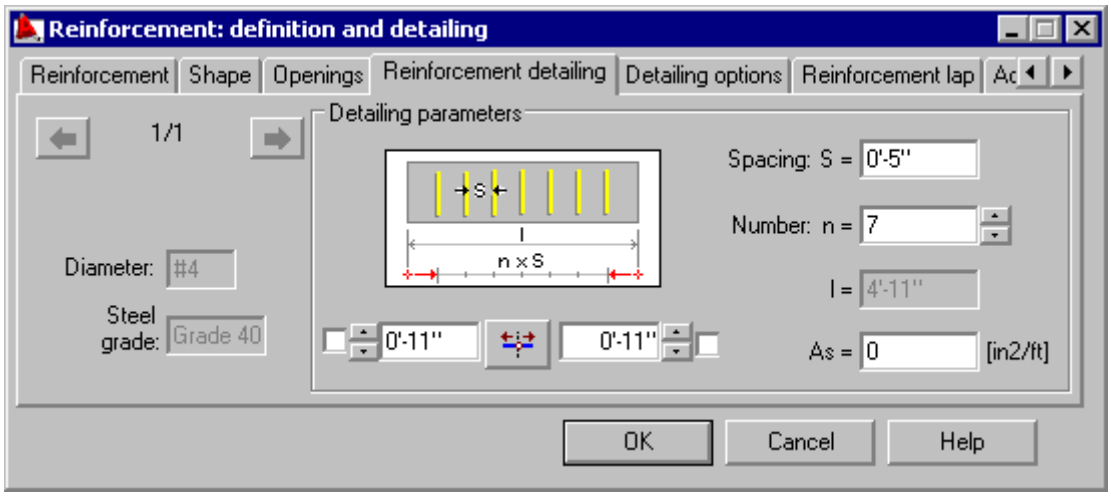
© 2010 Autodesk, Inc. All rights reserved



Use this dialog to specify parameters for bar ends near openings. The same end types as for other bars are available for bars that adjoin to openings (see the Shape tab).
If reinforcing bars pass through an opening, they are divided into 2 parts (on 2 sides of the opening). You can define an end type for each part of a divided bar; thus bar ends on both sides of the opening may differ.
Note that a bar may adjoin to the opening with one end and with the other - to the slab edge; ends of such bar are defined on 2 tabs (*Openings* and *Shape*) then.

15.6.Reinforcement detailing

Access this dialog by selecting the *Reinforcement detailing* tab in the Reinforcement: definition and detailing dialog. The following dialog displays:



The options contained in the above dialog are used for defining parameters of reinforcement distribution.
The distance between the distributed bars and distribution line is assumed by default to be the cover adopted from the bar shape. The direction of distribution is parallel to the defined distribution line.
Distribution parameters may be defined by:

- Defining a value of reinforcement spacing (this is the basic quantity and the basis for calculation of the remaining quantities)
- Determining a value of n parameter – it corresponds to the number of reinforcement spacings (NOTE: this value should not be confused with the reinforcement number which equals n+1)
- Determining reinforcement area.

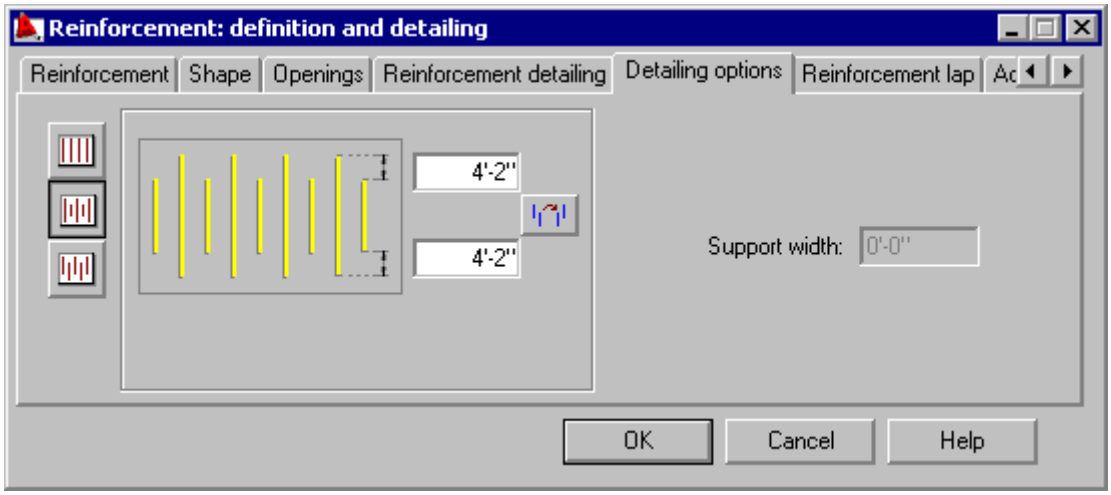
© 2010 Autodesk, Inc. All rights reserved

Change in any of the parameters listed, results in updating the values of the remaining parameters.
A schematic drawing provided in the dialog illustrates the parameters described above. The options located next to the drawing allows you to place the reinforcement distribution in a given zone:

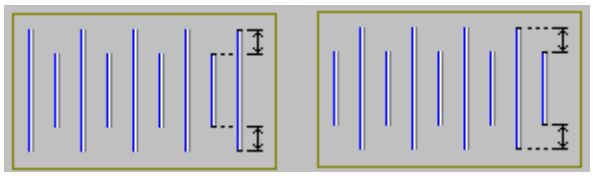
- Two edit fields determine a value of the distance between the extreme reinforcement and the zone border; there is a possibility to block the distance value for each zone – once the distance on one side is blocked, the distance value on the other side will be automatically adjusted to a specified number of bars and a spacing value; after blocking the distance on both sides, the spacing will be adjusted automatically to a given number of bars
- The button located between the edit fields enables centering the distribution.

15.7.Detailing options

This option is used to enable a more exact definition of the method of reinforcement distribution. Access this dialog by selecting the *Detailing options* tab in the Reinforcement: definition and detailing dialog. The following dialog displays:



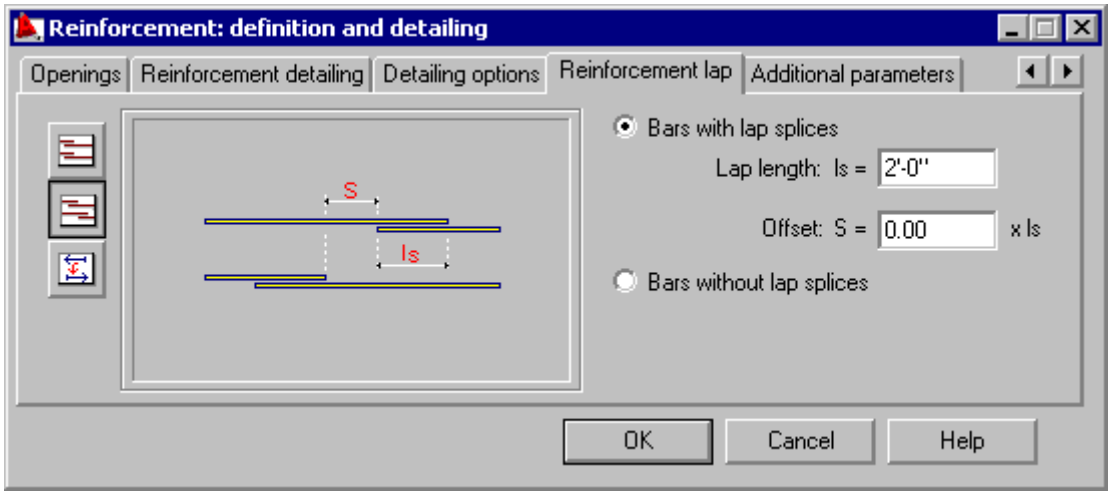
In the left side of the dialog three icons are provided:
 – for this type no parameters are determined: the whole surface is covered evenly with bars
 – defines passing distribution: every second bar extends from edge to edge, as regards the remaining ones, they end in a proper distance from the edge; middle bars are always straight bars; two edit fields enable defining the length of the middle bars and the additional icon located between the edit fields is used for changing the array (see the drawing below)
 - defines passing distribution: bars in the distribution are of the same shape, however, they are shifted with respect to each other; if there is an opening (in the zone near support), application of this distribution type is not justified, then the uniform distribution is applied.
The support width option is inaccessible; it is used when defining distribution above supports.



© 2010 Autodesk, Inc. All rights reserved

15.8.Reinforcement lap

Access this option by selecting the *Reinforcement lap* tab in the Reinforcement: definition and detailing dialog. The following dialog displays:



When main reinforcement is being distributed, it may prove necessary to use reinforcement laps. If reinforcement length exceeds the value defined in the preferences (e.g. 12 000 mm), then the options provided on this tab enable defining reinforcement laps (connections of reinforcing bars).
The options provided on this tab allow you to:
1. Determine if bars should be with or without laps
2. Specify parameters of bars with laps.
If the *Bars without lap splices* option is selected, then reinforcement laps will not be used in a reinforcement distribution. Bars will be distributed so that they fit the distribution region, but without considering the maximum length of bars (single bars in the distribution may be longer than Lmax) and without laps. The reinforcement table included information about the total length of bars in a distribution multiplied by a factor defined in the ***Job preferences*** dialog (the Options tab).
'LM' bars are bars presented in the table in running meters as a total sum of all segments formed as a result of distribution.
If the *Bars with lap splices* option is selected, then reinforcement laps is created during reinforcement distribution. The following parameters of reinforcement laps are defined:

- A lap length (proposed value is a multiple of reinforcement diameter)
- A value of an offset when laps are arranged in the passing manner.

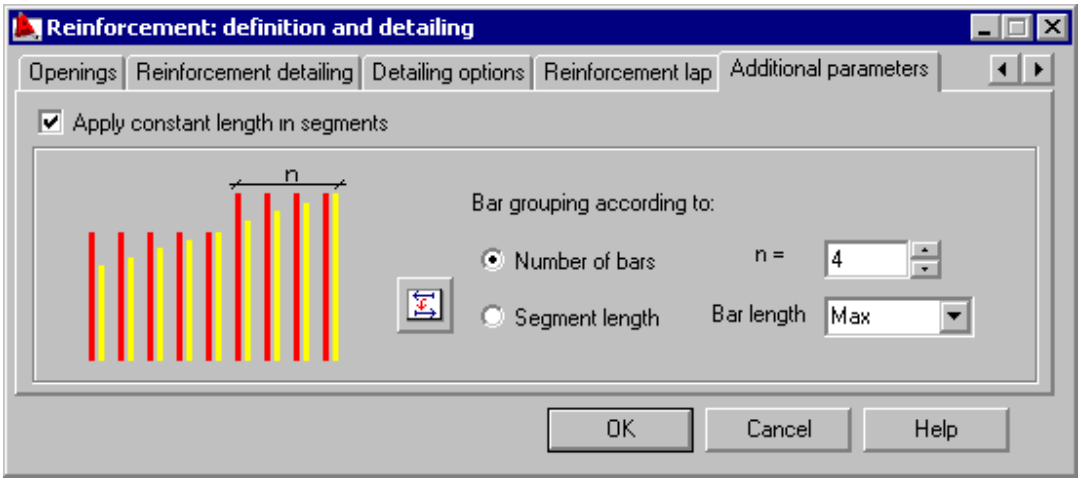
Definition of positions of Z laps involve changing the lap position (mirror reflection with respect to the bar center).

NOTE:
Reinforcement laps do not refer to the distributed reinforcement.

© 2010 Autodesk, Inc. All rights reserved

15.9. Additional parameters

Access this option by selecting the *Additional parameters* tab in the Reinforcement: definition and detailing dialog. The following dialog displays:



You can select the Apply constant length in segments option in the above dialog.
The option allows for automatic bar distribution in case one or more edges is inclined. The option allows to apply so-called constant length in segments, i.e. grouping the bars according to the rule defined in the dialog, and assigning constant length to them in a given group.

Bars can be grouped in two ways:

- Number of bars - by indicating the number of bars in a group in the ‘n’ field
- Segment length - by indicating the length of the sector containing bars of the same length.

Moreover, there is a possibility to select the maximum or the minimum bar length in a given group for both types in the Bar length field.

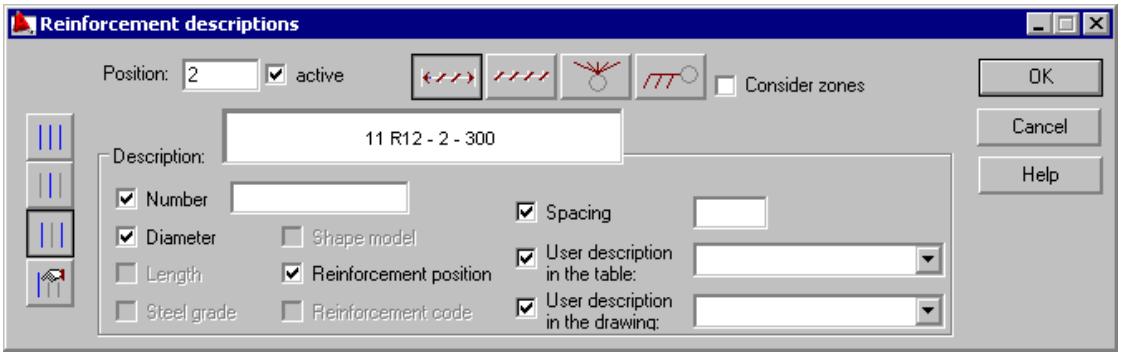
Additionally, the direction of starting the bar group definition can be changed by means of the  icon.

Note:
The automatic adjustment of the bars to the inclined edge takes in consideration the length precision defined in the dialog settings Job preferences

15.10. Description of reinforcement distribution

These options are used to enable final selection of reinforcement description and distribution (by deselecting active variables that are initialized based on the defined syntax). After completing reinforcement definition and determining its distribution within the defined region, the following dialog displays:

© 2010 Autodesk, Inc. All rights reserved



The following options are provided in the dialog:

- The *Active* option provides information about the current reinforcement position and allows you to avoid double or multiple calculation of the same reinforcement while preparing the reinforcement table.
  This part of the dialog also contains the *Consider zones* options; if this option is selected, then individual zones of reinforcement distribution are described separately, however, if this option is cleared, all zones of reinforcement distribution are described.
- Icons used to define the method of presenting distribution:
  – all elements are presented in a drawing of given reinforcement distribution
  – only the middle representative of distribution in a given zone is presented (the remaining elements are not visible)
  – only extreme elements of distribution in a given zone are presented (the remaining elements are not visible)
  – indicates graphically distribution elements to be presented
- The fields: *User description in the drawing* and *User description in the table* allows you to add a reinforcement description; the description displays in drawings (included in bar descriptions in the drawing) and in the table (included only in the reinforcement table); the added text is added to the selection list; text taken from the library of standard descriptions may also be applied. These descriptions assume the style of the text describing the reinforcement. The user description displays in several lines; then the mechanisms accessible in AutoCAD® are applied. The user description together with an extension line and a label make up one object. Such an object can be translated or rotated using the *Explode* option.

A description is assigned to the defined reinforcing bar distribution sector by sector (a sector is a contour part automatically recognized by the program as a part with similar distribution).

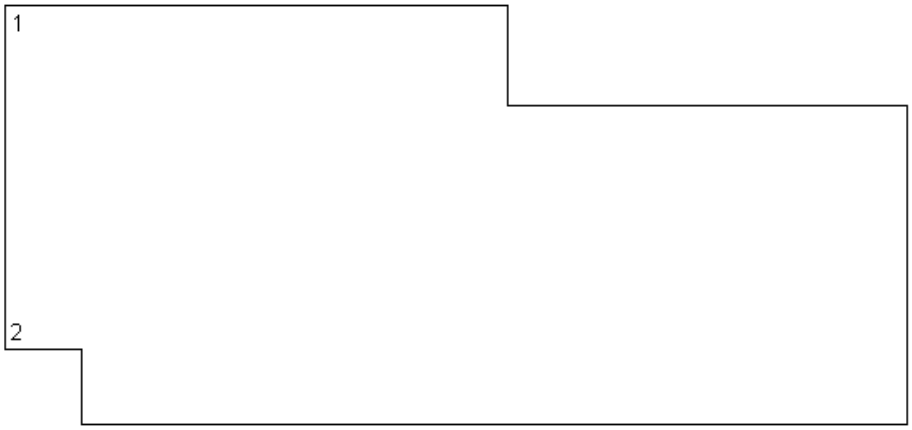
NOTE:
For surface distribution of a bar a DETAILED table is also available: table with total numbers of reinforcing bar consumption split into individual bar diameters.

NOTE:
Description of each reinforcing bar of the surface bar distribution is provided outside the formwork contour (Reinforcement bars – symbol).

© 2010 Autodesk, Inc. All rights reserved

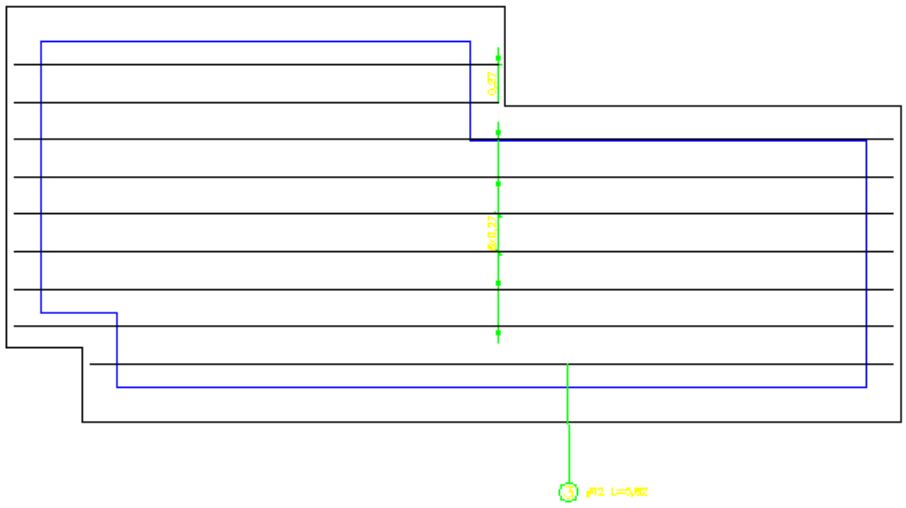
15.11. Example definition of surface bar distribution

This option is used to define surface bar distribution within the slab. The following dialog displays:



To define the surface bar distribution:

1. In the ***Surface reinforcement – bars*** dialog select distribution type  (method A) – distribution within a defined contour.
2. Define values of support width (25 cm) and cover (5 cm) – there will be identical values assumed for each contour edge.
3. Click  (*Pick point)*.
4. Indicate any point within the contour displayed.
5. Click **OK**.
6. In the command line, choose the 2Points command and indicate graphically point 1 and 2.
7. Click **Enter**. The ***Reinforcement: definition and detailing dialog*** displays.
8. On the *Reinforcement detailing* tab change the number of bars in the *Number n* field (the remaining values are recalculated automatically).
9. Click **OK**. The ***Reinforcement descriptions*** dialog displays.
10. Click **OK** (adoption of default reinforcement descriptions).
11. Define descriptions of distribution sector by sector; the generated reinforcement displays:



© 2010 Autodesk, Inc. All rights reserved

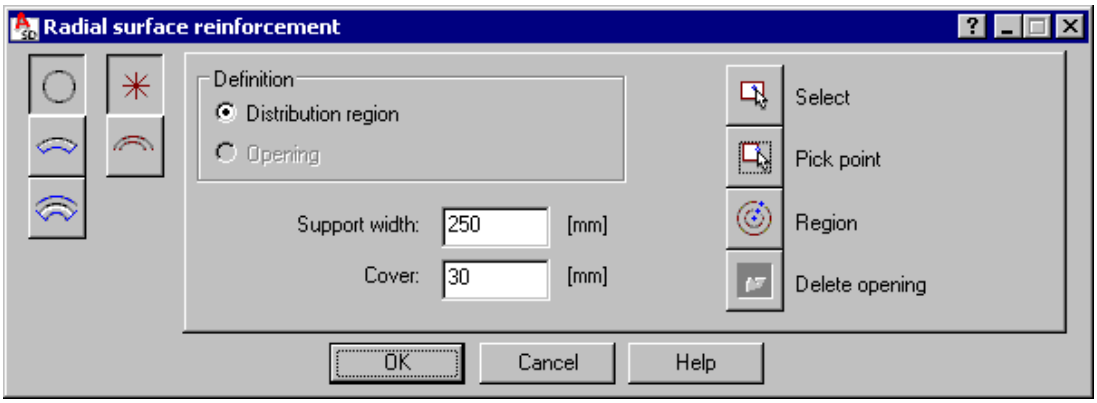
16. SURFACE REINFORCEMENT DISTRIBUTION - BARS (RADIAL REINFORCEMENT)

16.1. Radial reinforcement - bars

This option is used to define a distribution of reinforcing bars for 2D contours (e.g. an RC slab) in the shape of a circle or circle sector. There are three ways to access this option from:

- Menu: Reinforcement / Radial reinforcement - bars
- Ribbon: ASD - Reinforcement / Reinforcement - definition / Radial reinforcement - bars
- Toolbar: Definition - bars / Radial reinforcement - bars 
- Command line: RBCR_CREATE_RADIAL.

The following dialog displays:



The distribution defines two types of bars:

- *Radial distribution* - bars distributed perpendicularly to the circle along radiuses, with the assigned distribution angle (bars are spaced regularly along the circle circumference or circle sector)
- *Polar distribution* - bars of the circumferential reinforcement distributed uniformly with the assigned spacing, perpendicularly to the radius.

The dialog is divided into three main parts:

The left side of the dialog contains icons defining a distribution type / contour type:
SELECTION OF A CONTOUR TYPE
 - a contour of surface distribution of bars (this may only be a contour in the shape of a circle, circle sector, ring or ring sector) - radial or polar distribution
 - a contour of surface distribution of bars above an intermediate support (with respect to the support axis) – radial and polar distribution (NOTE: such a distribution may be defined only above an arc or circle)
 - a contour of surface distribution of bars above the outermost support (along the support edge) – radial and polar distribution (NOTE: such a distribution may be defined only above an arc or circle)

SELECTION OF A DISTRIBUTION TYPE
 - a surface distribution of bars within a defined contour (this may only be a contour in the shape of a circle, circle sector, ring or ring sector) - radial distribution
 - a surface distribution of bars within a defined contour (this may only be a contour in the shape of a circle, circle sector, ring or ring sector) – polar distribution

© 2010 Autodesk, Inc. All rights reserved

The central part of the dialog box includes parameters which are indispensable while defining a selected type of the reinforcement distribution:

Radial distribution (within a contour)
The upper part of the dialog contains options for defining a distribution region or opening(s): additionally, there are edit fields which enable defining values of support widths and a reinforcement cover.
When defining a reinforcement distribution contour, the *Opening* option is inaccessible, whereas the *Distribution region* option is active and selected. Once definition of a contour is completed, the *Distribution region* option is no longer active, whereas the *Opening* option is active and selected. You can then define an opening contour; a number of openings can be defined.
Once the beginning point of a distribution is indicated, reinforcing bars are distributed perpendicularly to the arc of the radius length reduced by twice the value of the cover (at the beginning and end of the bar). If a bar length does not exceed the allowable maximum bar length, then single bars are drawn. If it is longer, bars are automatically divided into segments with lap splices.

Radial distribution (with respect to the support axis)
The following options are provided in the central part of the dialog (reinforcing bars are distributed perpendicularly to the arc):

- The edit field for defining a support width.
- Edit fields for defining values of the reinforcement overhang outside the support face (in both directions).

Radial distribution (above the outermost support)
The following options are provided in the central part of the dialog (reinforcing bars are distributed perpendicularly to the arc):

- The edit field for defining a value of the reinforcement cover
- The edit field for defining a support width
- The edit field for defining a value of the reinforcement overhang outside the support face.

Polar distribution (within a contour)
Circle-shaped bars are distributed parallel to the circle or arc, with the defined spacing. There may be more than one zone in a distribution of circle-shaped bars. If a length of ring bars exceeds the allowable maximum bar length, then they are divided into segments considering the lap splice. Division into segments is performed according to the following rule:

1. The length of a number of bars does not exceed the maximum allowable bar length (considering the lap splice)
2. Lengths of all bars are identical.

Ring bars are distributed perpendicular to the radius of a distribution region.

Polar distribution (above the support)
Reinforcing bars are distributed parallel to the circle or arc (above the support).

The right side of the dialog includes icons for selecting a mode of graphical distribution definition. The number of icons depends on a selected type of the surface distribution.

Radial and polar distributions (within a contour)

 ***Select*** – is used to select a contour defined as a circle, circle sector, ring or ring sector.

 ***Pick point*** – is used to indicate an internal point of a closed contour; the operation results in detecting a contour.

 ***Region*** – is used to define a ring of two radiuses: inner and outer - for this mode it is possible to define supports of different widths on the contour edges.

 ***Delete opening*** – is used to delete an earlier-defined opening contour; available while modifying reinforcement in a defined region with an opening or while defining a greater number of openings.

© 2010 Autodesk, Inc. All rights reserved

Radial distribution (with respect to the support axis and above the outermost support) and polar distribution (above the support)

Select – is used to select one edge of a contour defined as a line or support.

Start - Center - End – is used to indicate three characteristic points of an arc: arc beginning, arc end and center of a circle to which the arc belongs.

3 Points – is used to indicate three points which lie on the arc.

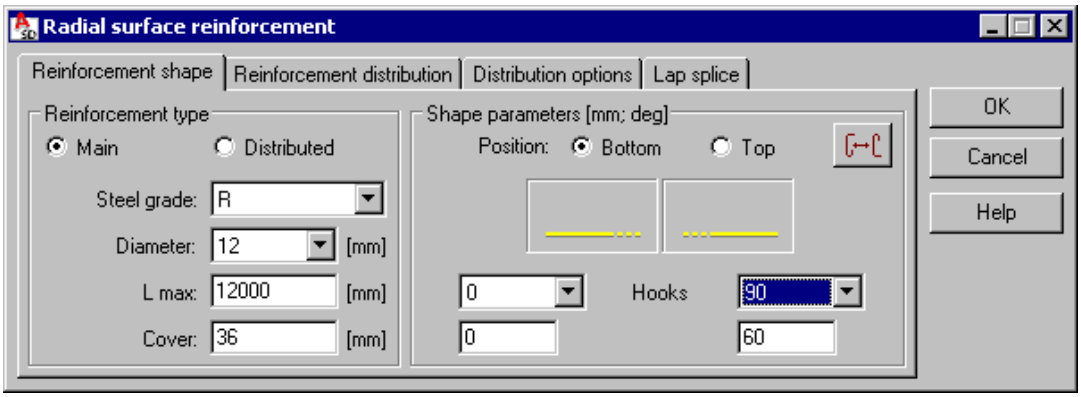
Click **OK**, to open the Reinforcement: definition and detailing – radial reinforcement dialog.

16.2. Radial/polar reinforcement - definition and detailing

After defining a reinforcement and its distribution in a defined region, click **OK**. The Reinforcement description (radial) dialog displays. The dialog includes the following tabs:
Reinforcement shape
Reinforcement distribution
Distribution options
Lap splice.

16.3. Reinforcement shape

After selecting the *Reinforcement shape* tab, the following dialog displays:



To define a reinforcement shape, the following parameters are available:

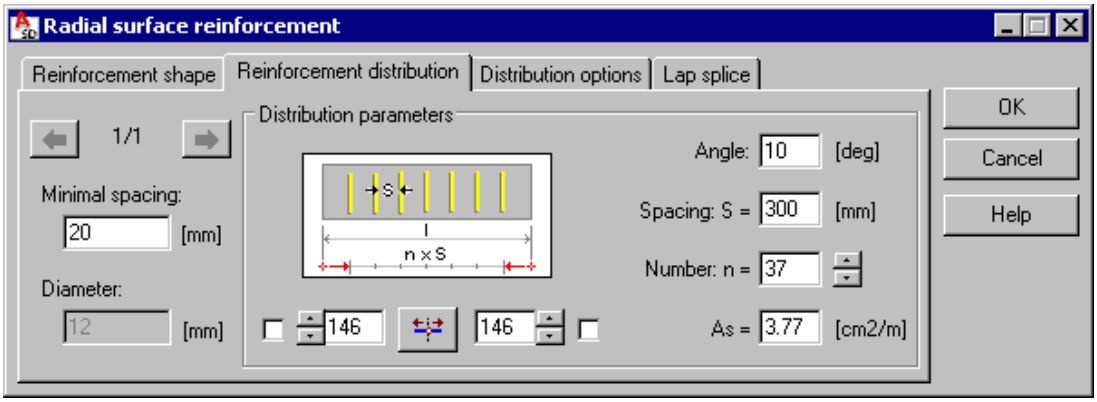
- In the *Reinforcement type* field:
  selection of reinforcement type: main or distributed reinforcement; the following parameters may be defined for the reinforcement:
  - steel grade
  - diameter of reinforcing bars
  - maximum length of a reinforcing bar
  - reinforcement cover.
- In the *Shape parameters* field:
  - definition of a reinforcement shape; the *Position* option enables placing the defined reinforcement in the upper or lower part of a slab,
  - click , to change the orientation of an asymmetrical reinforcement allowing you to determine on which side of the bar (beginning or end) the chosen types of bar ends are located,
  - In the lower part of the dialog,
    - choose the geometry of bar ends (dimensions of bar ends always remain the same as defined in the dialog, whereas a length of the middle part of bars is modified while defining a distribution);

© 2010 Autodesk, Inc. All rights reserved

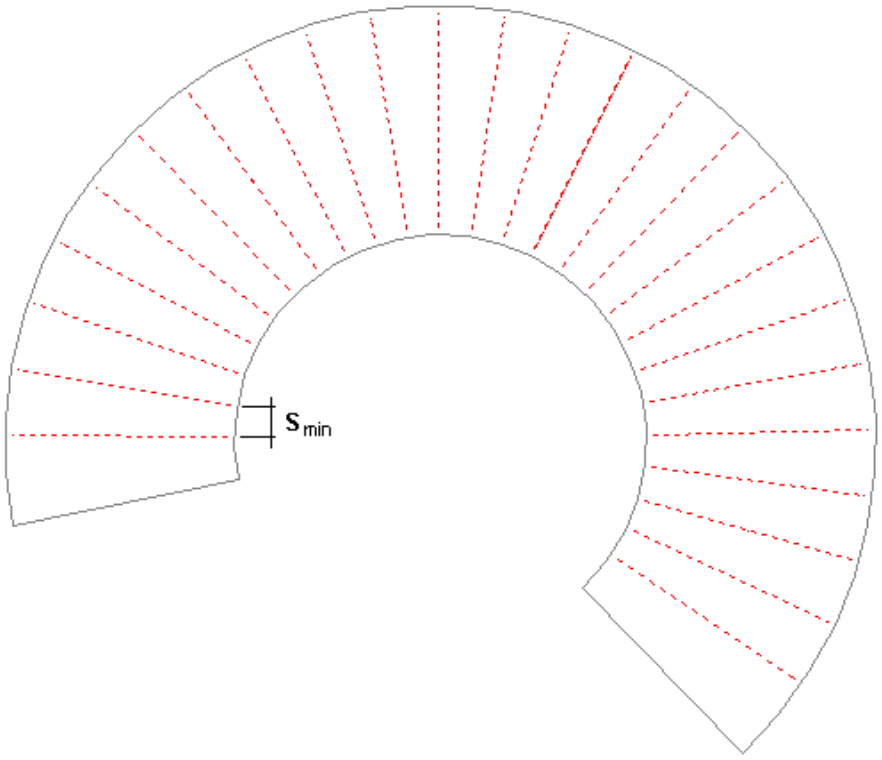
- click the ***Shape definition*** icon to represent a bar end type and opens the additional dialog - where an appropriate bar end can be specified; determine the values of appropriate dimensions of the bar end; specify the bar end type for both bar ends (top and bottom),
- you can also define bar ends in the form of hooks (the following information needs to be given: a value of the bend angle and a hook length).

16.4. Reinforcement distribution

Use this option to define parameters of a reinforcement distribution. It is accessible by selecting the *Reinforcement distribution* tab, the Reinforcement: definition and detailing – radial reinforcement dialog displays:



The distance between distributed bars and the distribution line is assumed by default to be the cover adopted from the bar shape.
In the upper part of the dialog box there is the *Minimal spacing* edit field used to define the minimal spacing for bars distributed along the radius (a default value equals 50 mm). The minimal spacing concerns the distance between ends of distributed reinforcing bars positioned closer to the center of a circle/arc and must be greater or equal to a given value.



© 2010 Autodesk, Inc. All rights reserved

Distribution parameters can be defined by:

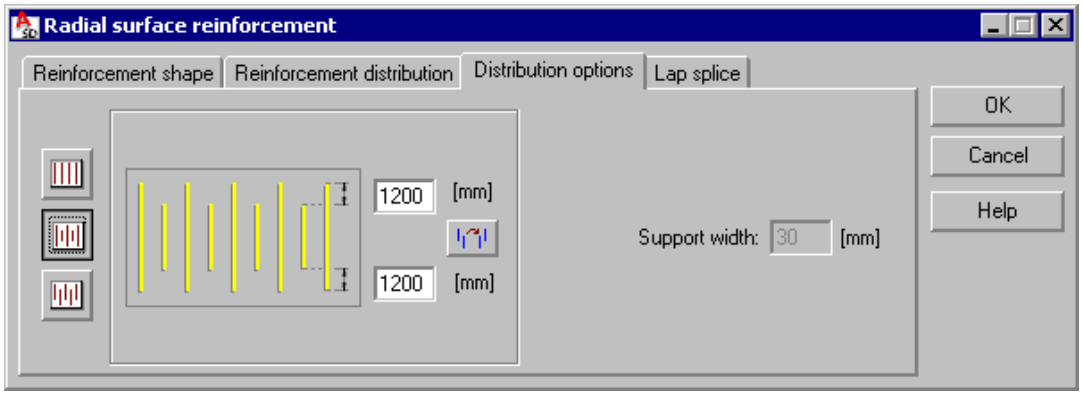
- The value of the distribution angle (this is the angle between bars in a defined distribution)
- The value of the reinforcement spacing (this is the distance between ends of distributed bars measured along the arc on the circle circumference); it is always a greater value of the spacing values for both ends)
- The value of the n parameter - it corresponds to the number of reinforcement spacings
- Determining a reinforcement area (presented on the region circumference).

Changing any of the listed parameters results in updating the values of the remaining ones. The schematic drawing provided in the dialog illustrates the parameters specified above. The options next to the drawing enable you to place the reinforcement distribution with precision in a given zone:

- Two edit fields define a value of the distance between the extreme reinforcement and the zone border; there is a possibility to block the distance value for each zone - once the distance on one side is blocked, the distance value on the other side will be automatically adjusted to a specified number of bars and a spacing value; after blocking the distance on both sides, the spacing will be adjusted automatically to a given number of bars
  - for a circle and ring distances are summed and make up the spacing S between the first and the last bar in the distribution
  - for a circle sector or ring, these are distances between extreme bars and straight edges of the region specified on the greater arc of the region circumference
- The button located between the edit fields enables centering the distribution.

16.5.Distribution options

Use this option to enable a more exact definition of the reinforcement distribution method. After selecting the *Distribution options* tab, the Reinforcement: definition and detailing – radial reinforcement dialog displays:



The left side of the dialog box contains three icons:

 - for this type no parameters are determined: a whole distribution surface is covered evenly with bars.

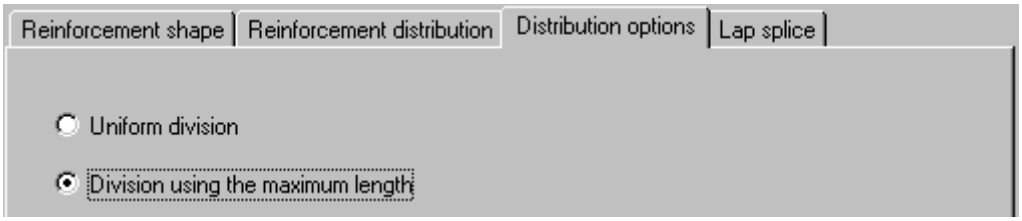
 - defines a passing distribution: every second bar extends from edge to edge, while the remaining ones end in an appropriate distance from the edge; middle bars are always straight bars; two edit fields allow defining the length of middle bars and the additional icon between the edit fields is used for exchanging the arrangement.

 - defines a passing distribution: distributed bars are of the same shape, however, they are shifted with respect to each other; if there is an opening (in the zone near the support), use of this distribution type is not justified, the uniform distribution is applied then.

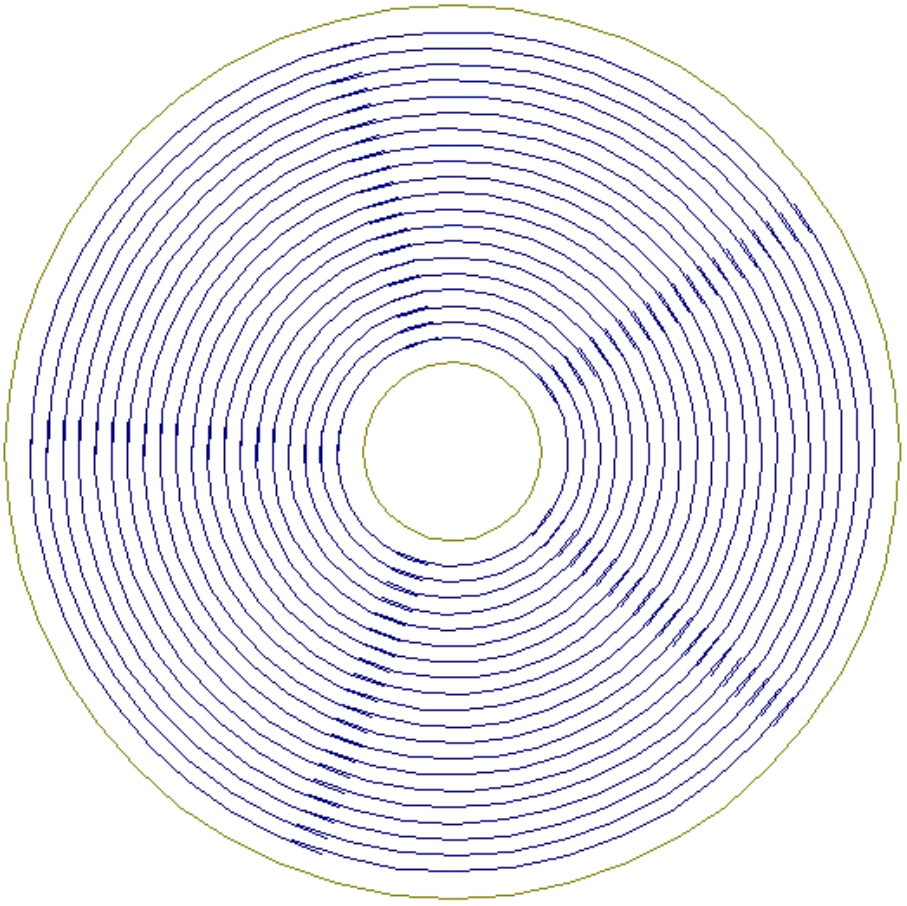
The support width option is inaccessible; it is used when defining distributions above supports.

© 2010 Autodesk, Inc. All rights reserved

There are two ways to define the polar distribution (distributing lap splices of bars in the polar distribution):

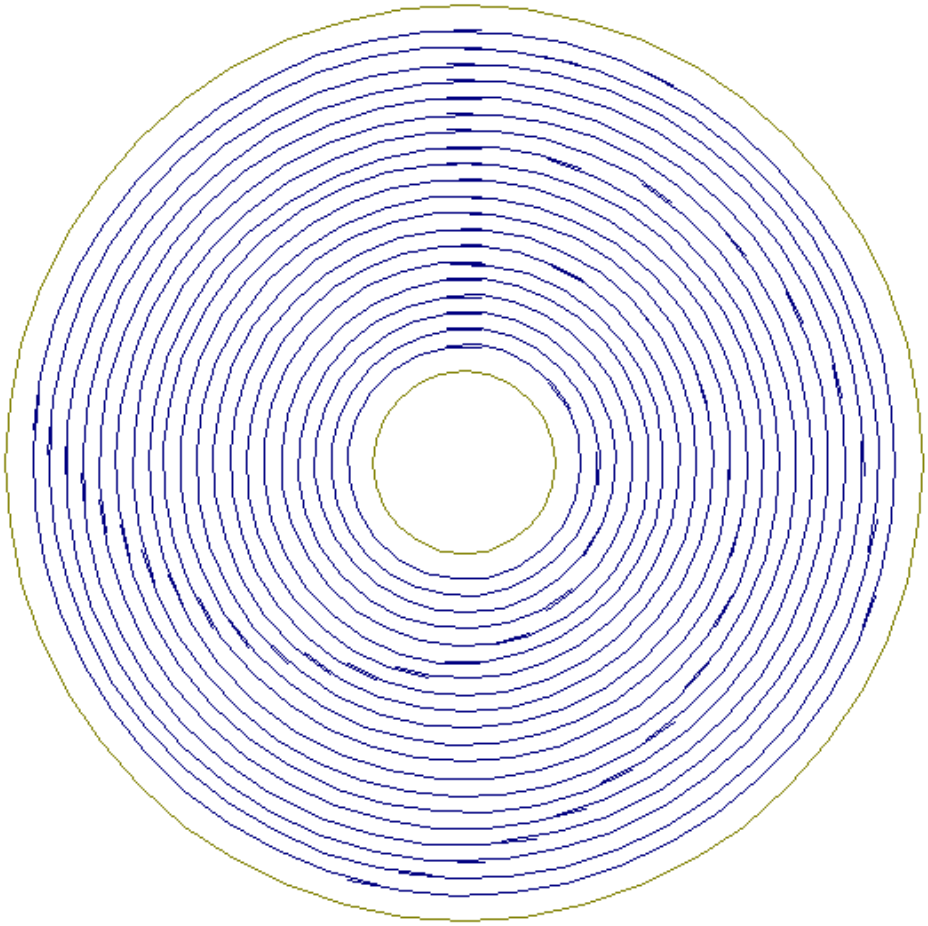


1. Uniform division (see the drawing below)



2. Division using the maximum length of a bar (see the drawing below).

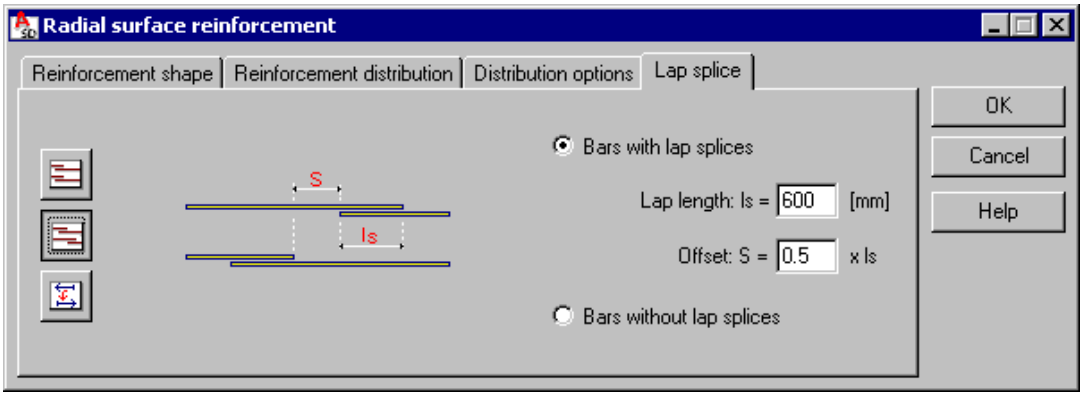
© 2010 Autodesk, Inc. All rights reserved



Each bar in the polar distribution is divided separately following the rule: bar of the maximum length + bar of the maximum length + the rest resulting from the remaining length of a bar to be distributed. Division of every bar in the polar distribution starts at the same point.

16.6.Lap splice

Use this option to define reinforcement laps (connections of reinforcing bars) if a reinforcement length exceeds the value defined in the preferences (e.g. 12 000 mm). After selecting the *Lap splice* tab, the Reinforcement: definition and detailing – radial reinforcement dialog displays:



The options provided on this tab allow you to:

1. Determine if bars should be with or without laps
2. Specify parameters of bars with laps.

© 2010 Autodesk, Inc. All rights reserved

If the *Bars without lap splices* option are selected, then reinforcement laps are not used in a reinforcement distribution. Bars will be distributed in such a way so that they fit the distribution region, but without considering the maximum length of bars (single bars in the distribution may be longer than Lmax) and without lap splices. The reinforcement table includes information about the total length of distributed bars multiplied by a factor defined in the ***Job preferences*** dialog box (the *Options* tab).
If the *Bars with lap splices* option is selected, then reinforcement lap splices will be created during reinforcement distribution.
The following parameters of reinforcing bar laps are defined:

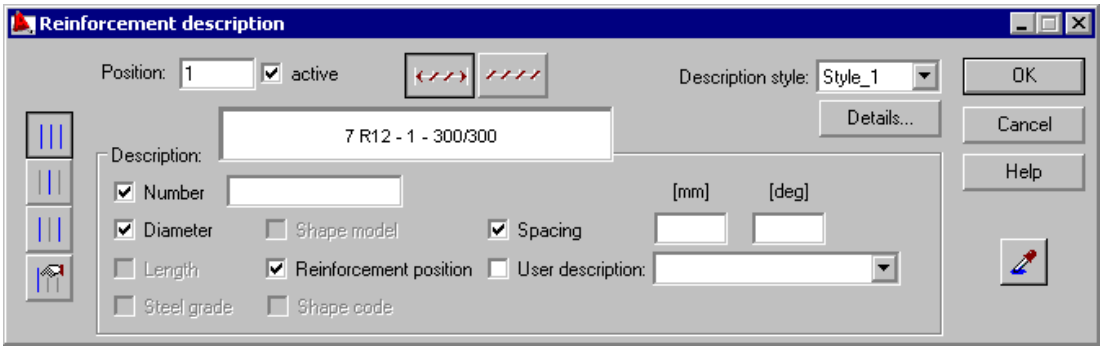
- A lap length (the proposed value is a multiple of a reinforcement diameter)
- An offset value when laps are arranged in the passing manner.

Definition of positions of Z laps involves changing the lap position (a mirror reflection with respect to the bar center).

NOTE:
Reinforcement laps do not refer to the distributed reinforcement.

16.7. Reinforcement description - radial/polar reinforcement

Use this option to define the reinforcement and the reinforcement distribution (by deselecting active variables that are initialized based on the defined syntax). After completing definition of a distribution and its parameters, the following dialog displays:



Radial distributions
A description of the radial distribution is always an arc-shaped line presenting an angular or linear spacing between bar ends. A dimension line may be complete (describes a distribution along its entire circumference) or partial (describes indicated bars in a part of the region and has arrowheads on its ends pointing where it continues along the circumference).
A description syntax for radial bars contains an additional variable (%deg) describing an angular spacing between bars.

Polar distributions
Polar distributions are defined with division into zones. A description of distributed bars is a (straight) dimension line.

The dialog provides the following options:

- The *Active* option, specifies the current position of a reinforcement when preparing a reinforcement table, used to avoid duplicating the same reinforcement in calculations.
- Icons used to display distribution:
  - all elements are presented in a drawing of a given reinforcement distribution.
  - only the middle representative of a distribution in a given zone is presented (the remaining elements are not visible).
  - only the extreme elements of a distribution in a given zone are presented (the remaining elements are not visible).
  - indicates graphically the distribution elements.

© 2010 Autodesk, Inc. All rights reserved

- The *User description* field enables adding any text to a reinforcement description. The text is added to the selection list, and it is also possible to use a text from the library of standard descriptions. These descriptions assume a text style of the reinforcement description. The description displays in several lines; then the mechanisms accessible in AutoCAD® are used. The user description together with an extension line and label make up one object. Such an object may be edited (translation, rotation), by clicking the EXPLODE option.

A description is assigned to a defined distribution of reinforcing bars sector by sector (a sector is a part of a contour, automatically recognized by the program, with a similar distribution).

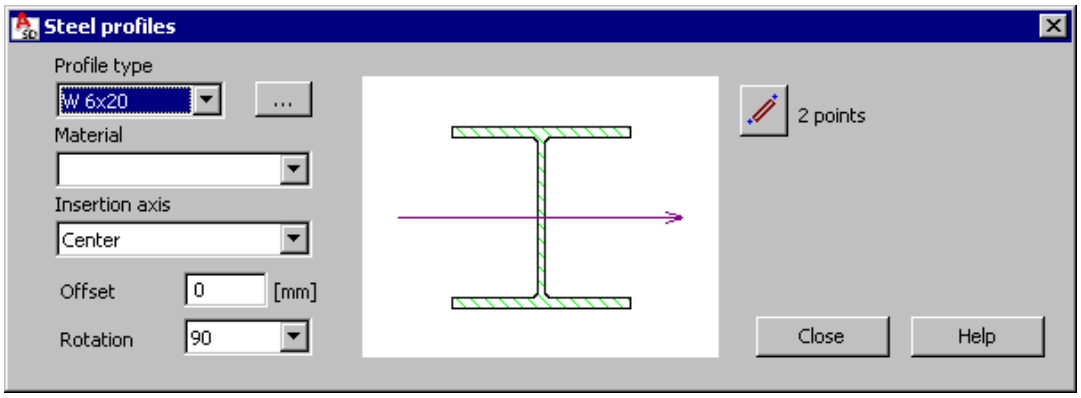
17. STEEL PROFILES

17.1.Steel profiles

Use this option to define a steel bar with a selected section. There are three ways to access this option from:

- Menu: Reinforcement / Definition - steel profiles / Steel profiles
- Ribbon: ASD - Reinforcement / Definition - steel profiles / Steel profiles
- Toolbar: Definition - steel profiles / Steel profiles 
- Command line: RBCR_CREATE_STEEL_VIEW.

The following dialog displays:



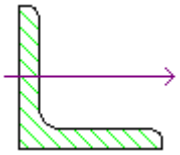
The ***Steel profiles*** dialog is divided into three parts:

- The left side of the dialog defines the basic information regarding the section of a defined steel bar:

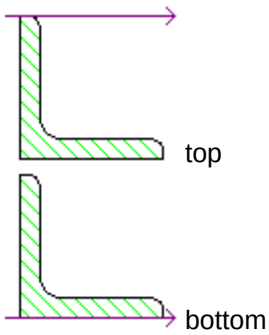
  A steel profile type is selected from the *Profile type* list (the list proposes the last-defined profile of a steel bar); clicking (**...**), opens the ***Profile list*** dialog where profiles from databases available in the program are added to the list of available profiles (the profile database that profiles will be selected from can be set in the ***Job preferences*** dialog).

  The *Material* list enables selection of a material type assigned to the defined steel profile (the material list can be defined in the ***Job preferences*** dialog)

  The *Insertion axis* field specifies the axis of definition of a steel profile:

  
  center

© 2010 Autodesk, Inc. All rights reserved



It is also possible to define an offset (shift) of the point of insertion of a steel profile; the offset denotes a shift of the profile center with respect to the insertion axis. An offset value may be positive (offset upwards) or negative (offset downwards)

The *Rotation* list specifies an angle of rotation of the cross-section of a steel profile; the following typical values of the rotation angle are available: 0, 90, 180 and 270 degrees

- The central part of the dialog displays a graphic field presenting a selected steel profile
- The right side of the dialog displays the icon used for definition of a steel profile:
   - By means of 2 points (the beginning and end of a steel profile)

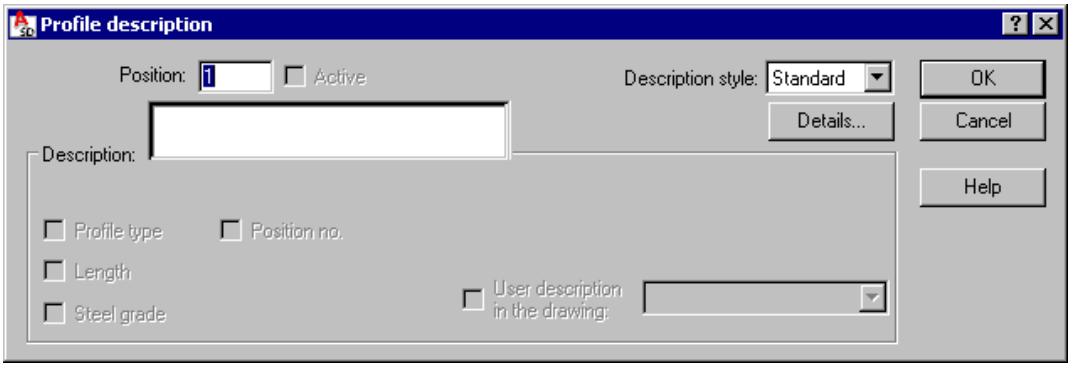
The dialog opens showing bar profile parameters defined recently.

See also:
Description of a steel profile
Operations performed on steel profiles

17.2. Description of a steel profile

After defining the steel profile, it can be accessed by selecting the option:

- Menu: Reinforcement / Definition - steel profiles / Steel profiles - description
- Ribbon: ASD - Reinforcement / Definition - steel profiles / Steel profiles - description
- Toolbar: Definition - steel profiles / Steel profiles - description 
- Command line: RBCR_CREATE_STEEL_DESC.



Options in this dialog specify a profile description by clearing active variables initialized on the basis of a defined syntax (e.g. profile type, profile length, steel grade).

© 2010 Autodesk, Inc. All rights reserved

The *Position* field is used to specify a number of a described element. If the *Active* option is selected, the profile described will be included in the table. It means that for a profile described for the first time the option is active by default. When the same profile is described twice, the option is cleared on its own. Thus it is possible to prevent (when the same profile is described twice) taking steel profiles into account twice in the table.

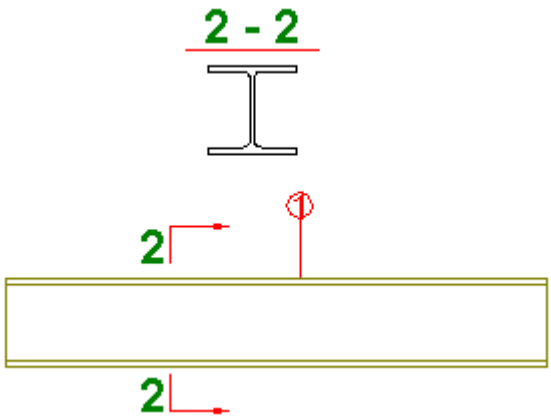
The *User description in the drawing* field adds any text to a steel profile description. The description is presented appropriately in drawings (included in profile descriptions in the drawing); the added text will be added to the selection list.

A style of steel profile description is selected from the *Description style* list; the list contains all description styles defined for steel profiles (the first item on the selection list is a default description style chosen in the ***Description of reinforcement shape*** dialog); parameters of a description style are modified before a steel profile description is inserted into the drawing; clicking **Details,** opens the ***Reinforcement description*** dialog where modifications of the style of steel profile description can be made.

17.3. Operations performed on steel profiles

The following operations are possible on defined steel profiles:

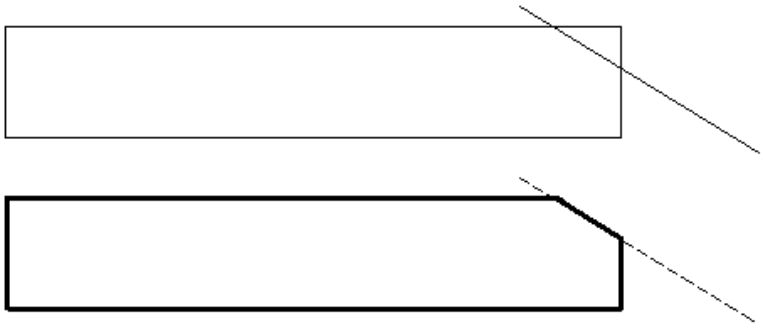
- A section through an indicated steel profile



To make a section through a steel section:

1. Indicate the beginning and end point of the section,
2. Define section depth / direction,
3. Select location of a drawing of the section through a steel profile.

- Cutting the steel profile so that it fits the defined line



© 2010 Autodesk, Inc. All rights reserved

Cut the profile by specifying positions of two points that define a line. Additionally, a direction is indicated (a point on one side of the cutting line): it determines the object part that will be cut.

18. ELEMENT MANAGER

18.1. Element manager

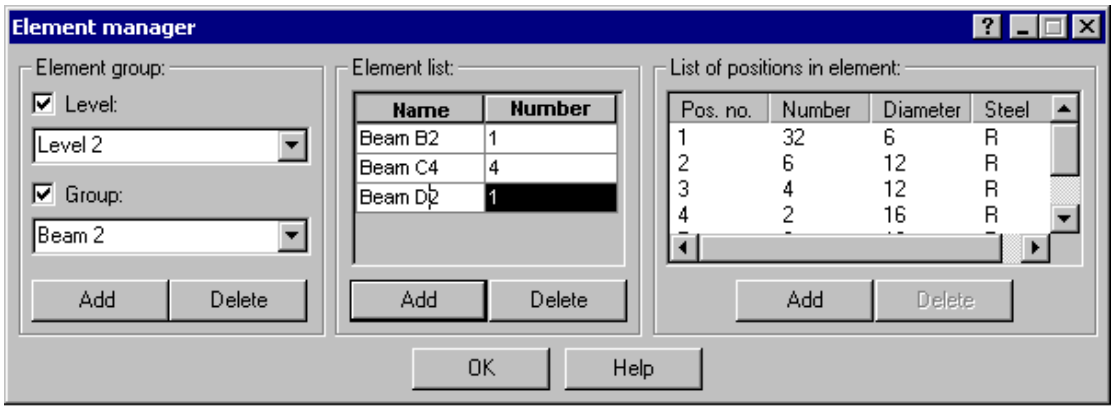
Use this option to create a reinforcement table (the table *Bars – Element table*) with reinforcing bars divided into structural elements such as a beam, a column, a spread footing, etc. There are three ways to access this option from:

- Menu: Reinforcement / Tools / Element manager
- Ribbon: ASD - Reinforcement / Tools / Element manager
- Toolbar: Tools / Element manager 
- Command line: RBCR_CREATE_ELEMENT.

The option is a convenient tool for grouping reinforcing bars into elements (groups) that can created in the following ways:

- In ***AutoCAD***® or by means of macros for generation of formworks of RC structure elements - countours of structural elements are created and reinforcement is drawn; next, using the *Create element* command, reinforcing bars are assigned to appropriate elements.
- In ***AutoCAD***® or by means of macros for generation of formworks of RC structure elements - countours of structural elements are created; next, using the *Create element* command 'empty' elements are defined, and finally, bars are drawn which should be added to an element.
- Macros for generation of reinforcement of RC structure elements – contours of structural elements with their reinforcement are created; reinforcing bars are automatically assigned to appropriate elements.

After selecting the option, the following dialog displays:



The options provided in the *Element group* field define hierarchy, based on the following rules:

- In the hierarchy, a level is a superior element with respect to a group
- Within a level, several different groups may be defined
- Every group may contain many elements.

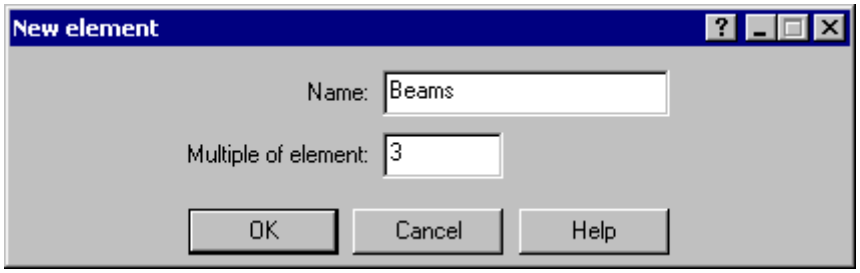
To define a level / group follow these steps:

1. Select the *Level / Group* option (the symbol √ appears).
2. Enter a name of a level and a group in the relevant field.
3. Click **Add**.

© 2010 Autodesk, Inc. All rights reserved

Defined levels / groups can be deleted from the lists of available levels / groups. To delete a group, choose the name of the group, set the mouse cursor in the *Group* field and click **Delete**.

The central part of the dialog, i.e. the *Element list* field, holds options that make possible creation of elements in a selected group (and level). After choosing – from the drop-down lists – the names of the level and the group in which an element will be created, and after clicking **Add**, the ***New element*** dialog displays:



In the above dialog, specify a name of the element and a number of these elements (multiple of element); after clicking **OK**, indicate in the drawing the objects that should belong to the element being created; it is possible to select contours (e.g. beams along with axes, section symbols, an elevation mark) and reinforcing bars. If reinforcing bars have not been drawn in a formwork, then only formwork parts are included in the defined element.

Selected reinforcing bars together with the elements defined in the manner as described above are presented in the ***Element manager*** dialog (selected reinforcement is entered into the right panel of the dialog, in the *List of positions in element* field); names of created elements are added automatically to the hierarchy tree located in the ***Object Inspector*** dialog on the *Model* tab.

If while creating an element contours, reinforcing bars are chosen, then reinforcing bars will be entered into the *List of positions in element* field in the ***Element manager*** dialog. The *List of positions in element* field displays reinforcing bars included in the element. If the element contains both reinforcing bars and wire fabrics, then bars are shown first on the list, whereas wire fabrics are listed after them (NOTE: for wire fabrics, in place of a diameter, a wire fabric type is presented).
The *List of positions in element* field holds two buttons:
- **Add** - enables adding a reinforcing bar / a wire fabric to a selected element
- **Delete** - enables deleting a reinforcing bar / a wire fabric indicated on the list from an element.

© 2010 Autodesk, Inc. All rights reserved

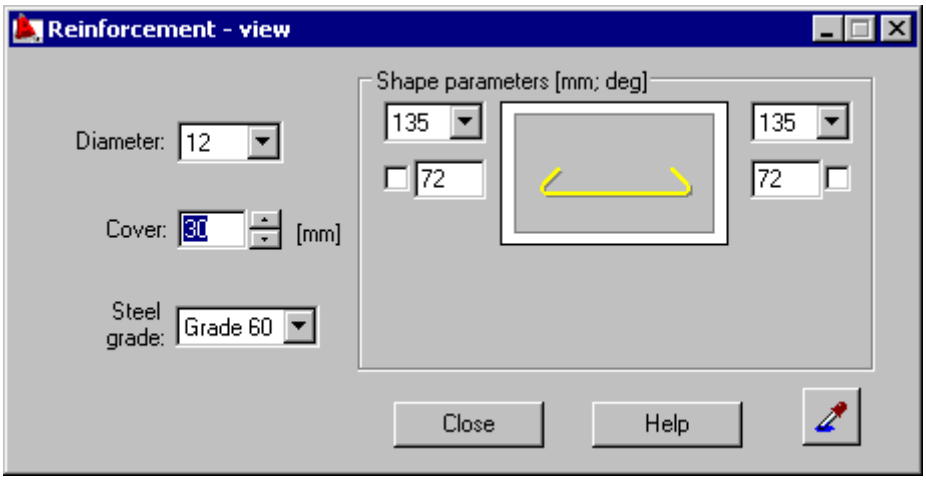
19. REINFORCEMENT MODIFICATION

19.1. Longitudinal reinforcement (reinforcement - elevation) - modification

Use this option to modify reinforcing bars (longitudinal reinforcement) in the longitudinal section of an RC structure element. There are three ways to access this option from:

- Menu: Reinforcement / Modify / Reinforcement
- Ribbon: ASD - Reinforcement / Modify / Modify reinforcement
- Toolbar: Modify / Modify reinforcement 
- Command line: RBCR_MOD_REINF.

After activating the option and selecting longitudinal reinforcement, the following dialog displays:



The following parameters of a reinforcing bar (longitudinal reinforcement) can be modified:

- Bar diameter (the current diameter of a reinforcing bar is presented in the edit field)
- Reinforcing bar cover (the current cover of a reinforcing bar is presented in the edit field)
- Steel grade (the current steel grade is chosen from the selection list)
- Shape parameters (parameters of anchors of reinforcement ends): hook angle and hook length. You can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears); the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

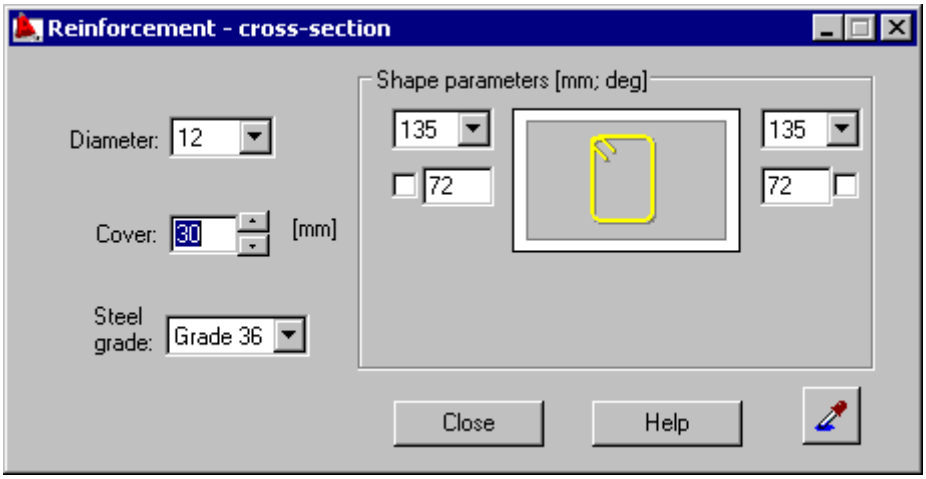
19.2. Transversal reinforcement (reinforcement - section) - modification

Use this option to modify reinforcing bars (transversal reinforcement) in the cross-section of an RC structure element. There are three ways to access the option from:

- Menu: Reinforcement / Modify / Reinforcement
- Ribbon: ASD - Reinforcement / Modify / Modify Reinforcement
- Toolbar: Modify / Modify Reinforcement 
- Command line: RBCR_MOD_REINF.

© 2010 Autodesk, Inc. All rights reserved

The following dialog displays:



The following parameters of a reinforcing bar (transversal reinforcement) may be modified:

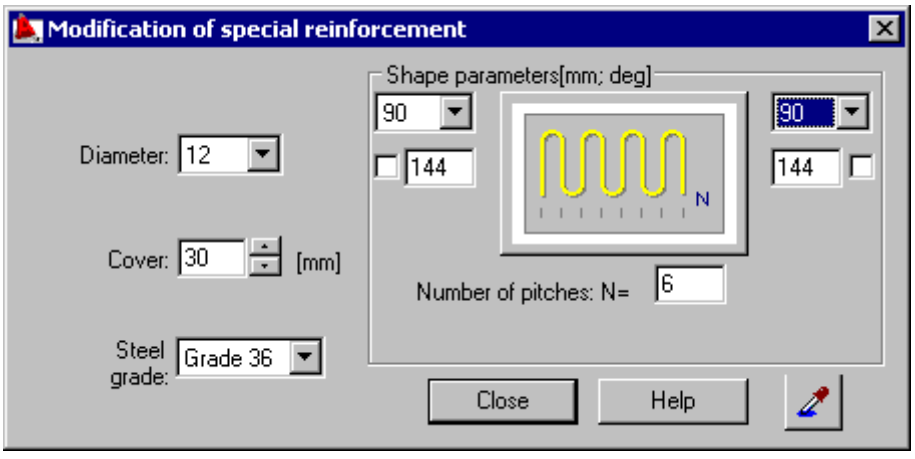
- Bar diameter (the current diameter of a reinforcing bar is presented in the edit field)
- Reinforcing bar cover (the current cover of a reinforcing bar is presented in the edit field)
- Steel grade (the current steel grade is chosen from the selection list)
- Shape parameters, i.e. parameters of anchors of reinforcement ends: hook angle and hook length; you can lock a hook length by selecting the option next to the edit field for defining a hook length (√ appears): the edit field becomes inaccessible. If you modify parameters (length or diameter) of a bar with locked hook length, the hook length does not change.

19.3. Special reinforcement - modification

Use this option to enable modification of reinforcing bars (of special reinforcement) in an RC structure element. There are three ways to access this option from:

- Menu: Reinforcement / Modify / Reinforcement
- Ribbon: ASD - Reinforcement / Modify / Modify reinforcement
- Toolbar: Modify / Modify reinforcement 
- Command line: RBCR_MOD_REINF.

The following dialog displays:



The following parameters of a reinforcing bar (special reinforcement) can be modified:

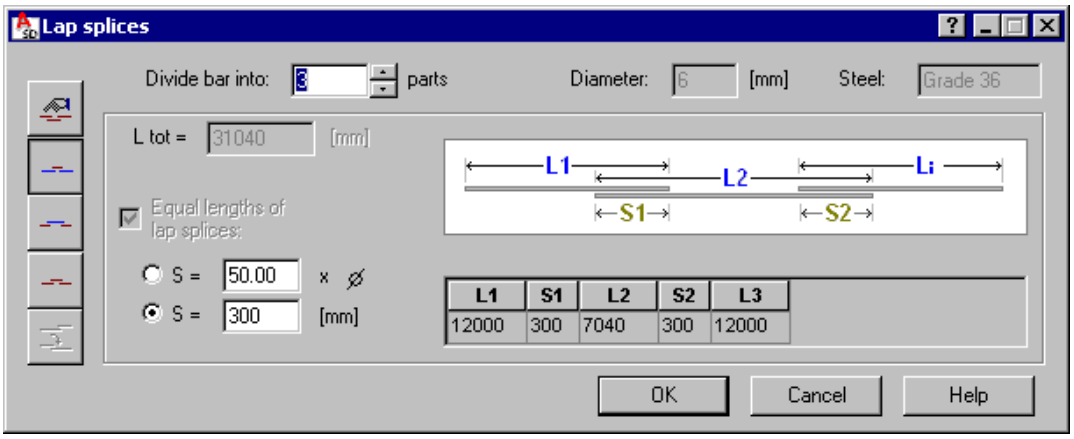
- A bar diameter (the edit field shows the current reinforcing bar diameter)

© 2010 Autodesk, Inc. All rights reserved

- A reinforcing bar cover (the edit field shows the current reinforcing bar cover)
- Reinforcement grade (the current steel grade is selected on the selection list)
- Shape parameters depending on a selected type of the special reinforcement.

19.4.Lap splices

Use this option to define/modify lap splices in reinforcing bars if the bar length exceeds the bar length defined in the database. After defining the bar whose length is greater than a value of the maximal bar length and accepting the information about division of the reinforcing bar, the following dialog displays:



The left part of the dialog provides the following icons used to determine methods of lap splice definition:

- – Manual definition (a lap splice is defined in the table provided in the bottom part of the dialog by specifying lengths of successive bar segments L1, L2, ... and lengths of lap splices S1, S2, etc.)
- – Bar is divided in the direction ‘from outside’
- - Bar is divided in the direction ‘from inside’
- – Lengths of all bars are equal
- – Lengths of the first and last bars are identical.

The top part of the dialog includes information for the divided bar:

- Number of bar divisions (this value is modified in the dialog – the value is available only if all segments are equal and if bar is divided into segments manually)
- Bar diameter and steel grade (neither of these values can be changed in this dialog).

The lower part of the dialog includes the following data:

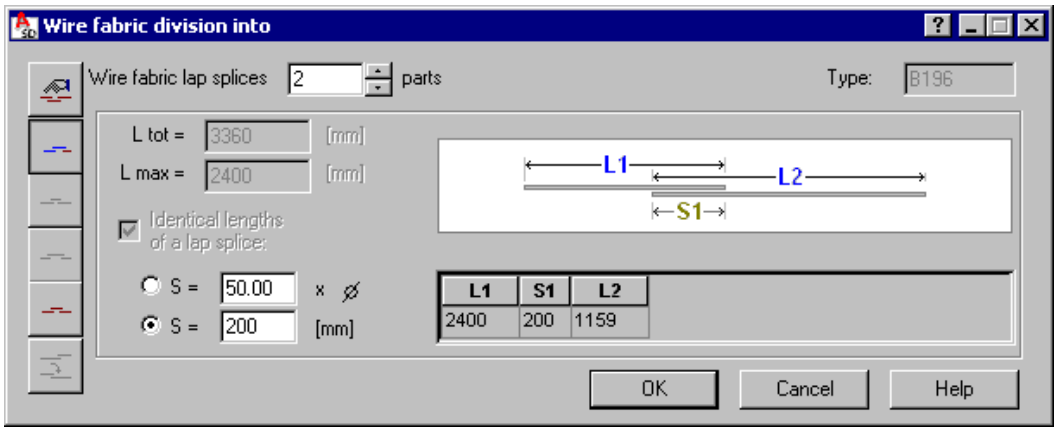
- Bar total length (with bar lap splices included – it is the total of all bar segments with lap splices)
- If the *Equal lengths of lap splices* option is selected, then all the lap slices in bar will be of identical length; lap splice length can be determined by giving the value of lap splice length or as a multiplier of bar diameter.

The bottom part of the dialog box includes a table presenting the defined bar division into successive segments:
- L1, L2, L3, etc. denote lengths of successive bar segments
- S1, S2, S3, etc. denote lengths of successive lap splices in bar.

© 2010 Autodesk, Inc. All rights reserved

19.5.Wire fabric lap splices

This option is used to define/modify the lap splices of wire fabrics defined in the cross section when the length of a wire fabric exceeds the wire fabric length defined in the database. After defining a wire fabric whose length exceeds the value of the maximum wire fabric length and accepting the information about division of the wire fabric, the following dialog displays:



The left part of the dialog contains the following icons used to define the lap splice of a wire fabric:

-  - Manual definition (a lap splice is defined in the table provided in the lower part of the dialog by specifying lengths of successive wire fabric segments L1, L2, ... and lengths of lap splices S1, S2, etc.)
-  - A wire fabric is divided in the direction ‘from outside’
-  - A wire fabric is divided in the direction ‘from inside’
-  - Lengths of all wire fabrics are equal
-  - Lengths of the first and last wire fabric are identical.

The upper part of the dialog displays information concerning the divided wire fabric:

- Number of wire fabric divisions (this value may be modified in the dialog - the value is available only if all segments are equal and if a wire fabric is divided into segments manually)
- Wire fabric type - cannot be modified in this dialog.

Below the following information displays:

- Total length of a wire fabric (including lap splices of the wire fabric – this is the total of all wire fabric segments with lap splices)
- If the *Identical lengths of a lap splice* option is selected, then all lap splices in a wire fabric will be of identical length; a lap splice length can be determined by giving a value of the lap splice length or as a multiplier of the wire fabric diameter.

In the lower part of the dialog is a table presenting the defined division of a wire fabric into successive segments:

- L1, L2, L3, etc. denote lengths of successive segments of a wire fabric
- S1, S2, S3, etc. denote lengths of successive lap splices of a wire fabric.

© 2010 Autodesk, Inc. All rights reserved

19.6. Modification of reinforcement graphical parameters

This option is used to modify graphical parameters of reinforcing bars. There are three ways to access this option from:

- Menu: Reinforcement / Modify / Graphical parameters
- Ribbon: ASD - Reinforcement / Modify / Graphical parameters
- Toolbar: Modify / Modify graphical parameters 
- Command line: RBCR_MOD_PROP.

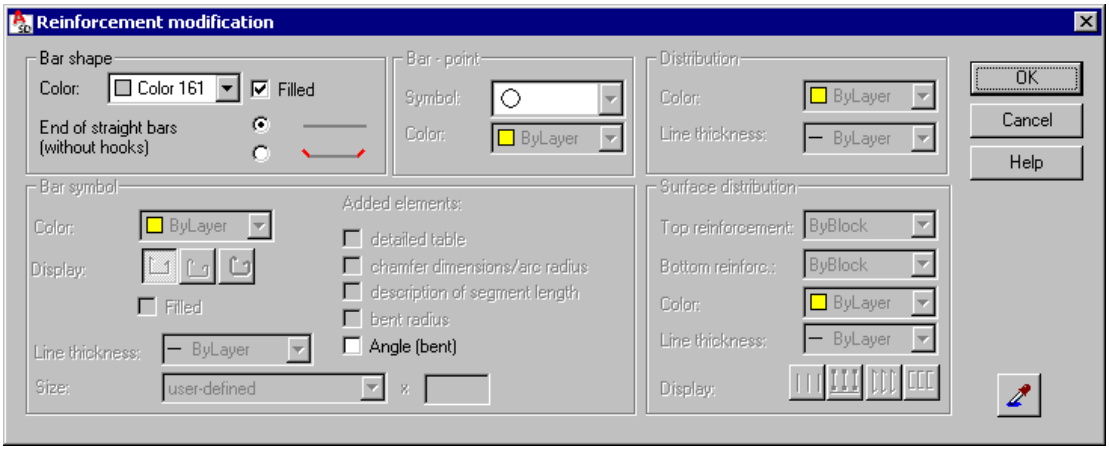
A different dialog displays based on the selected reinforcement type:

- reinforcing bars
- wire fabrics.

After selecting the type of bar reinforcement (e.g. stirrup reinforcement in cross section or reinforcement distribution), only these options display in the dialog and are available to enable modification of parameters of a selected reinforcement type.

19.7. Modification of graphical parameters of reinforcement (bars)

After selecting the *Modify: graphical parameters of reinforcement* option, select bar reinforcement. The following dialog displays:



NOTE:
After selecting the type of bar reinforcement (e.g. stirrup reinforcement in cross section or reinforcement distribution), only these options display in the dialog and are available to enable modification of parameters of a selected reinforcement type.

The following options are provided in the *Bar shape* field:

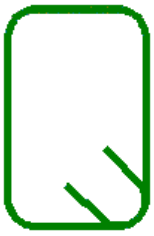
- *Color* - selection of a color with which reinforcement will be drawn; thickness of reinforcing bars is always drawn proportionally to their diameter
- If the *Filled* option is selected, then a reinforcing bar contour being drawn will be filled in completely with a selected color.

The *End of straight bars* option allows you to set the method of presenting bar ends in a drawing; the option includes only straight bars without hooks.

© 2010 Autodesk, Inc. All rights reserved

Reinforcing bar shapes are presented below:

- contour - filled



- contour - not filled

The options in the *Bar - point* field are used to modify the type of presentation of a reinforcing bar in a cross section. The following symbols (used to designate bars in a cross section) are provided on the drop-down list:

Moreover, a color can be chosen for the indicated symbol.

The options provided in the *Distribution* field apply to the distribution of the existing (with shape already defined) reinforcement. You can modify a color used to present distribution of reinforcement elements and line thicknesses.

The options from the *Bar symbol* field refer to reinforcement whose description is provided outside the formwork contour.
You can modify color and line thickness applied while drawing reinforcement. The following three buttons are used to determine the manner of reinforcement presentation:

- The first button provides rough (schematic) reinforcement presentation - in the form of a broken line
- The second button presents reinforcement together with bend curvatures
- The third button presents reinforcement showing real diameters and real dimensions.

If the third option is selected, then the *Filled* option is accessible which, when selected, allows you to fill in the drawn reinforcing bar shape. For rough presentation and presentation showing bend curvatures, the selection list of line thicknesses is available.
This field also includes the *Added elements* option; this is a list of elements to be added to a bar whose description is provided outside the formwork contour:

- *Detailed table* - in the case of a bar (whose description is provided outside the contour), whose length is linearly variable (the result of the linearly-varying distribution), a table containing a detailed list with a separate description of each bar is provided; for a bar of constant length, the table includes the description of bar dimensions.
- *Chamfer dimensions* - (horizontal and vertical) dimension lines describing chamfered segments of reinforcement
- *Description of segment length* - dimensions determining total length (with hooks included) of each bar segment
- *Bent radius* - in some cases information about the size of radiuses of roller mandrels that form bends, is needed.

The options included in the drop-down *Size* list are used to determine the size of reinforcement symbols. The following sizes are available:

- *1 : 1* - it indicates that a symbol size equals the size of reinforcement in an element formwork

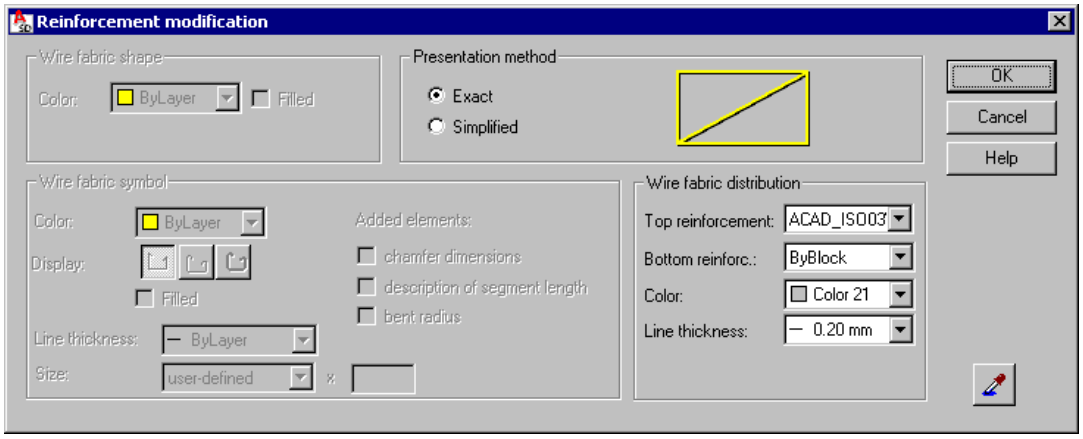
© 2010 Autodesk, Inc. All rights reserved

- *User-defined* - once this option is selected, you need to indicate (graphically) the region in which the bar symbol is to be contained
- *Scale coefficient* - once this option is selected, there appears an edit field in which you determine a scale coefficient that will decrease or increase the symbol with respect to the real size of a bar included in a formwork; for example, entering the coefficient value of 0.5 causes the drawing to be twice as small, whereas entering a value of 2 means that the drawing will be twice as large.

The *Surface distribution* field allows you to:
- Modify the style of lines applied to draw top / bottom reinforcement
- Modify color and line thickness for reinforcement distribution
- Set (the *Display* option) the method of presenting reinforcement (significant for bars ended with hooks).

19.8. Modification of graphical parameters of reinforcement (wire fabrics)

After selecting the *Modify: Graphical parameters of reinforcement* option, and selecting wire fabric reinforcement, the following option displays:



The *Wire fabric distribution* field allows you to:
- Modify the style of lines applied to draw top / bottom reinforcement
- Modify color and line thickness for elements of reinforcement distribution.

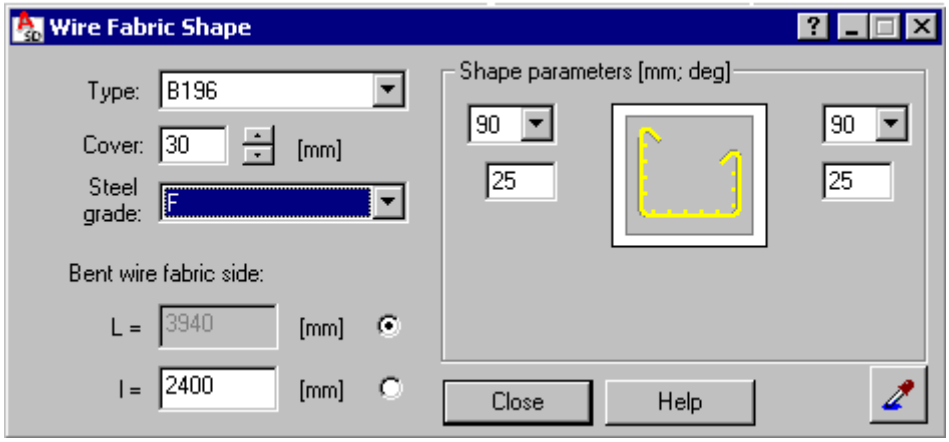
Note: The remaining options are not available in the current version.

19.9. Wire fabrics in cross section - wire fabric shape - modification

Use this option to modify wire fabrics in the cross section of an RC structure element. There are several ways to access this option:
- Menu: Reinforcement / Modify / Reinforcement
- Ribbon: ASD - Reinforcement / Modify / Modify reinforcement
- Toolbar: Modify / Modify reinforcement 
- Command line: RBCR_MOD_REINF.

© 2010 Autodesk, Inc. All rights reserved

After selecting the option and a wire fabric in the cross section, the following dialog displays:



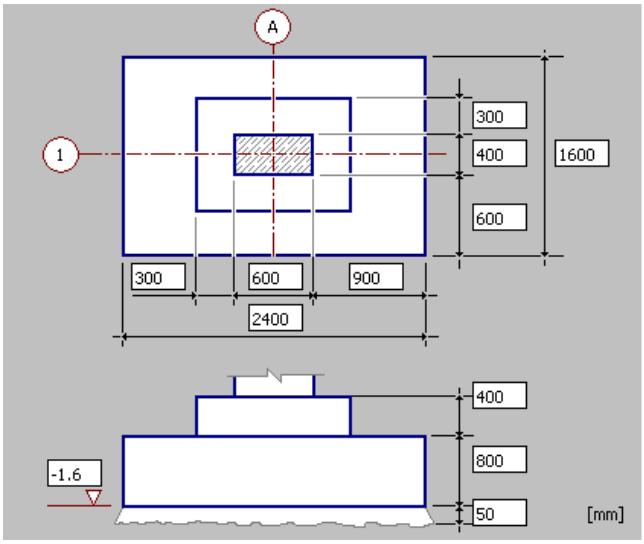
The following parameters of a wire fabric in the cross section can be modified:

- Wire fabric type (the current wire fabric type displays in the edit field)
- Wire fabric cover (the current wire fabric cover displays in the edit field)
- Reinforcing steel grade (the current steel grade is selected from the selection list)
- Bent wire fabric side (a shorter or longer wire fabric side should be selected)
- In the *Shape parameters* field – parameters of the hook ending of a wire fabric, i.e. a hook angle and length.

19.10. Example of reinforcement modification

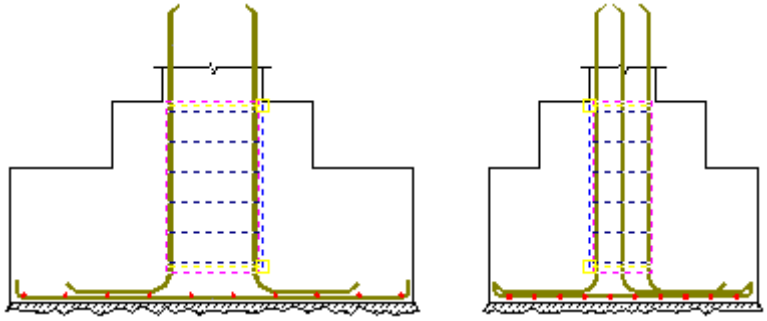
Modification of reinforcement will be illustrated based on changes in parameters of reinforcement generated for a spread footing with the use of the ***Spread Footing*** macro. To define the spread footing reinforcement, follow the steps below:

1. Click the Spread footing  icon
2. In the ***Spread footing - GEOMETRY*** dialog specify the following parameters:
   - Element name: spread footing S1
   - Number of elements = 1
   - Foundation shape - 1 rectangular spread footing
   - Column shape - 1 column with rectangular cross-section
3. Adopt the dimensions of the column, the spread footing and the column pier as shown in the drawing below



© 2010 Autodesk, Inc. All rights reserved

4. Click **Next**; it opens the ***Spread footing – REINFORCEMENT*** tab
5. Switch off the *Top reinforcement of spread footing* option; this type of reinforcement will not be generated in the defined spread footing
6. Determine the following parameters of the bottom reinforcement of the spread footing:
   - lower layer: ϕ = 12 mm, spacing s = 150 mm
   - upper layer: ϕ = 10 mm, spacing s = 250 mm
   - steel: R, cover 30 mm
7. Determine the following parameters of dowel bars of the column base-column connection:
   - reinforcement type: 1
   - reinforcement:
     - cover = 30 mm,
     - number of bars: side A = 3, side B = 2
     - ϕ = 12 mm,
     - steel: R
   - anchorage length: in column = 50*ϕ, in foundation = 50*ϕ
   - stirrups: ϕ = 6 mm, spacing s = 180 mm, steel: R
8. Click **Insert.**
9. Accept the default reinforcement number (given in the command line), click **Enter**
10. Indicate the location of the generated drawing of the spread footing and its reinforcement.
11. In the case reinforcement parameters or a reinforcement description needs to be modified once the spread footing reinforcement has been defined, the option *Modify – Reinforcement* or *Modify – Reinforcement description* should be used.
    For example, to modify parameters of the stirrups generated in the spread footing, do as follows:
    select the stirrup reinforcement in both sections of the spread footing (see the drawing below)



12. Right-click *Modify* option from the context menu.
13. In the ***Reinforcement distribution*** dialog, change the stirrup spacing entering n = 6 (instead of n = 5); the stirrup spacing is adjusted automatically (the change from s=180 mm to s=150mm)
14. Click **OK**; stirrups will be modified in the drawing
15. Click the Update tables  icon.
16. Select the reinforcemet table range: *All* and click **Enter**; the reinforcement table will be modified and it will include new reinforcement parameters.

Similarly, there is a possibility to modify a description of a reinforcement position; after indicating a number of the reinforcement position (label), right-clicking the *Modify* option from the context menu, the ***Reinforcement description*** option appears on the screen. In this dialog, you can select a new reinforcement description style or modify the currently used reinforcement style (after clicking **Details).**

© 2010 Autodesk, Inc. All rights reserved

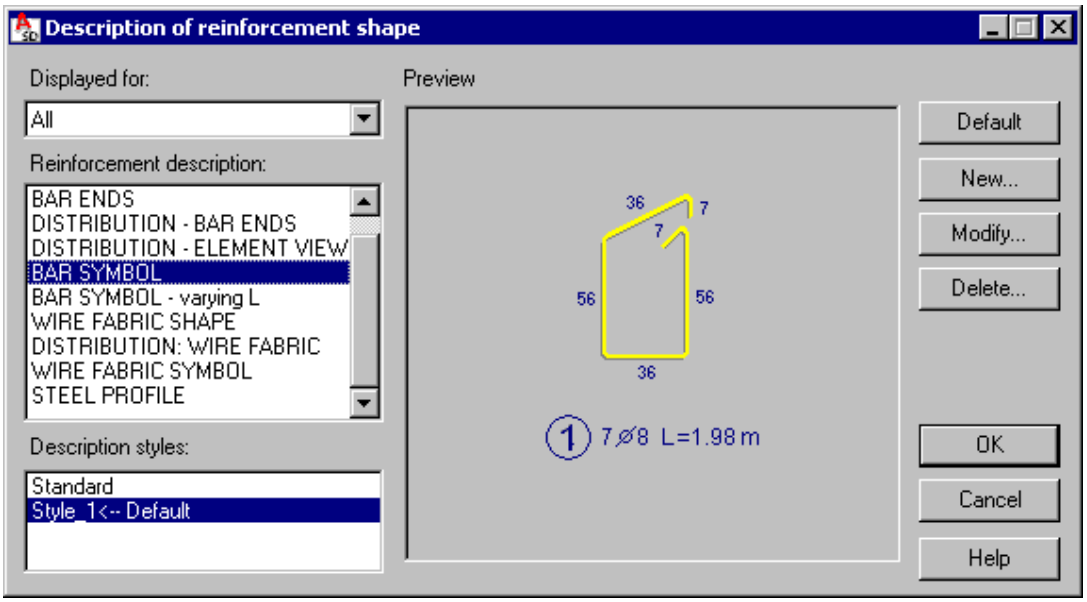
20. DESCRIPTION OF REINFORCEMENT

20.1. Description of reinforcement shape

After you define reinforcement (such as bar shape, reinforcement distribution, or wire fabric distribution), you can assign a description appropriate for the reinforcement type.

To begin assigning a description, open the Description of reinforcement shape dialog from:

- Menu: Reinforcement / Reinforcement description / Styles of reinforcement description
- Ribbon: ASD - Reinforcement / Settings / Styles of reinforcement description
- Command line: RBCR_SHAPE_DESCR.



For purposes of description, there are 4 categories of reinforcement (bars):

- Reinforcement shape – a bar in the elevation view and a bar in the section of an element (for example, main bar of a beam, stirrup)
- Bar ends – defined by additional lines drawn at bar ends
- Reinforcement distribution - stirrup distribution along the beam length, or bar distribution over the plate surface
- Bar symbol - a bar with a description provided outside the formwork contour

For purposes of description, there are 3 categories of reinforcement (wire fabrics):

- Wire fabric shape – a wire fabric in the elevation view and a wire fabric in the section of an element
- Wire fabric distribution - wire fabric(s) in an element projection or view
- Wire fabric symbol - a wire fabric with a description provided outside the formwork contour

There is also a Steel profile category.

To define the description:

- Under Displayed for, select the description list for bars, wire fabrics, profiles, or all.
- Under Reinforcement description, select a description for bars, wire fabrics, or steel
  - Bar shape, Bar ends, Distribution - element view, Bar symbol, Bar symbol - varying length of a bar
  - Wire fabric shape, Distribution: wire fabric, Wire fabric symbol
  - Steel profile

© 2010 Autodesk, Inc. All rights reserved

- Under Description styles is a list of styles defined for a selected description of reinforcement.
- The Preview field displays a graphic representation for the selected description style.

Use the buttons on the right of the dialog:

- Default – click this to specify a selected style as a default style of reinforcement description.
- New - click this to open the Reinforcement description dialog, where you can define a new style of reinforcement description.
- Modify - click this to open the Reinforcement description dialog, where you can change a selected type of reinforcement description.
- Delete - click this to delete the highlighted style of reinforcement description.

20.2.Reinforcement description

Use the Reinforcement description dialog to define elements that are to be included in a description of a reinforcement shape.
The dialog is opened when you click New or Modify on the Description of reinforcement shape dialog.

The appearance of the dialog depends on the type of reinforcement description selected:

Bars

- Bar Shape - the dialog consists of 2 tabs: Description elements, Description syntax
- Bar ends – the Reinforcement description dialog
- Distribution – Bar Ends – Reinforcement description dialog
- Distribution - Element View - the dialog consists of 2 tabs: Description elements, Description syntax
- Bar Symbol - the dialog consists of 2 tabs: Description elements, Description syntax
- Bar Symbol - Varying Length - the dialog box consists of two tabs: Description elements, Description syntax

Wire Fabrics

- Wire Fabric Fhape - the dialog contains 2 tabs: Description elements, Description syntax
- Distribution: Wire Fabric - the dialog contains 2 tabs: Description elements, Description syntax
- Wire Fabric Symbol - the dialog contains 2 tabs: Description elements, Description syntax

Steel Profiles

- Steel Profile - the dialog contains 2 tabs: Description elements, Description syntax

20.3.Bars

20.3.1. Bar shape

When you define a description for a bar shape, the Reinforcement description dialog contains 2 tabs:

- Description elements
- Description syntax.

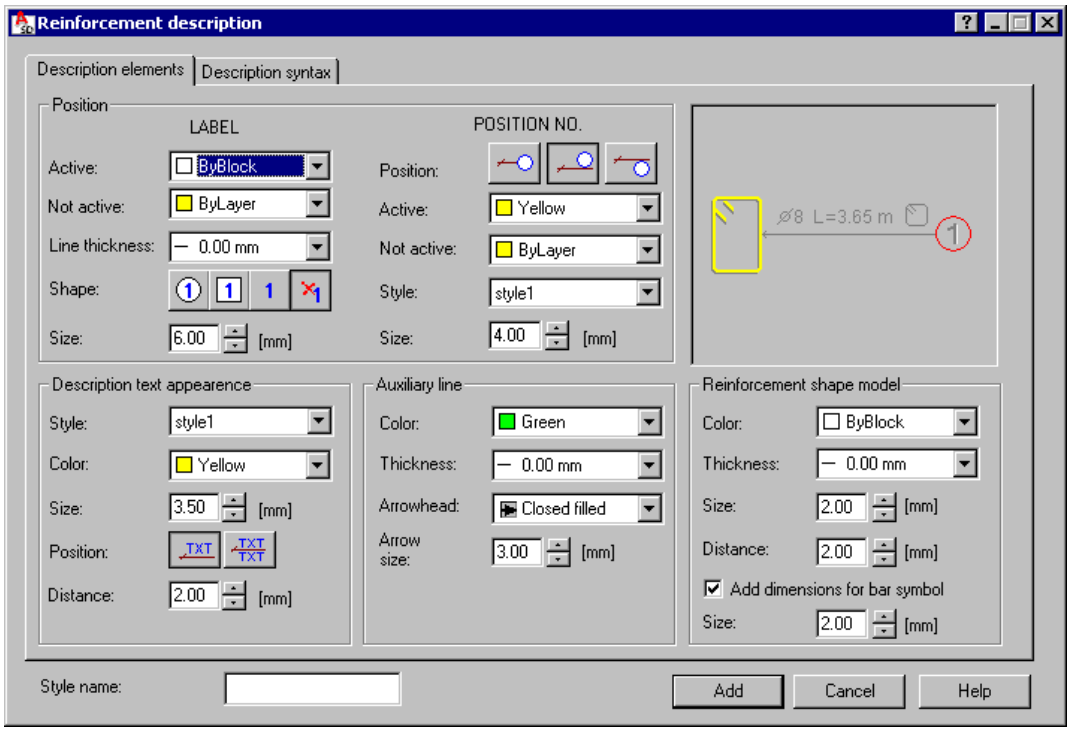
The Reinforcement description dialog may be opened after selecting the description of reinforcement shape and clicking New or Modify on the Description of reinforcement shape dialog.

© 2010 Autodesk, Inc. All rights reserved

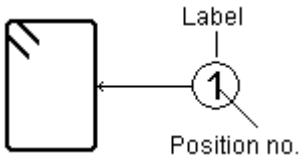
To add a new description of a bar shape, click Add after you define parameters of the bar shape description.

20.3.2. Description elements

On the Description elements tab of the Reinforcement description (bar shape) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.



The options included in the Position field refer to a label and the number that the label contains (see the drawing below).



Under Position, specify Label parameters:

- Colors for active and not active positions
- Line thickness
- Label shape
- Label size

Specify Position Number parameters:

- Default position on the extension line
- Colors for active and not active positions
- Font style
- Font size

The active position referred to here is specified on the Reinforcement description dialog (see the drawing below). If Active is selected for a given position, you choose a color from the Active list. If Active is not selected, you choose a color for this position from the Not active list.

© 2010 Autodesk, Inc. All rights reserved

The options under Description text appearance define a description placed between a position (label) and the described reinforcement:

- Style
- Color
- Size
- Position with respect to the auxiliary line (above only or above and below)

Under Auxiliary line, define parameters of a line that connects a position with reinforcement:

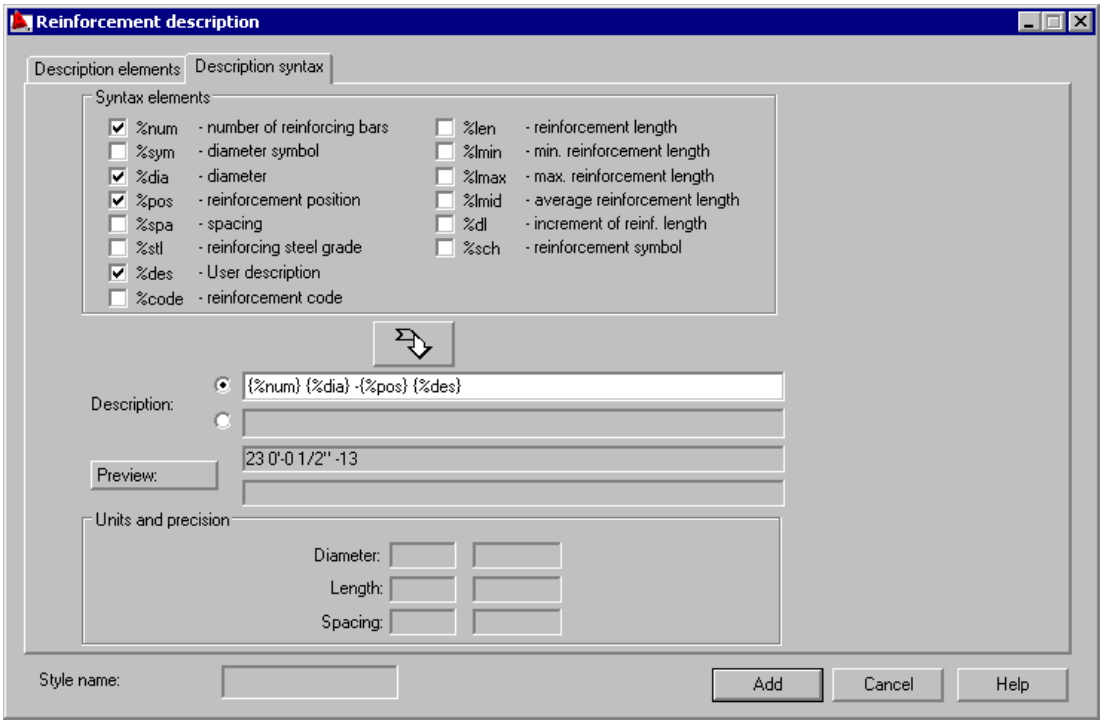
- Color
- Thickness
- Type of arrowheads
- Arrow size

Under Reinforcement shape model, define parameters for a symbolic shape of the described reinforcement:

- Color and thickness of a line forming a symbol
- Size of a symbol
- Vertical distance to description text
- Dimensions for bar symbol - when you select this, the bar description includes a bar symbol, and you can specify the size of individual segments of a reinforcing bar.

20.3.3. Description syntax

On the Description syntax tab of the Reinforcement description (bar shape) dialog, you can define syntax of a reinforcement description. The dialog lets you define the general style and also lets you compose syntax and contents of reinforcement description.



© 2010 Autodesk, Inc. All rights reserved

Under Syntax elements, select components and move them to the Description fields (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols. An example description is: ϕ10 every 15 cm length = 2.0 m.
Because the description may consist of 2 parts, there are 2 edit fields. The upper edit field contains desciption components that will display above the line, whereas the lower edit field contains the components that display under the line (see the Position option on the Description elements tab).
The Preview field displays a description of reinforcement that results from the defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.
Under Units and precision, the software displays the diameter, length, and spacing data applied while displaying a given value.

Variables included in a reinforcement description:

%num	- number of reinforcing bars
%sym	- diameter symbol
%dia	- diameter
%pos	- number of reinforcement position
%spa	- spacing
%stl	- reinforcement class
%len	- reinforcement length
%lmin	- minimum reinforcement length
%lmax	- maximum reinforcement length
%lmid	- average reinforcement length
%dl	- increment of reinforcement length equal to a constant value
%sch	- reinforcement symbol
%code	- reinforcement code
%des	- user description

Select User description in order to add text to the reinforcement description determined in the Reinforcement description dialog (for longitudinal and transversal reinforcement, point reinforcement, or distribution of reinforcement).

NOTE:
The manner of reinforcement description depends on the type of reinforcement being described and on the country code being applied. For example, the description may take the following form:

Bar shape %sym%dia L= %len m ϕ10 L= 2.0m

Characters added should be put in brackets to ensure that, if any description data (such as spacing) is missing, the entire description text with a variable will not be displayed.

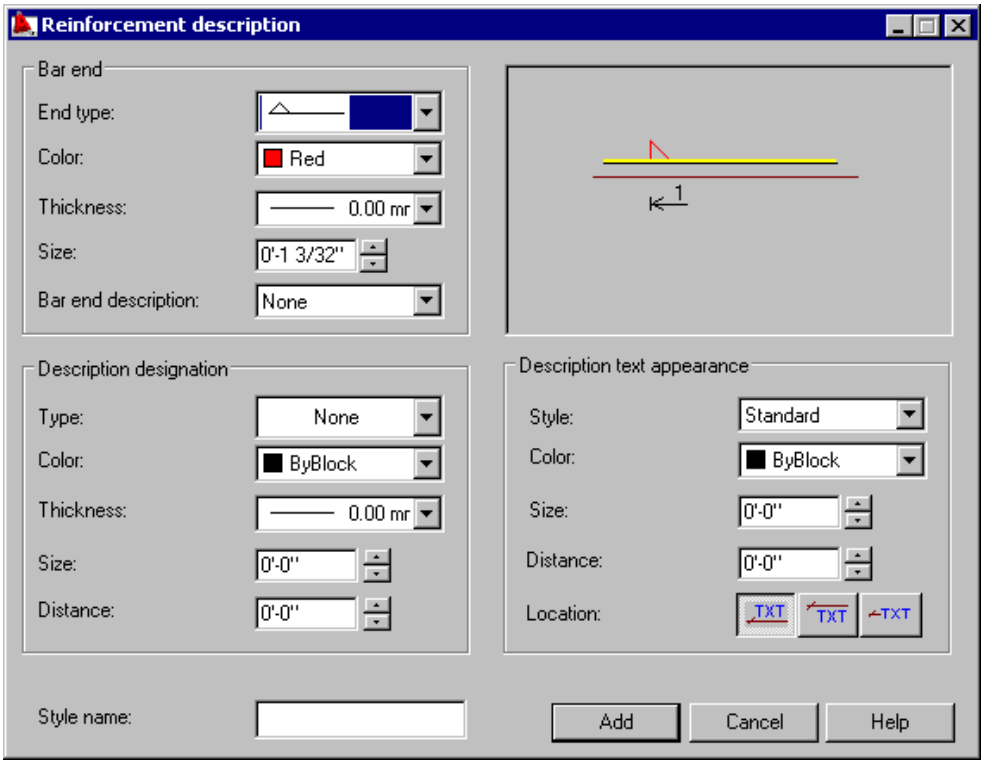
Any variables applied in a syntax must be put in brackets {}; you can add any text in between the successive variables put in these brackets.

NOTE:
For example, if a bar symbol is to be included in the description of a defined reinforcing bar, select Reinforcement symbol and click the arrow. The variable containing a bar symbol will be added to the Description edit field, and you should then click Add.

20.3.4. Bar ends - reinforcement description

Use the Reinforcement description dialog to define parameters for description of bar ends. The Reinforcement description dialog displays after you select the description of bar ends and click New or Modify on the Description of reinforcement shape dialog.

© 2010 Autodesk, Inc. All rights reserved



The options included in the Bar end field refer to the way the ends of reinforcing bars are displayed (additional lines at bar ends). You can specify a graphical designation and an arrowhead with the bar number.
A description of the bar end can be deleted, because it is not linked with the designation of the bar end. Deleting the designation also deletes the description of the bar end.
Specify Bar end parameters:

- End type

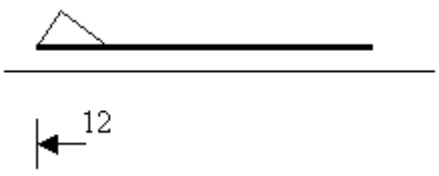
- Color and thickness of the line used to draw bar ends
- Symbol size
- Description of the bar end (none or description type: 1, 01)

Under Description designation, define parameters of the line that represents a bar end description:

- Type

If you select either of the arrow designation types, the bar end description is inserted with the arrowhead

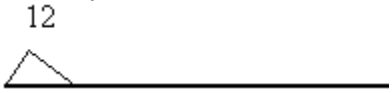
o under the bar at the specified distance + a cover value



© 2010 Autodesk, Inc. All rights reserved

o over the bar, if the Distance value is negative (then the cover is subtracted)

None – if you select this, the description of a bar end will be inserted over the bar end at the specified distance, as shown



- Color
- Thickness
- Size
- Distance of the line end

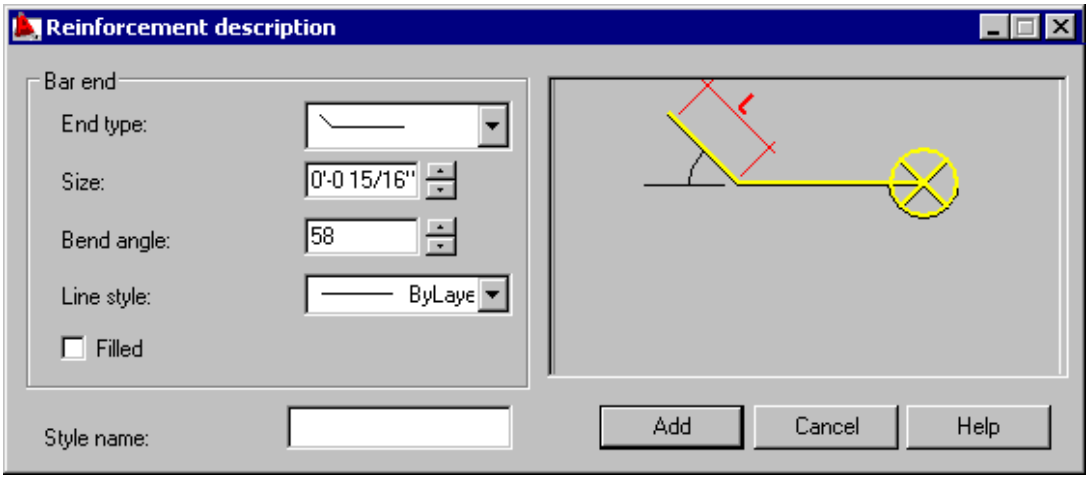
The options under Description text appearance define a description of bar ends:

- Style
- Color
- Size
- Location - over, under, or next to the line

NOTE:
If, in the Job Preferences dialog (the Bars / Display tab), you select the option that allows drawing bars without hooks - with bar ends, then bar ends will be drawn automatically according to the default style.

20.3.5. Distribution - Bar ends - Reinforcement description

This is the ***Reinforcement description*** dialog for descriptions of bar ends for distributions. To open this dialog, select the *Distribution – Bar ends* option and click **New** or **Modify** in the Description of reinforcement shape dialog.



The *Bar end* field has options for presenting reinforcing bar ends (additional lines at bar ends) in distributions. These lines are additional objects connected with the bar.

© 2010 Autodesk, Inc. All rights reserved

Specify the following parameters in the *Bar end* field:

- end type; you can select the following end types:

- size (length l)
- bend angle
- line style.

After selecting the *Filled* option, a symbol is filled  .

20.3.6. Distribution - element view

The Reinforcement description dialog for bar distribution (element view) consists of 2 tabs:

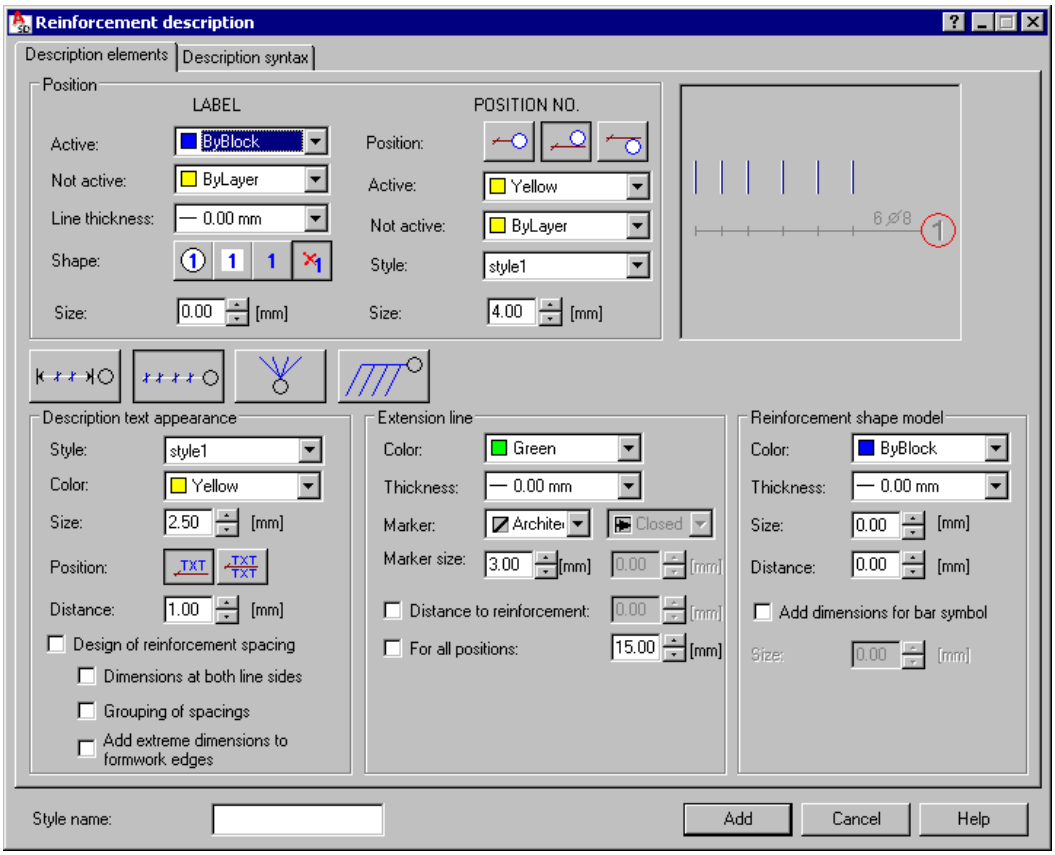
- Description elements
- Description syntax

The Reinforcement description dialog displays after you select the description of reinforcement distribution (element view) and click New or Modify on the Description of reinforcement shape dialog.

To add a new description of distribution (element view), click Add after you define parameters of distribution description.

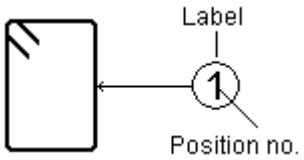
20.3.7. Description elements

On the Description elements tab of the Reinforcement description (distribution - element view) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.



© 2010 Autodesk, Inc. All rights reserved

The options included in the Position field refer to a label and the number that the label contains (see the drawing below).



Under Position, specify Label parameters:

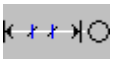
- Colors for active and not active positions
- Line thickness
- Label shape
- Label size

Specify Position Number parameters:

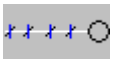
- Default position on the extension line
- Color of active and not active positions
- Font style
- Font size

The active position referred to here is specified on the Reinforcement description dialog (see the drawing below). If Active is selected for a given position, you choose a color from the Active list. If Active is not selected, you choose a color for this position from the Not active list.

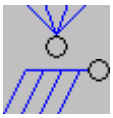
There are 4 styles of distribution description that can be parametrized. For each style, various parameters can be defined:



the first style lets you define 2 independent types of markers (on ends of an extension line and in between them) and their sizes; the Distance to reinforcement option is available.



the second style lets you define 1 marker type and size; the Distance to reinforcement option is available.



for the third and fourth styles, 1 field is provided for selecting a marker: arrowhead and size; the Distance to reinforcement option is available.

The options under Description text appearance define a description placed between a position and the described reinforcement:

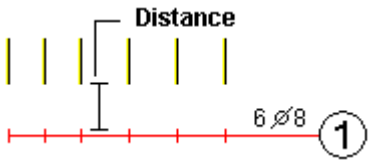
- Style
- Color
- Size
- Position with respect to the auxiliary line (above only or above and below)
- Horizontal distance to a label

For the first 2 types of distribution description (line linking a position with described reinforcement), you can select Design of reinforcement spacing, which adds a dimension of reinforcement spacing to the line describing distribution. You can then select additional options that will determine the position of dimensions, which are shown in the preview at the top right of the dialog.

© 2010 Autodesk, Inc. All rights reserved

Under Extension line, define parameters of a line that connects a position with reinforcement. The Parameters of line color and thickness are invariable, and they do not depend on a selected style.

If you select Distance to reinforcement, you can determine the distance between reinforcement description and reinforcement distribution (see the drawing below). If the distance equals 0, reinforcing bars in the distribution are connected with the description.



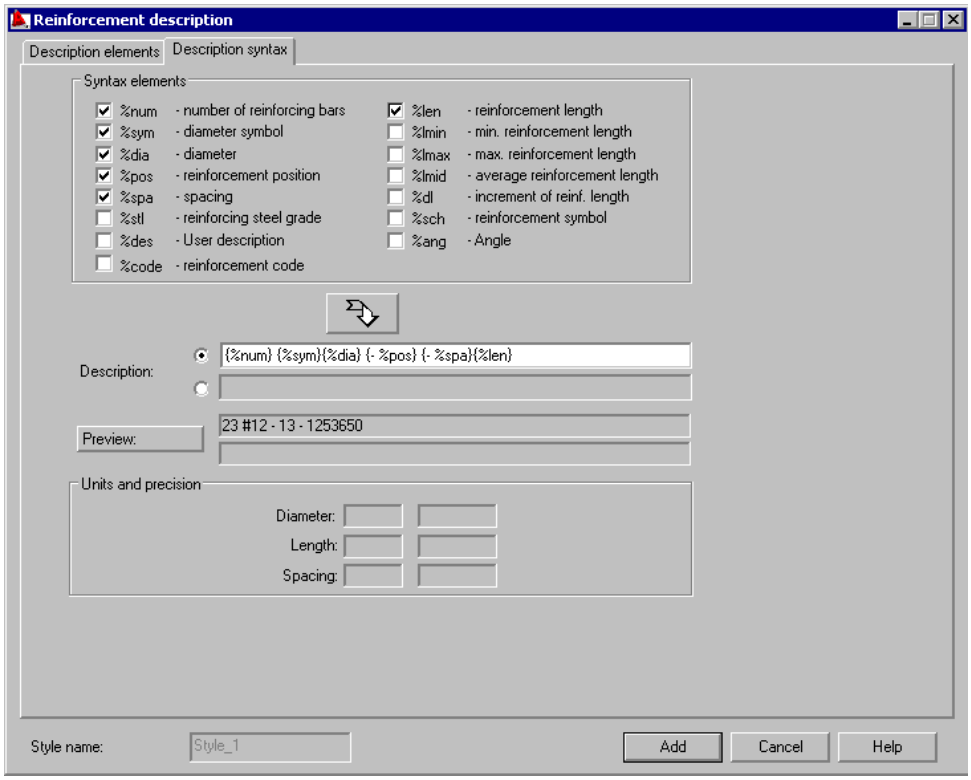
If you select For all positions, the distance between the reinforcement description and the reinforcement distribution will equal the value defined for all positions.

Under Reinforcement shape model, you define parameters of a symbolic shape of described reinforcement:

- Color and thickness of the line making up a symbol
- Size of a symbol
- Horizontal distance to description text
- Dimensions for bar symbol - when you select this, the bar description includes a bar symbol, and you can specify the size of individual segments of a reinforcing bar.

20.3.8. Description syntax

On the Description syntax tab of the Reinforcement description (distribution - element view) dialog, you can define syntax of a reinforcement distribution. The dialog lets you define the general style and also lets you compose syntax and contents of reinforcement description.



© 2010 Autodesk, Inc. All rights reserved

Under Syntax elements, select components and move them to the Description fields (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols. An example description is: ϕ10 every 15 cm length = 2.0 m.
Because the description may consists of 2 parts, there are 2 edit fields. The upper edit field contains desciption components that will display above the line, whereas the lower edit field contains the components that display under the line (see the Position option on the Description elements tab).
The Preview field displays a description of reinforcement distribution that results from the defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

Under Units and precision, the software displays the diameter, length, and spacing data applied while displaying a given value.
Variables included in a reinforcement distribution description:

%num	- number of reinforcing bars
%sym	- diameter symbol
%dia	- diameter
%pos	- number of reinforcement position
%spa	- spacing
%stl	- reinforcement class
%len	- reinforcement length
%lmin	- minimum reinforcement length
%lmax	- maximum reinforcement length
%lmid	- average reinforcement length
%dl	- increment of reinforcement length equal to a constant value
%sch	- reinforcement symbol
%ang	- angle
%code	- reinforcement code
%des	- user description

Select User description in order to add text to the reinforcement description determined in the Reinforcement description dialog (for longitudinal and transversal reinforcement, point reinforcement, or distribution of reinforcement).

NOTE:
The manner of reinforcement distribution description depends on the type of reinforcement being described and on the country code being applied.
Characters added should be put in brackets to ensure that, if any description data (such as spacing) is missing, the entire description text with a variable will not be displayed

NOTE:
For example, if a bar symbol is to be included in the description of a defined reinforcing bar, select Reinforcement symbol and click the arrow. The variable containing a bar symbol will be added to the Description edit field, and you should then click Add.

20.3.9. Bar symbol

The Reinforcement description dialog for a bar symbol or a symbol of a bar with variable length consists of 2 tabs:

- Description elements
- Description syntax

Using the options on this dialog, you can define components that are provided when a reinforcement description is placed outside the contour of an element formwork.

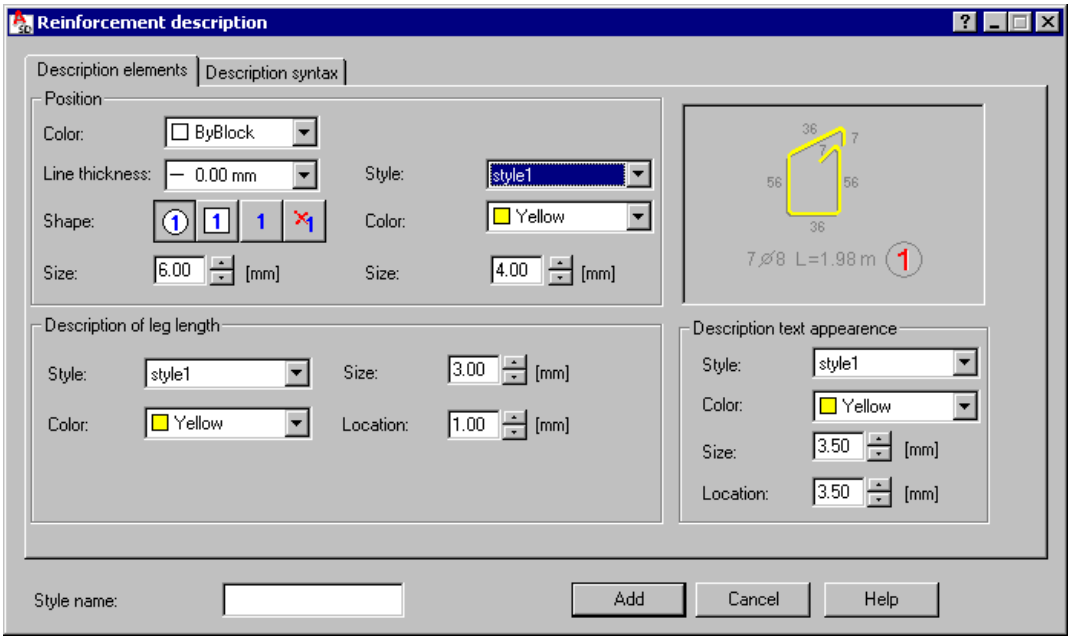
© 2010 Autodesk, Inc. All rights reserved

The Reinforcement description dialog displays after you select the description of reinforcement distribution (element view or element projection) and click New or Modify on the Description of reinforcement shape dialog.

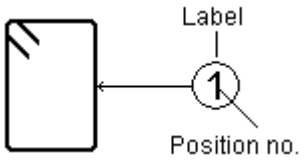
To add a new description of bar symbol, click Add after you define parameters of a bar symbol description.

20.3.10. Description elements

On the Description elements tab of the Reinforcement description (bar symbol/with variable L) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.



The options included in the Position field refer to a label and the number that the label contains (see the drawing below).



Specify label parameters:

- Color
- Line thickness
- Shape
- Size

Specify label number parameters:

- Font style
- Color
- Size

© 2010 Autodesk, Inc. All rights reserved

Using the options under Description of leg length, you can define a description of the bar leg length:

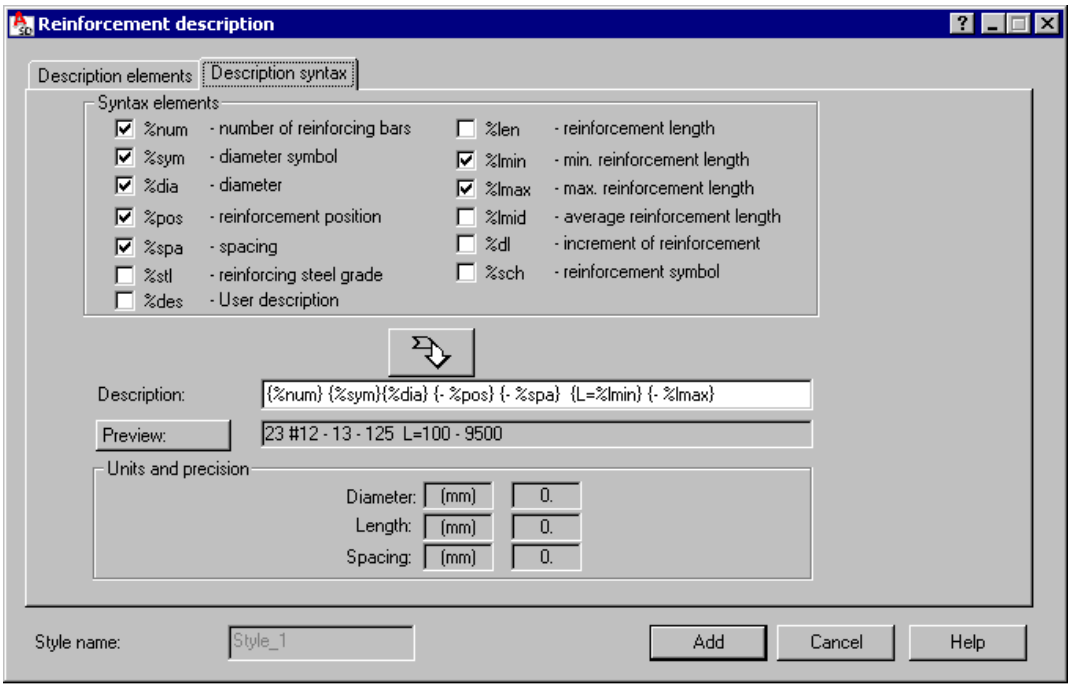
- Style
- Color
- Size
- Position of the text with respect to the reinforcement

The options under Description text appearance define a description placed directly behind a position:

- Style
- Color
- Size
- Position with respect to a label (horizontal distance)

20.3.11. Description syntax

On the Description syntax tab of the Reinforcement description (bar symbol/with variable L) dialog, you can define description syntax for a symbol of reinforcement whose description is provided outside the formwork contour.



Under Syntax elements, select components and move them to the Description field (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols. An example description is: f10 every 15 cm length = 2.0 m.

The Preview field displays a description of a reinforcement symbol that results from the defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

Under Units and precision, the software displays the diameter, length, and spacing data applied while displaying a given value.

Variables included in a reinforcement symbol description:

%num	- number of reinforcing bars
%sym	- diameter symbol
%dia	- diameter

© 2010 Autodesk, Inc. All rights reserved

%pos	- number of reinforcement position
%spa	- spacing
%stl	- reinforcement class
%len	- reinforcement length
%lmin	- minimum reinforcement length
%lmax	- maximum reinforcement length
%lmid	- average reinforcement length
%dl	- increment of reinforcement length equal to a constant value
%sch	- reinforcement symbol
%des	- user description

Select User description in order to add text to the reinforcement description determined in the Reinforcement description dialog (for longitudinal and transversal reinforcement, point reinforcement, or distribution of reinforcement).

NOTE:
The manner of reinforcement symbol description depends on the type of reinforcement being described and on the country code being applied.

Characters added should be put in brackets to ensure that, if any description data (such as spacing) is missing, the entire description text with a variable will not be displayed

NOTE:
For example, if a bar symbol is to be included in the description of a defined reinforcing bar, select Reinforcement symbol and click the arrow. The variable containing a bar symbol will be added to the Description edit field, and you should then click Add.

20.4.Wire fabrics

20.4.1. Wire fabric shape

The Reinforcement description dialog for wire fabric shape consists of 2 tabs:

- Description elements
- Description syntax

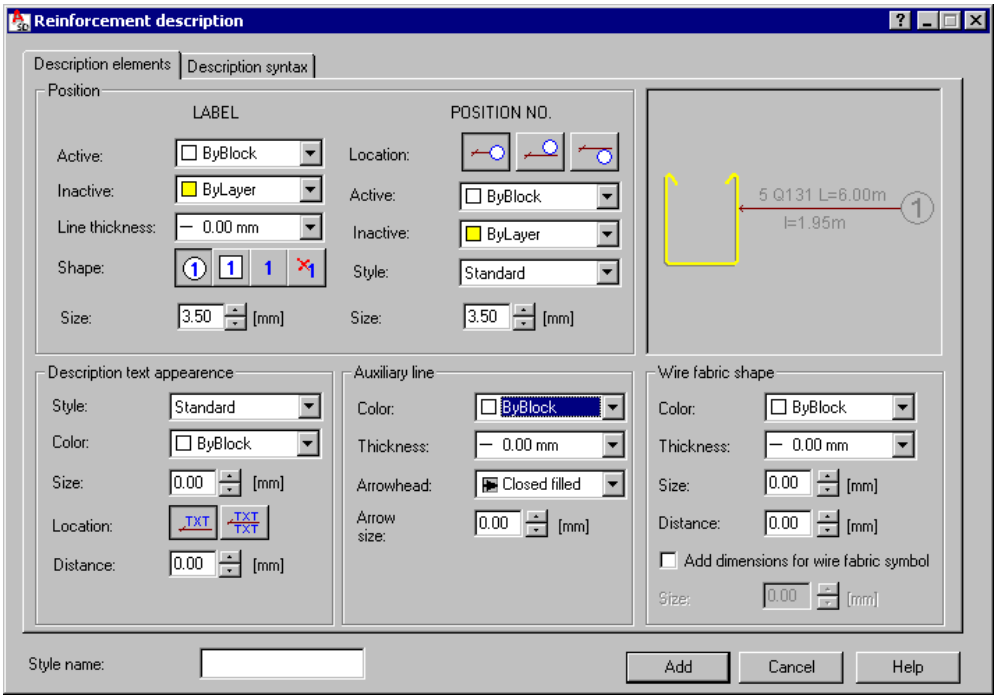
The Reinforcement description dialog displays after you select a description of the wire fabric shape and click New or Modify on the Description of reinforcement shape dialog.

To add a new description of the wire fabric shape, click Add button after you define parameters of the wire fabric shape description.

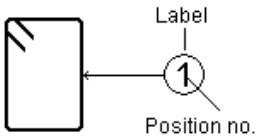
20.4.2. Description elements

On the Description elements tab of the Reinforcement description (wire fabric shape) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.

© 2010 Autodesk, Inc. All rights reserved



The options included in the Position field refer to a label and the number that the label contains (see the drawing below).



Under Position, specify Label parameters:

- Colors for active and not active positions
- Line thickness
- Label shape
- Label size

Specify Position Number parameters:

- Default position on a leader
- Color of active and not active positions
- Font style
- Font size

The active position referred to here is specified on the Reinforcement description dialog (see the drawing below). If Active is selected for a given position, you choose a color from the Active list. If Active is not selected, you choose a color for this position from the Not active list.

The options under Description text appearance define a description placed between a position (label) and the described wire fabric:

- Style
- Color
- Size
- Position with respect to the auxiliary line (above only or above and below), and vertical translation with respect to the line.

© 2010 Autodesk, Inc. All rights reserved

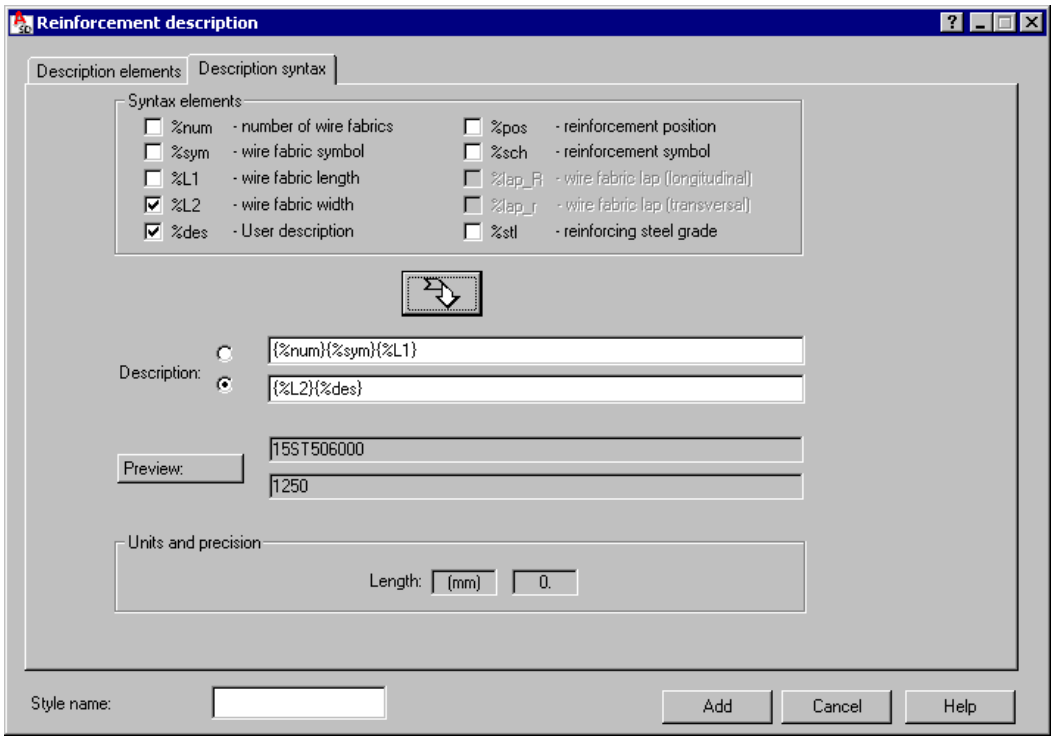
Under Auxiliary line, define parameters of a line that connects a position with reinforcement:

- Color
- Thickness
- Type of arrowheads
- Arrow size

Under Wire fabric shape, define parameters for a symbolic shape of the described wire fabric:
Color and thickness of a line forming a symbol
Size of a symbol size
Horizontal distance to description text
Dimensions for wire fabric symbol - when you select this, the wire fabric description includes a wire fabric symbol, and you can specify the size of individual segments of a wire fabric bar.

20.4.3. Descrption syntax

On the Description syntax tab of the Reinforcement description (wire fabric shape) dialog, you can define syntax of a description of a wire fabric shape.



Under Syntax elements, select components and move them to the Description field (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols.
The Preview field displays a description of the wire fabric shape that results from the defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

Under Units and the precision, the software displays the diameter, length, and spacing data applied while displaying a given value.
Variables included in a wire fabric description:

%num	- number of wire fabrics
%sym	- wire fabric symbol
%L1	- wire fabric length
%L2	- wire fabric width
%des	- user description
%pos	- reinforcement position

© 2010 Autodesk, Inc. All rights reserved

%sch - reinforcement symbol
%lap_R - wire fabric lap (longitudinal)
%lap_r - wire fabric lap (transversal)
%stl - reinforcing steel grade

NOTE:
The method of wire fabric description depends on the type of reinforcement being described and on the country code being applied.

Any variables applied in a syntax must be put in brackets {}; you can add any text in between the successive variables put in these brackets.

NOTE:
For example, if a wire fabric symbol is to be included in the description of a defined wire fabric, select Reinforcement symbol and click the arrow. The variable containing a wire fabric symbol will be added to the Description edit field, and you should then click Add.

20.4.4. Wire fabric distribution

The Reinforcement description dialog for wire fabric distribution consists of 2 tabs:

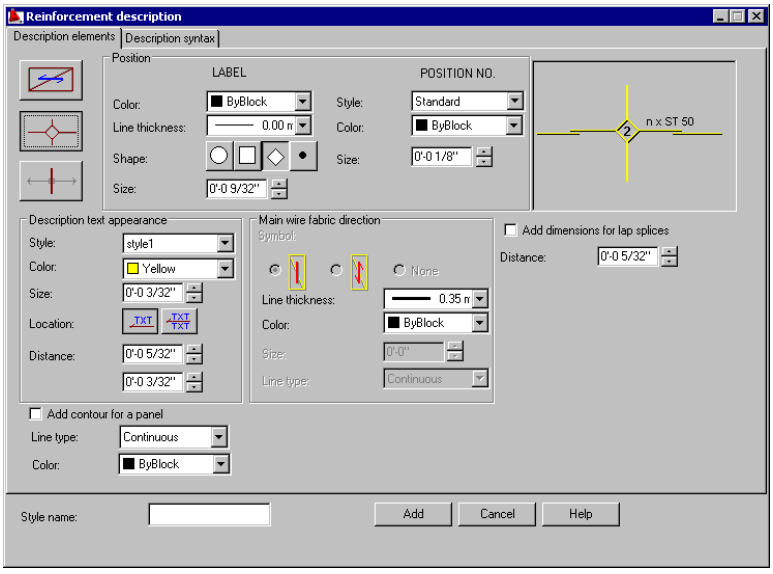
- Description elements
- Description syntax.

The Reinforcement description dialog displays after you select the description of wire fabric distribution and click New or Modify on the Description of reinforcement shape dialog.

To add a new description of a wire fabric shape, click Add after you define parameters of a wire fabric distribution description.

20.4.5. Description elements

On the Description elements tab of the Reinforcement description (wire fabric distribution) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.



There are the following ways to display a wire fabric in drawings:

© 2010 Autodesk, Inc. All rights reserved

-  exact
-  simplified
-  group.

Options in the dialog are specific to a selected type of presenting a wire fabric.

The options included in the Position field refer to a leader (label) and the number that the label contains.

Under Position, specify label parameters:

- Color
- Line thickness
- Label shape
- Label size

Specify position number parameters:

- Font style
- Color
- Size

The options under Description text appearance define a description placed behind a reinforcement position:

- Style
- Color
- Size
- Position with respect to a label and bottom level of a label

Under Main wire fabric direction, select a symbolic shape of the main wire fabric direction:

- 
- 
- None – the absence of a symbol indicating the main wire fabric direction

When a symbol is used, define symbol parameters:

- Line thickness
- Symbol color
- Size

If you select the Add dimensions for lap splices option, descriptions include dimensions of lap splices.

At the bottom of the dialog is the option for simplified presentation of wire fabrics - Add contour for a panel. After you select this option, additionally, a contour is drawn for a panel (slab). Specify a line type and color for this contour.

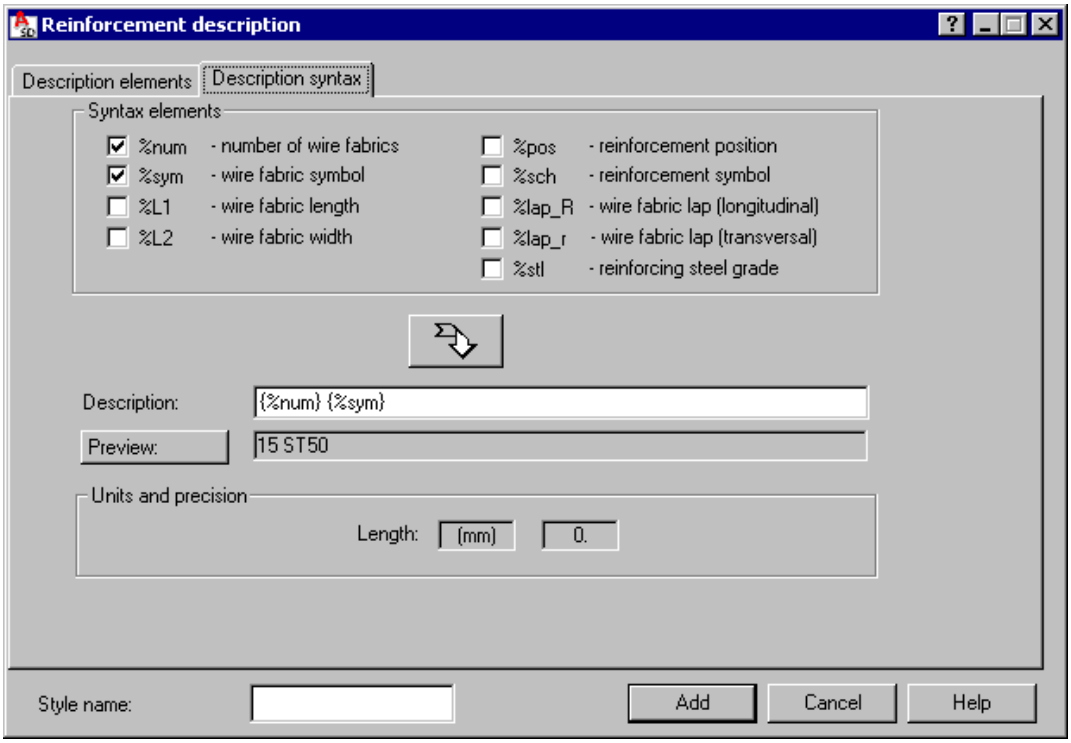
The *Distribution line* field has options for the group presentation of wire fabrics:

- Type and color of the distribution line
- Marker type
- Size
- Thickness
- Shape.

© 2010 Autodesk, Inc. All rights reserved

20.4.6. Description syntax

On the Description syntax tab of the Reinforcement description (wire fabric distribution) dialog, you can define the description syntax of wire fabric distribution.



Under Syntax elements, select components and move them to the Description field (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols.

The Preview field displays a description of reinforcement distribution that results from a defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

Under Units and precision, the software displays the diameter, length, and spacing data applied while displaying a given value.

Variables included in a wire fabrics description:

%num	- number of wire fabrics
%sym	- wire fabric symbol
%L1	- wire fabric length
%L2	- wire fabric width
%pos	- reinforcement position
%sch	- reinforcement symbol
%lap_R	- wire fabric lap (longitudinal)
%lap_r	- wire fabric lap (transversal)
%stl	- reinforcing steel grade

NOTE:
The manner of reinforcement description depends on the type of reinforcement being described and on the country code being applied.

Any variables applied in a syntax must be put in brackets {}; you can add any text in between the successive variables put in these brackets.

© 2010 Autodesk, Inc. All rights reserved

NOTE:
For example, if a wire fabric symbol is to be included in the description of a defined wire fabric, select Reinforcement symbol and click the arrow. The variable containing the wire fabric symbol will be added to the Description edit field, and you should then click Add.

20.4.7. Wire fabric symbol

The Reinforcement description dialog for a wire fabric symbol consists of 2 tabs:

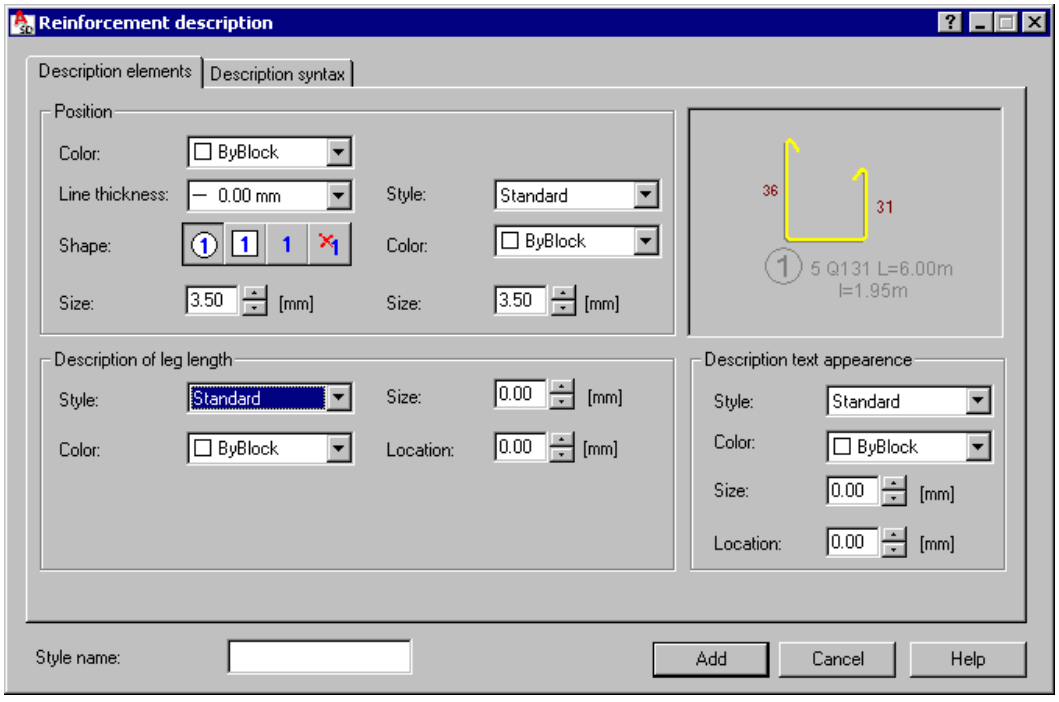
- Description elements
- Description syntax

The Reinforcement description dialog displays after you select the description of the wire fabric symbol and click New or Modify on the Description of reinforcement shape dialog.

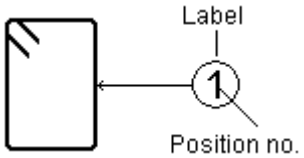
To add a new description of the wire fabric symbol, click Add after you define parameters of the wire fabric symbol description.

20.4.8. Description elements

On the Description elements tab of the Reinforcement description (wire fabric symbol) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.



The options included in the Position field refer to a label and the number that the label contains (see the drawing below).



© 2010 Autodesk, Inc. All rights reserved

Under Position, specify label parameters:

- Color
- Line thickness
- Label shape
- Label size

Specify position number parameters:

- Font style
- Font color
- Font size

Define parameters for Description of leg length:

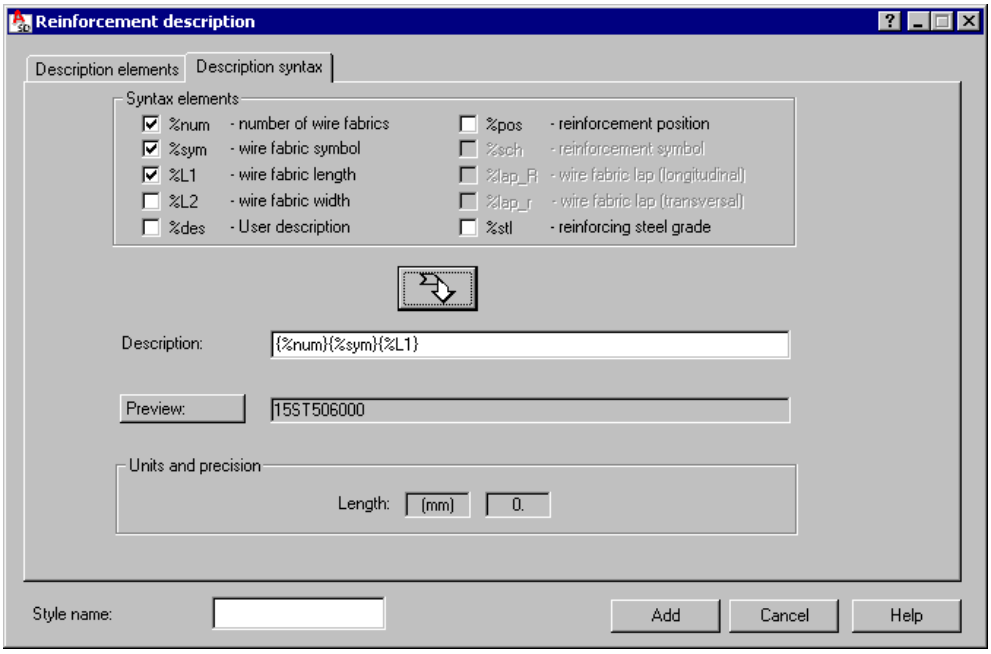
- Style
- Color
- Size
- Position of a text with respect to the described wire fabric

The options under Description text appearance define a description placed directly behind a position:

- Style
- Color
- Size
- Position with respect to a label (horizontal distance)

20.4.9. Description syntax

On the Description syntax tab of the Reinforcement description (wire fabric symbol) dialog, you can define a description syntax for a wire fabric symbol.



Under Syntax elements, select components and move them to the Description field (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols.
The Preview field displays a description of the wire fabric symbol that results from the defined syntax. This description is based on number values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

© 2010 Autodesk, Inc. All rights reserved

Under Units and the precision, the software displays the diameter, length, and spacing data applied while displaying a given value.
Variables included in the wire fabric description:

%num	- number of wire fabrics
%sym	- wire fabric symbol
%L1	- wire fabric length
%L2	- wire fabric width
%des	- user description
%pos	- reinforcement position
%sch	- reinforcement symbol
%lap_R	- wire fabric lap (longitudinal)
%lap_r	- wire fabric lap (transversal)
%stl	- reinforcing steel grade

 NOTE:
The method of wire fabric description depends on the type of reinforcement being described and on the country code being applied.

Any variables applied in a syntax must be put in brackets {}; you can add any text in between the successive variables put in these brackets.

20.5.Steel profiles

20.5.1. Steel profile

The Reinforcement description dialog for describing steel profiles consists of 2 tabs:

- Description elements
- Description syntax

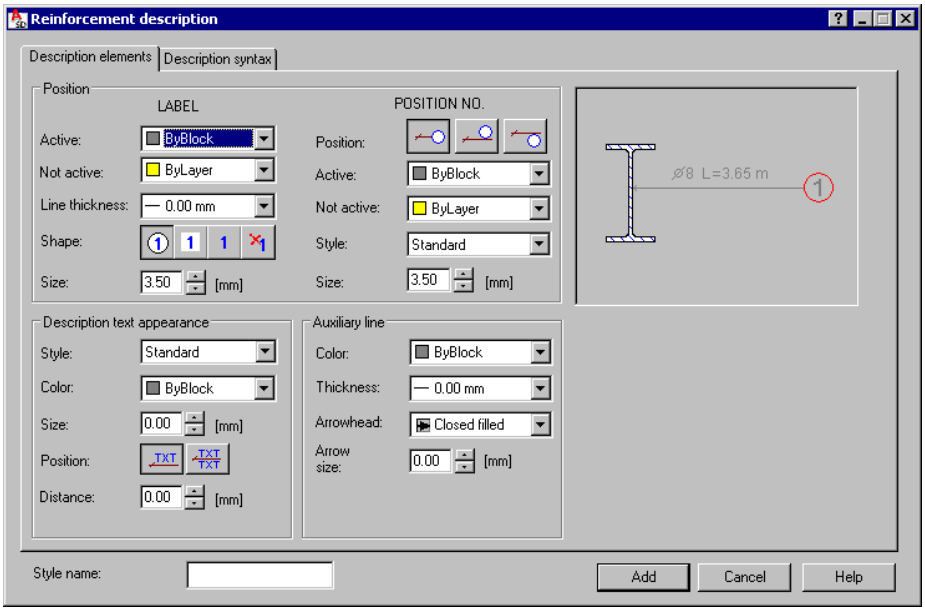
The Reinforcement description dialog displays after you select a steel profile description and click New or Modify on the Description of reinforcement shape dialog.

To add a new description of a steel profile, click Add button after you define parameters of the steel profile description.

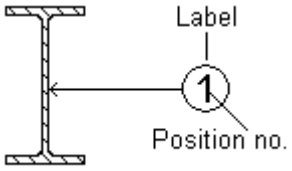
20.5.2. Description elements

On the Description elements tab of the Reinforcement description (steel profiles) dialog, you can define parameters such as colors, line thickness, font size, and label shape for a description.

© 2010 Autodesk, Inc. All rights reserved



The options in the Position field refer to a label and the number that the label contains (see the drawing below).



Under Position, specify label parameters:

- Colors for active and not active positions
- Line thickness
- Label shape
- Label size

Specify position number parameters:

- Default position on the extension line
- Colors for active and not active positions
- Font style
- Font size

The active position referred to here is specified on the Reinforcement description dialog (see the drawing below). If Active is selected, you choose a color from the Active list. If Active is not selected, you choose a color from the Not active list.

The options under Description text appearance define a description placed between a position (label) and the described steel profile:

- Style
- Color
- Size
- Position with respect to the auxiliary line (above only or above and below)

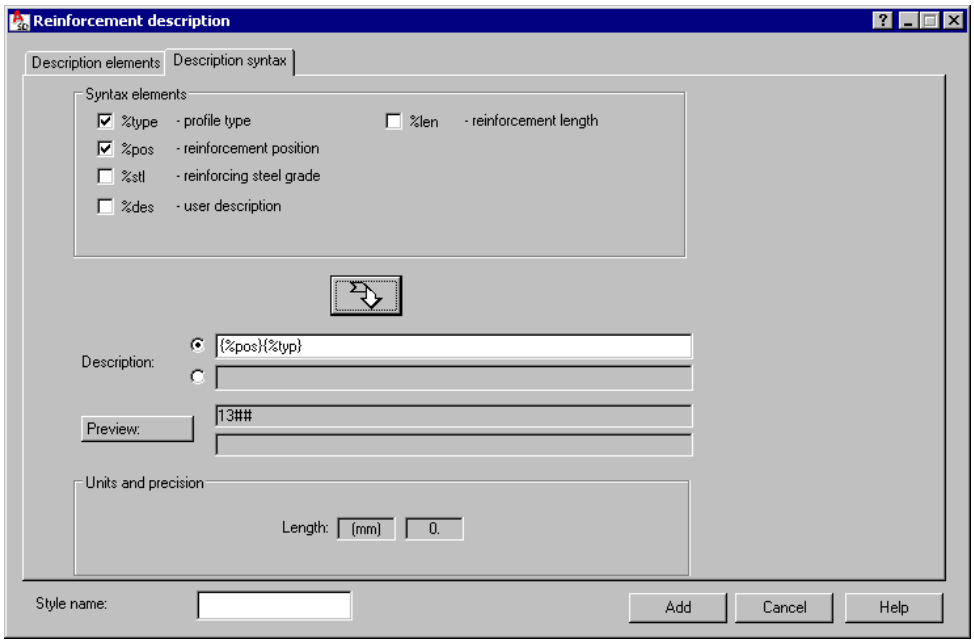
© 2010 Autodesk, Inc. All rights reserved

Under Auxiliary line, define parameters of a line connecting a position with the steel profile:

- Color
- Thickness
- Type of arrowheads
- Arrow size

20.5.3. Description syntax

On the Description syntax tab of the Reinforcement description (steel profiles) dialog, you can define a syntax of a steel profile description.



Under Syntax elements, select components and move them to the Description fields (by clicking the arrow under the element list), where you can arrange variables with user-defined text and symbols.

The Preview field displays a steel profile description that results from the defined syntax. This description is based on numerical values that have been saved as fixed, and updates with changes in preferences (change of unit or precision). NOTE: units are not displayed in a preview.

Under Units and precision, the software displays the diameter, length, and spacing data applied while displaying a given value.

Variables included in a steel profile description:

%type – profile type
%len - reinforcement (profile) length
%pos - reinforcement position
%stl - reinforcing steel grade
%des - user description

NOTE:
The manner of reinforcement description depends on the type of reinforcement being described and on the country code being applied.

Any variables applied in a syntax must be put in brackets {}; you can add any text between the successive variables put in these brackets.

© 2010 Autodesk, Inc. All rights reserved

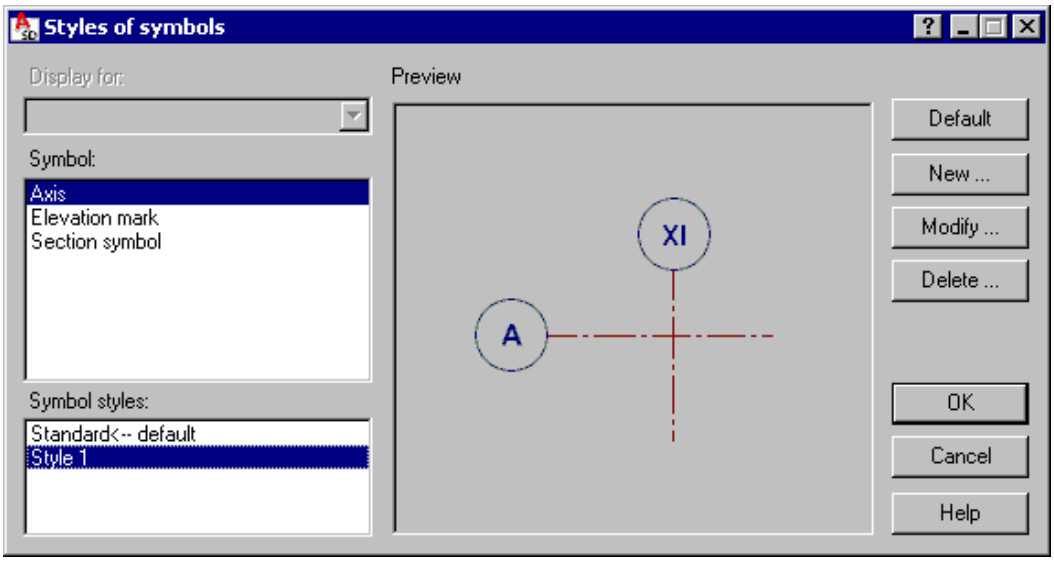
21. STYLES OF SYMBOLS

21.1. Styles of symbols

Use this option to define/modify symbols of axes, levels and sections used in elements of an RC structure. There are two ways to access this option from:

- Menu: Reinforcement / Graphic elements / Styles - graphic elements
- Ribbon: ASD - Reinforcement / Settings / Styles - graphic elements
- Command line: RBCT_DEF_SYMBOL_STYLE.

After selecting this option, the following dialog displays:



The following types of symbols are used for elements of RC structures (presented in the *Symbol* field in the dialog):

- Axis symbol
- Elevation mark symbol
- Section symbol.

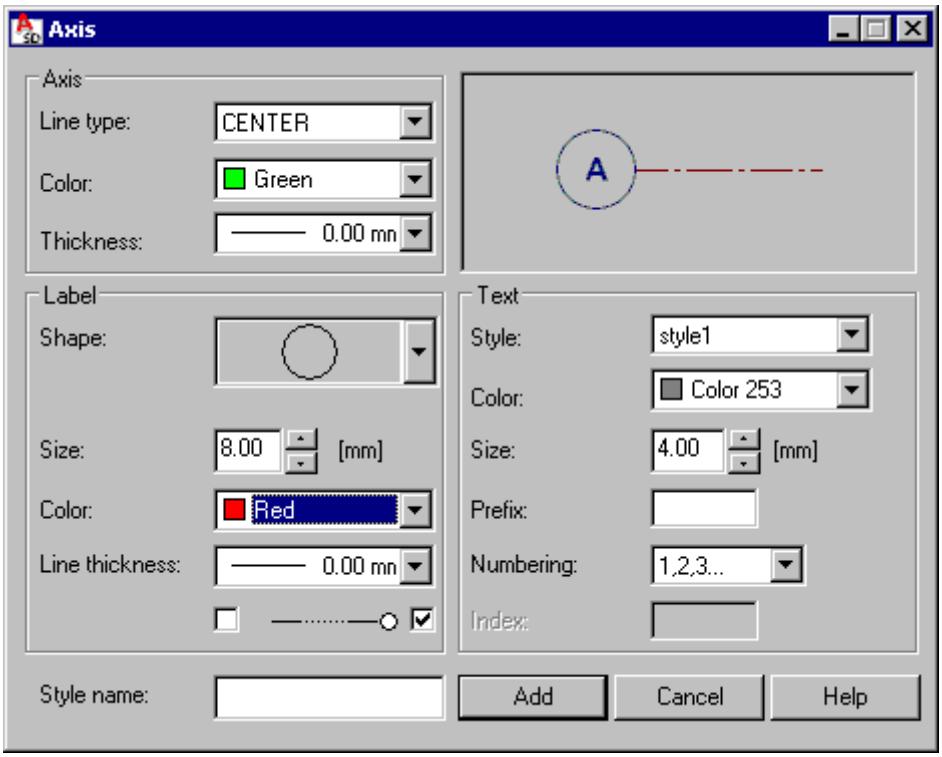
For every symbol type a standard style is defined. After highlighting a symbol type and a symbol style, the current view of the symbol of an axis, level or section is presented in the central part of the dialog (in the *Preview* field).
The right side of the dialog displays the following buttons (apart from the standard buttons **OK, Cancel** and **Help**):

- **Default** - clicking this button sets a selected style as a default symbol style for an axis, level or section.
- **New** - clicking this button opens one of the dialog: Axis, Elevation mark or Section symbol, where a new style of the selected symbol type are defined (based on the existing style).
- **Modify** - clciking this button opens one of the following dialogs: Axis, Elevation mark or Section symbol, where a selected symbol type can be modified.
- **Delete** - clicking this button deletes a highlighted style from the list of styles available in the *Symbol styles* field.

© 2010 Autodesk, Inc. All rights reserved

21.2. Axis

Use this dialog to define a new style or to modify an existing style of an axis. After choosing an axis style in the *Symbol* field, and clicking **New** or **Modify** from the Styles of symbols dialog, the following dialog displays:



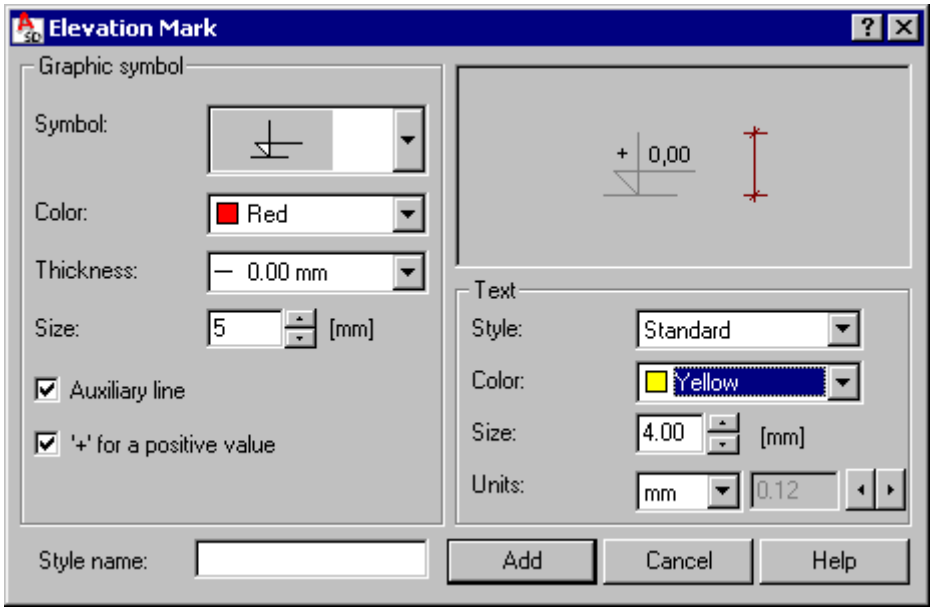
The *Axis* field holds parameters of a line presenting the axis in a drawing: line type, color and thickness.
In the *Label* field you determine parameters of a label of the axis description: label shape, size, color and thickness of the label line; the following label shapes are available: circle, ellipse, square, octagon. At the bottom of this field there are options that allow switching on / off the display of a label at ends of the axis.
The options in the *Text* field refer to the axis description provided in the label. The following parameters are defined: font style, color and size; additionally, it is possible to choose a structure axis prefix and a numbering type: with letters: A, B, C, with numerals: 1, 2, 3, with numerals: I, II, III or by determining any other designations (after selecting the *Define* option).

To add a new axis description, specify a name of the axis description style (in the *Style name* field) and click **Add**.

21.3. Elevation mark

Use this option to define a new style or to modify an existing style of an elevation mark. After choosing an elevation mark style in the *Symbol* field, and clicking **New** or **Modify** in the Styles of symbols dialog, the following dialog displays:

© 2010 Autodesk, Inc. All rights reserved



The *Graphic symbol* field holds parameters of a symbol representing a level in the drawing: symbol type, color, size and thickness of the line in the symbol.
There are two options:

- *Auxiliary line* - if this option is selected, then the elevation mark symbol and the drawing will present an auxiliary line connecting the elevation mark symbol with the level of an RC element; when the option is cleared, the elevation mark symbol displays without any additional lines.
- *'+' for a positive value* - if this option is selected, then the '+' symbol appear when a value of a number presented in the elevation mark symbol is greater than zero; if this option is cleared, a positive value is presented in the elevation mark symbol without any additional symbol.

The options in the *Text* field refer to the elevation mark description provided in the elevation mark symbol. Settings of the following parameters are defined: font style, color and size; additionally, it is possible to select a unit used to present a level value and number precision (a number of decimal places).

To add a new elevation mark description, specify a name of the elevation mark description style (in the *Style name* field) and click **Add**.

21.4.Section symbol

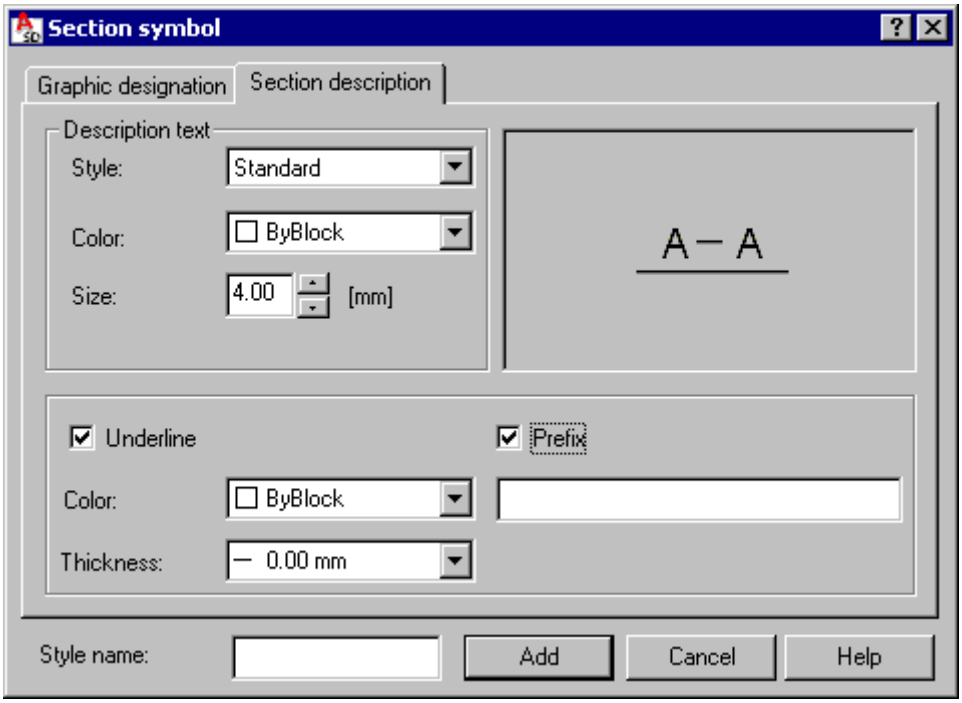
Use this dialog to define a new style or to modify an existing style of a section of an RC structure element. After choosing a section symbol style in the *Symbol* field, click **New** or **Modify** in the Styles of symbols dialog.
The dialog consists of two tabs:
Graphic designation
Section description.

To add a new description of a section symbol, specify a name of the description style of the section symbol (in the *Style name* field) and click **Add**.

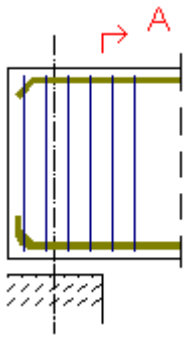
© 2010 Autodesk, Inc. All rights reserved

21.5.Graphic designation

After selecting the *Graphic designation* tab from the Section symbol dialog, the following dialog displays:



The *Position* field holds parameters of a symbol representing the section of an RC structure element in a drawing: graphic symbol type, arrowhead of the section symbol, symbol color, size and thickness of a line in the symbol; besides, it is possible to select numbering of the section symbol: with letters: A, B, C, with numerals: 1, 2, 3, with numerals: I, II, III or by determining any other designations (after the *Define* option is selected). An example of a section designation is displayed below.

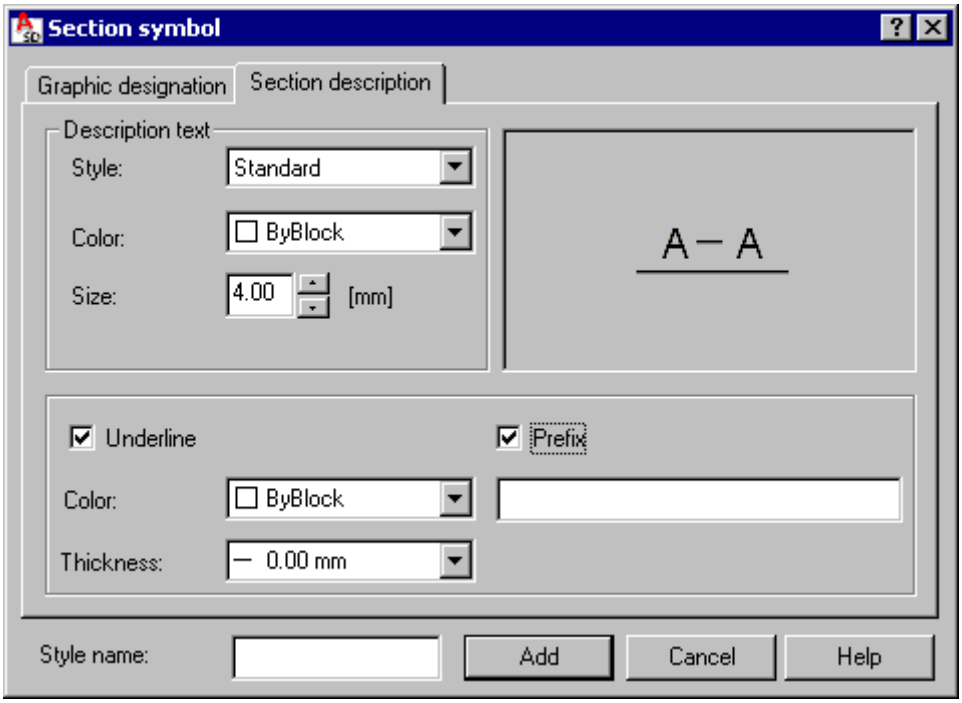


The options provided in the *Number* field refer to a section description. The following parameters can be set: font style, color and size.

© 2010 Autodesk, Inc. All rights reserved

21.6.Section description

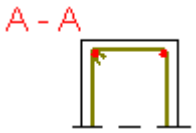
After selecting the *Section description* tab from the Section symbol dialog, the following dialog displays:



The options located in the *Description text* field specify the description of an RC element section. The following parameters can be set: font style, color and size. Below are two options:

- *Underline* - if this option is selected, then the section description (name) will be additionally underlined with a line of a selected color and thickness; if this option is cleared, the section name will not be underlined
- *Prefix* - if this option is selected, then an additional edit field is accessible in which it is possible to define any character string being a prefix of the section name.

An example of a designation of the section name is displayed below.



© 2010 Autodesk, Inc. All rights reserved

22. DRAWING TEMPLATE STYLES

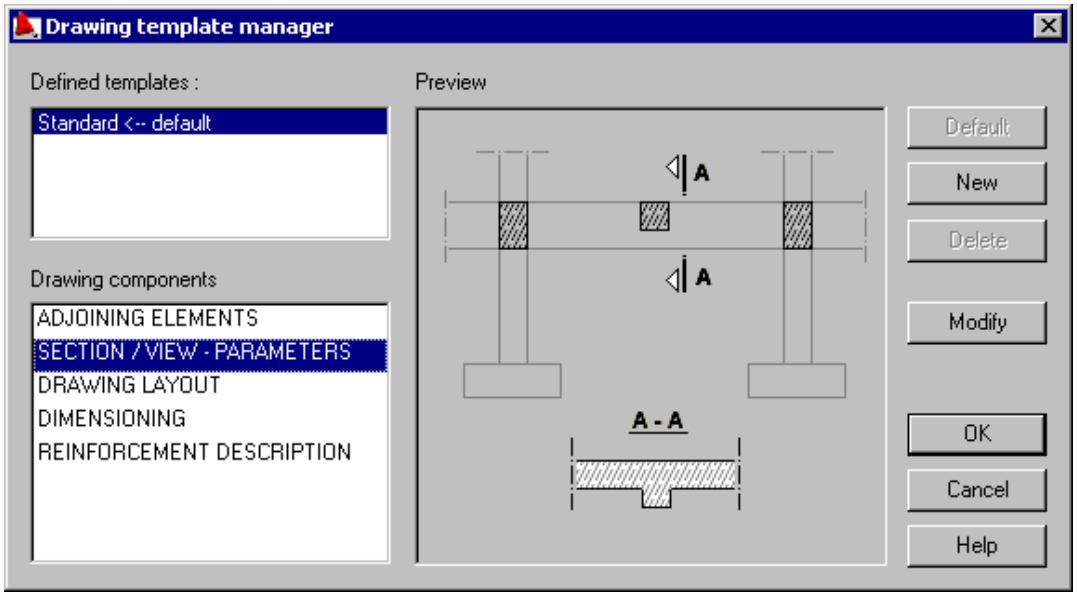
22.1. Construction drawings - settings

The drawing templates manager allows to define how the structure drawings of elements in ***AutoCAD® Structural Detailing - Reinforcement*** will be created. It includes defining parameters of appearance of individual structure elements (colors, scale, plans, reinforcement descriptions, etc.); drawing templates for each type of element are created this way.

NOTE:
All the parameters defined in the dialog refer to the link between the **AutoCAD® Structural Detailing - Reinforcement** and **Autodesk Revit Structure** or **Autodesk Robot Structural Analysis**. The reinforcement drawings generated for the structure elements transferred to AutoCAD® Structural Detailing - Reinforcement from the applications mentioned above will be created in accordance with the settings saved in the drawing templates manager.

The Drawing templates manager dialog can be open from:

- Menu: Reinforcement / Structure elements - reinforcement / Construction drawing - settings
- Ribbon: ASD Reinforcement / Settings / Styles / Construction drawing - settings or ASD Structure elements / Settings / Styles / Construction drawing - settings
- Command line: STYLE_DG.



The structure drawings are parametrized by a set of styles. They are divided in groups which parametrize the specified components of a structure drawing of an element.
The following components of drawings are available:
Adjoining elements
Section / View - parameters/
Drawing layout
Dimensioning
Reinforcement description.

Use the buttons on the right to work with drawing components:

- Default - click this to designate a template as a default drawing template for a selected drawing component
- New - click this to open a dialog where you can define a new template for drawing components.

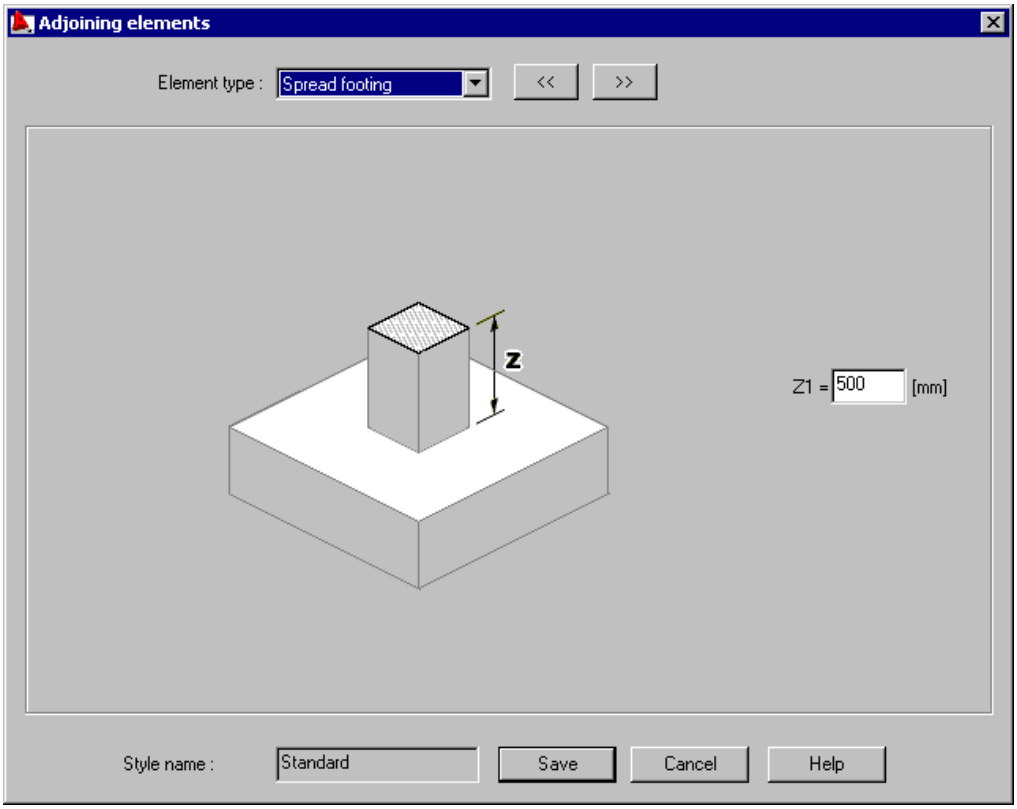
© 2010 Autodesk, Inc. All rights reserved

- Modify - click this button to open a dialog where you can modify a selected template for a drawing component.
- Delete - click this to delete a highlighted template.

22.2. Adjoining elements

Use this dialog to define parameters for elements that adjoin the selected element type. These parameters determine the length of adjoining elements in a drawing.
To display the Adjoining elements dialog:

1. On the Drawing templates manager dialog, for Drawing components, select Adjoining Elements.
2. Click New or Modify.



In the Adjoining elements dialog, specify dimensions that form the surroundings of a selected element type.

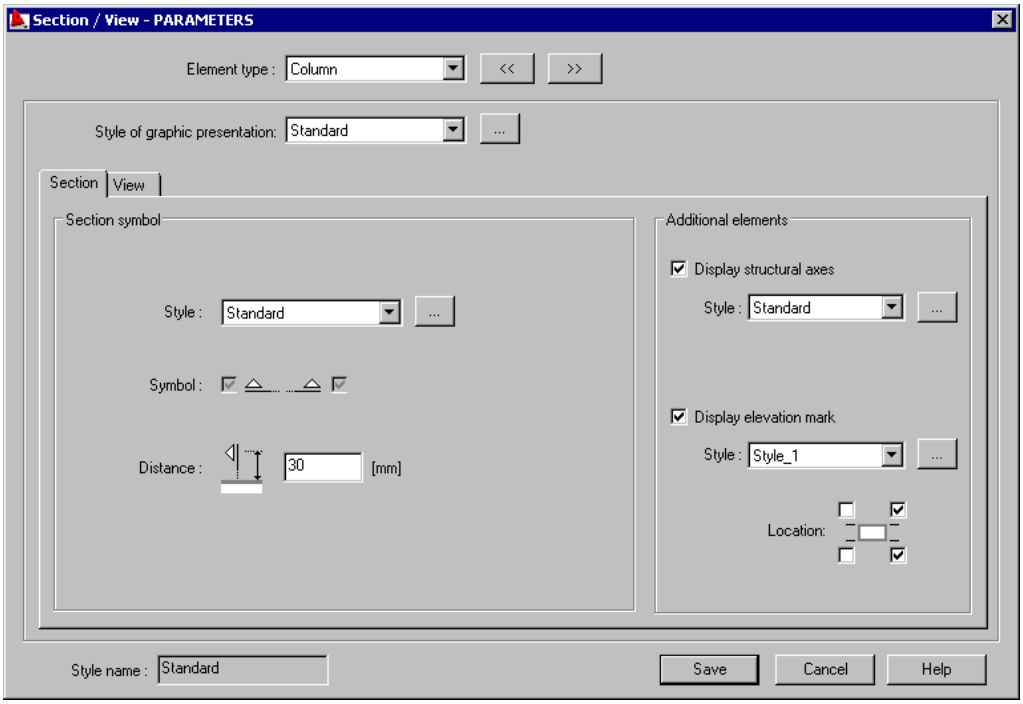
22.3. Section / View - parameters

Use this dialog to specify parameters of section symbols and descriptions of views as they display in formwork drawings.
To display the Section / View - Parameters dialog:

1. On the Drawing templates manager dialog, for Drawing components, select Section / View - Parameters.
2. Click New or Modify.

For Style name, enter a name for the component style, and click Save (this is only available when creating a style, not when modifying an existing style).
For Element type, select a structure element type (such as beam, column, or spread footing) for which parameters of sections and views will be defined.

© 2010 Autodesk, Inc. All rights reserved



The dialog box consists of two tabs: Section and View.
In the upper part of the dialog, it is possible to select style of the graphic presentation of the graphic elements, according to which the edges of the elements will be drawn.

Options for the drawing of an element section are available on the Section tab:

- style - the list includes all the defined styles of section symbols. Click the Browse (**...**) button to open the Styles of symbols dialog, where you can select or modify an existing style of that symbol.
- symbol - it switches on / off the symbol presentation of a section in the structure drawings
- distance - specifies a distance between the section symbol and the element contour
- structure axes - switches on / off the presentation of the structure axes and enables selection of the style of their presentation
- elevation mark - switches on / off the presentation of the structure axes and enables selection of the style of their presentation

Options for the parametrization of view of the drawing element are available on the View tab:

- description components - define the syntax of a section description. Because a description may consist of 2 lines of text, there are 2 edit fields. Select a description component, click the arrow, and the selected description components are moved to the active edit field. A preview of the resulting syntax displays below the edit fields.
  %El_name - element name (position name)
  %Quant - quantity (number of positions)
  %Scale - scale of the drawing of an element view
- description text - define the color, style, and size of description text.
- description location - select from several description positions, and specify a distance between the description and the view drawing.
- structure axes - switches on / off the presentation of the structure axes and enables selection of the style of their presentation
- elevation mark - switches on / off the presentation of the structure axes and enables selection of the style of their presentation

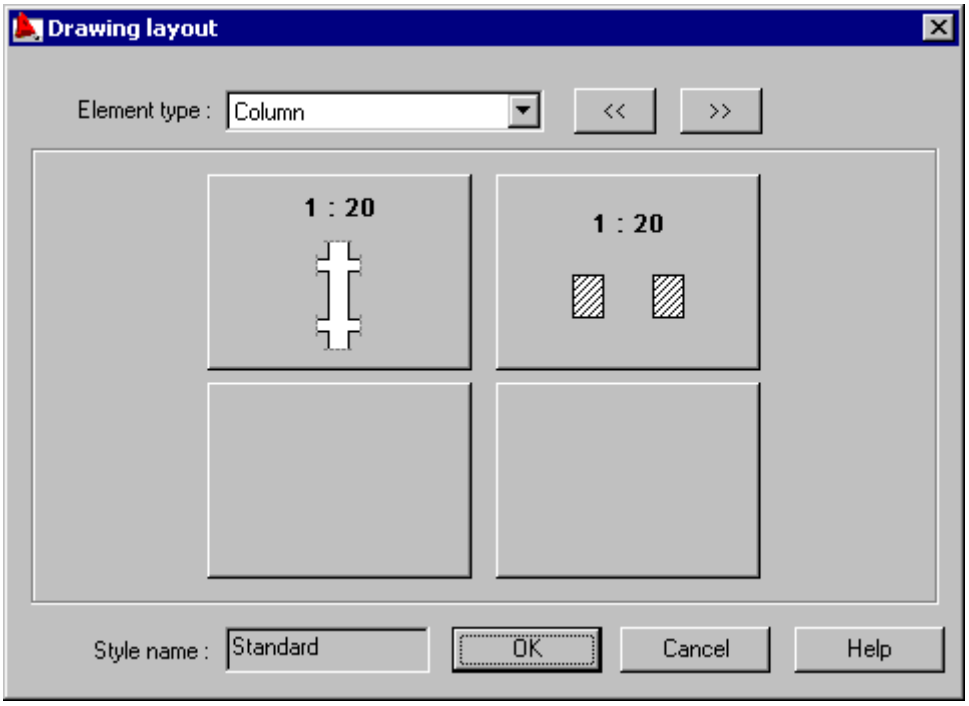
© 2010 Autodesk, Inc. All rights reserved

22.4.Drawing layout

Using this dialog, you can specify which drawings will be generated (and in what scale) for selected types of structure elements.
To display the Drawing layout dialog:

1. On the Drawing templates manager dialog, for Drawing components, select Drawing layout.
2. Click New or Modify.

For Style name, enter a name for the component style, and click Save (this is only available when creating a style, not when modifying an existing style).



The dialog presents layout of views/plans to which the views or section elements can be assigned.
Clicking an icon that symbolizes a generated drawing will display the additional dialog Drawing components.
If an empty icon displays for a selected drawing layout and a selected structure element type, the field does not contain a drawing.

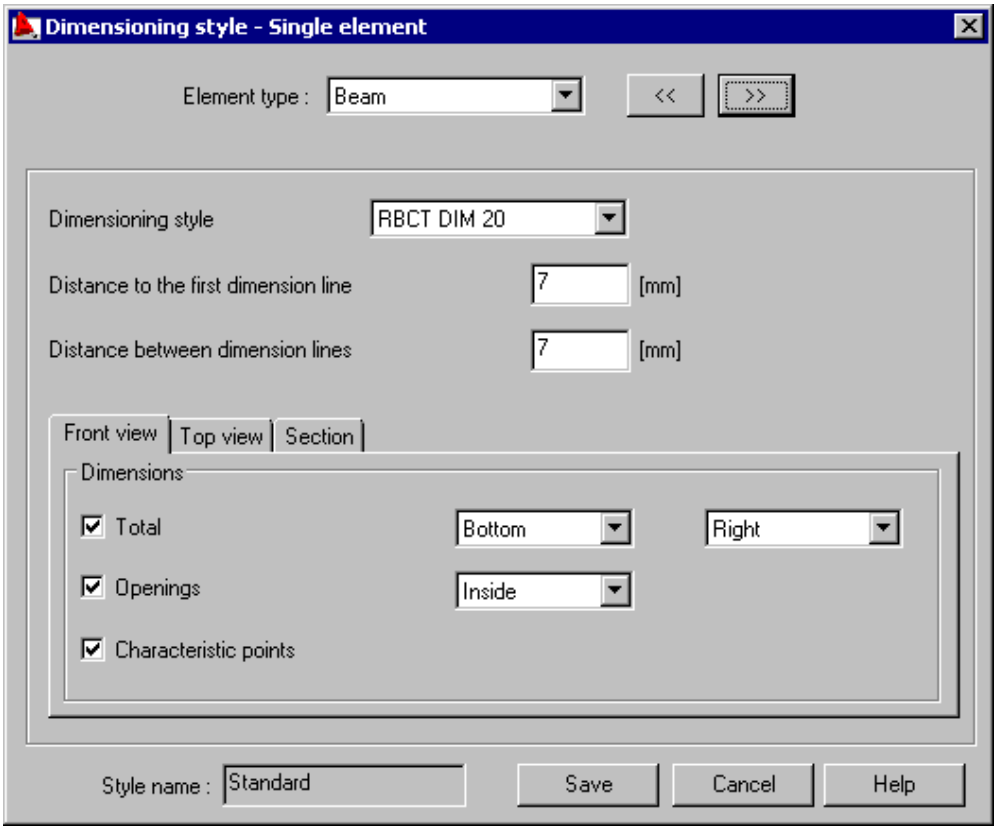
22.5.Dimensioning

Using this dialog, you can define the method of dimensioning structure elements on drawings. Parametrization of the dimensioning lines is separate for the defined element views (view, section).
To display the Dimensioning layout dialog:

1. On the Drawing templates manager dialog, for Drawing components, select Dimensioning.
2. Click New or Modify.

For Style name, enter a name for the component style, and click Save (this is only available when creating a style, not when modifying an existing style).

© 2010 Autodesk, Inc. All rights reserved



A selection list for selection of a structure element type (beam, column, spread footing, etc.) is located in the upper part of the dialog; it defines for which element the dimensioning parameters will be defined.
Design styles defined in AutoCAD® can be selected from the selection list. It is possible to set distance between the design lines in the edit fields.
On tabs related to the specified elements of view, it is possible to set location of the total dimension and, optionally, dimensions of openings and the characteristic points of an element.

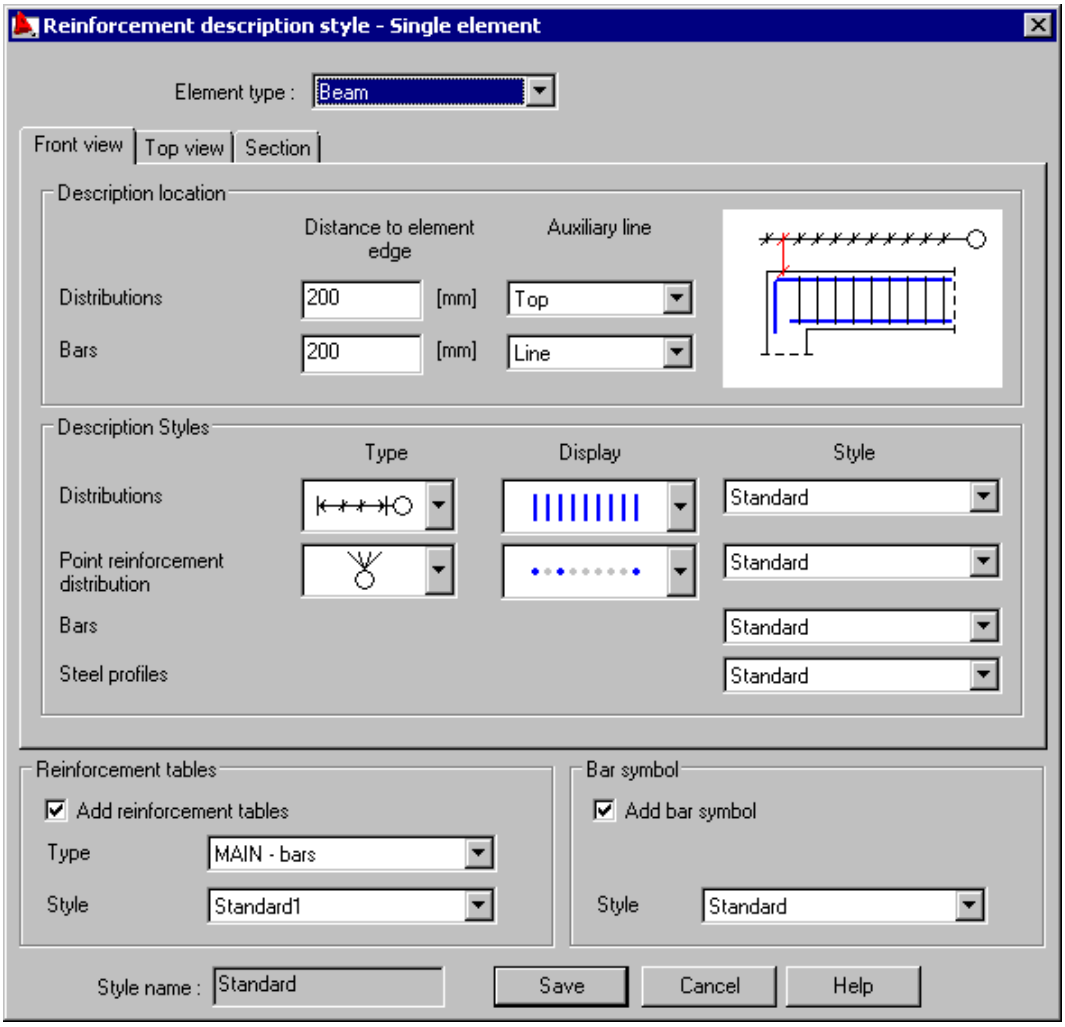
22.6.Reinforcement description

Using this dialog, you can define the method of reinforcement description in the structure drawings of the elements. Parametrization of the reinforcement description is separate for the defined element views (view, section).
To display the Reinforcement description dialog:

1. On the Drawing templates manager dialog, for Drawing components, select Reinforcement description.
2. Click New or Modify.

For Style name, enter a name for the component style, and click Save (this is only available when creating a style, not when modifying an existing style).

© 2010 Autodesk, Inc. All rights reserved



A selection list for selection of a structure element type (beam, column, spread footing, etc.) is located in the upper part of the dialog; it defines for which element the reinforcement description will be defined.
The options parametrizing the description location and the description styles are available on tabs related to the specified element views.
The settings related to the description location include separate parameters for the distribution of bars and for single bars. It is possible to define distances between the descriptions and element edges (in the units used in the model). It is possible to define location of the bar distribution description and the leader type for single bars in the selection fields.
Settings related to the description styles include separate parameters for different types of the presented reinforcement. It is possible to select the description types, the method of presentation of the distribution bars and the description style for the bar distribution. The description style defined in the program settings can be defined for bars and steel profiles.
Parameters related to generation of the reinforcement table and the symbols of bars in the created drawings of elements are available in the bottom part of the dialog. It is possible to select the reinforcement table type and its style in accordance with the settings defined in the AutoCAD® Structural Detailing - Reinforcement DWT file.
If you select drawing symbols of bars in accordance with a specified style, the symbols of bars are added to the reinforcement drawings (views and sections of the structure element).

© 2010 Autodesk, Inc. All rights reserved

23. REINFORCEMENT TABLES

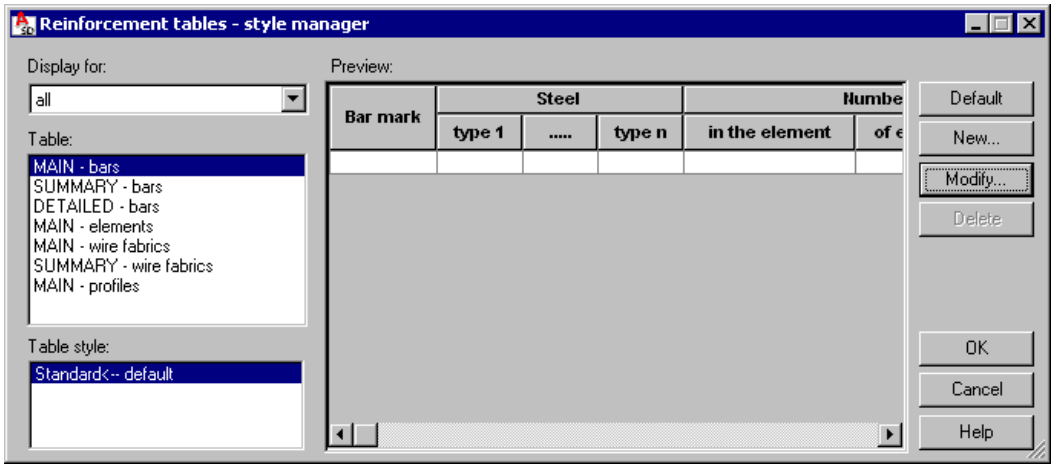
23.1. Reinforcement tables (style manager)

Use this option to define/modify tables used to prepare the tables of reinforcement in RC structure elements. There are two ways to access this option from:

- Menu: Reinforcement / Reinforcement tables / Styles - reinforcement tables
- Ribbon: ASD - Reinforcement / Settings / Styles - reinforcement tables
- Command line: RBCR_LIST_PAR.

NOTE:
*Reinforcement tables in **AutoCAD® Structural Detailing - Reinforcement** are updated automatically after modifying a drawing, if in the **Options** dialog (the Structural Detailing tab) the Automatic table update option is selected.*

After selecting the option, the ***Reinforcement tables - style manager*** dialog displays:



The following types of the reinforcement table are available in the *Table* field:

- MAIN - reinforcing bars
- SUMMARY - reinforcing bars
- DETAILED - reinforcing bars
- MAIN - elements (see Element manager)
- MAIN - wire fabrics
- SUMMARY - wire fabrics
- MAIN - (steel) profiles.

The individual types of reinforcement tables present the following information:

- MAIN table – it is a global reinforcement table
- SUMMARY table – it is a reinforcement table intended only for the distribution varying linearly (e.g. for stirrups distributed within a tapered beam), to obtain such a table, choose reinforcement distribution varying linearly and select the option *Reinforcement table / Summary table*
- DETAILED table – it is a summary table concerning the reinforcement steel consumption broken down by bar diameters (see also: Generation of distribution varying linearly and detailed table) – available for distribution varying linearly and bar surface distribution.

For each table type, the standard table style (it is presented in the *Table style* field) is defined. Once the table type and table style are highlighted, the view of a selected table style is presented in the middle part of the dialog (the *Preview* field).
The right side of the dialog (apart from the standard buttons **OK**, **Cancel** and **Help**) contains the following buttons:

- **Default** - click this button to select a style for the default table layout (description style)

© 2010 Autodesk, Inc. All rights reserved

- **New** - click this button to open the Definition of new reinforcement table style dialog where a new style of a selected table type can be defined (based on the style that already exists)
- **Modify** - click this button to open the Modification of reinforcement table style dialog where changes can be made in a selected table type and table style
- **Delete** - click this button to delete the highlighted table style from the list of styles available in the *Table style* field.

23.2. Style definition/modification

23.2.1. Definition/modification of reinforcement table style

Use this dialog to define a new style or to modify an existing style of a table type.

The ***Definition of new reinforcement table style*** dialog is opened by clicking **New** in the Reinforcement tables (style manager) dialog (the ***Modification of reinforcement table style*** dialog can be opened by clicking **Modify**).

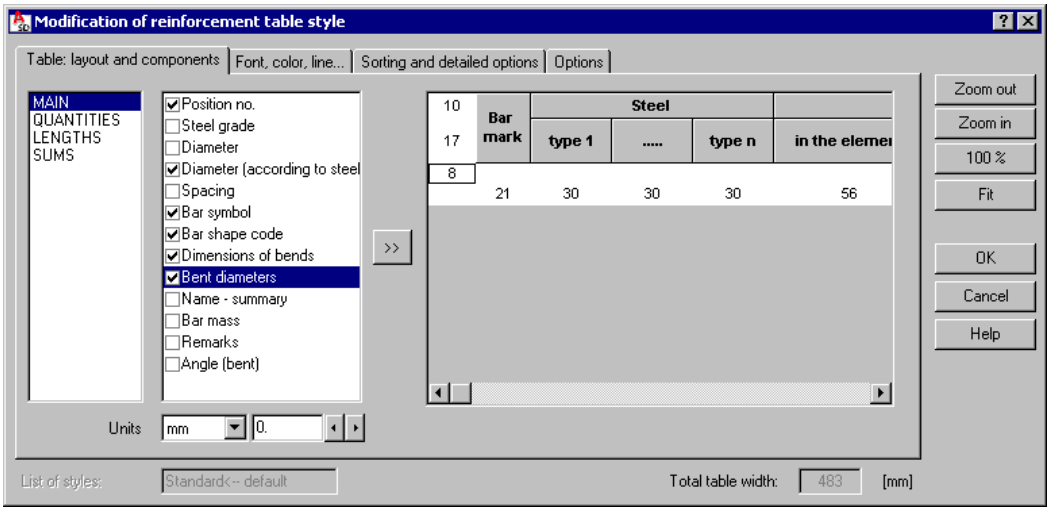
The dialog box consists of three tabs:
Table: layout and components
Font, color, line
Options.

NOTE:
If one of the reinforcement table types for bars is chosen (MAIN - bars, MAIN - elements, SUMMARY - bars, DETAILED - bars, MAIN - profiles), there is also another tab available: Sorting and detailed options.

NOTE:
If the type SUMMARY – wire fabrics is chosen, then another tab Display options (wire fabric cuts) is also available for wire fabrics.

23.2.2. Table layout and components

The following dialog displays, after selecting the *Table: layout and components* tab from the Definition/modification of reinforcement table style dialog.



© 2010 Autodesk, Inc. All rights reserved

NOTE:
The options located on this tab depend on a table type selected in the ***Reinforcement tables - style manager*** *dialog. The drawing above shows the options available after selecting the main table for reinforcing bars.*

The bottom part of the dialog contains the *Style name* edit field; a name of the defined table style should be entered there (in case of modifying the table style, the *Style name* field is inaccessible).
To define/modify a table style:

- Select a set of table components (e.g. in the above dialog: *Main, Quantities, Lengths, Sums*)
- In the next field, select the components to be included in the table (the option is selected when √ symbol appears)
- Click **>>**.

The right side of the dialog is used to define the table layout.

For example, for a bar symbol (shape) to be presented in the MAIN reinforcement table:

1. In the Reinforcement tables – style manager dialog, select the MAIN table
2. Click **Modify**.
3. On the *Table: layout and components* tab in the Modification of reinforcement table style dialog select the *Bar symbol* option
4. Click **>>**, to add a new column to the main reinforcement table
5. Set the added column with the bar symbol in the appropriate place in the table
6. Click **OK**.

Use the same method to add the remaining components to the reinforcement table.

NOTE:
Column positions and column names can be modified for each reinforcement table style.

The following options are also available in the above dialog:

- *Total table width* - inaccessible edit field displays the defined table width.
- Buttons: **Zoom in**, **Zoom out**, **100% -** allow zooming in/zooming out.
- **Fit** button – adjusts (fits) the width of table columns to the length of texts in column headings.

The order of individual table columns can be arranged by left-clicking the entire column, and moving the column to the selected position. In a table, the cell height can be increased and in the table heading, the descriptions or changed names of the existing columns can be entered.

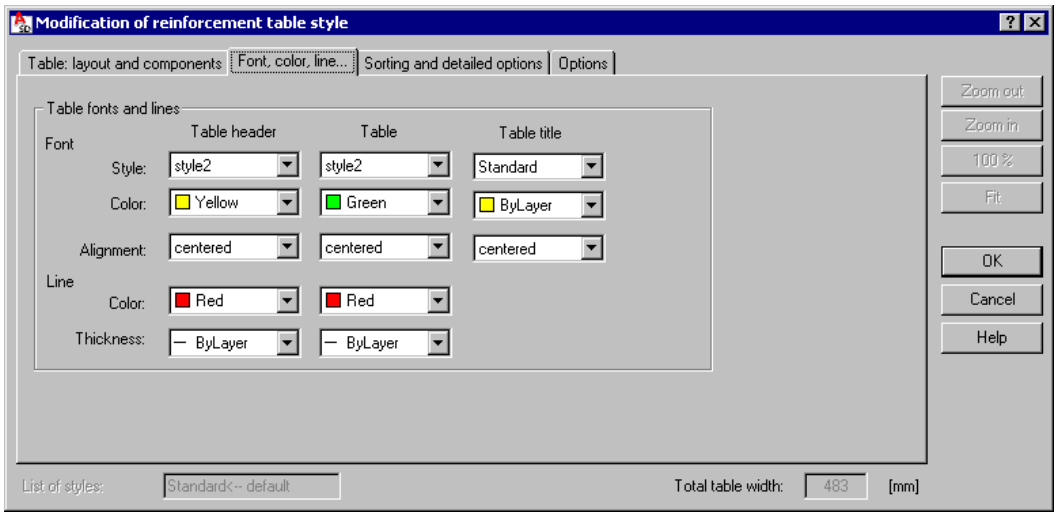
The tables enable you to:

- Add blank lines at the beginning and end of a table
- Add blank columns in tables
- Define exact table dimensions (column width and line height) – dimensions of the column width and the line height are presented under the table and to the left of the table, respectively.

© 2010 Autodesk, Inc. All rights reserved

23.2.3. Font, color, line

Once the *Font, color, line* tab is selected in the Definition/modification of reinforcement table style dialog, the following displays:

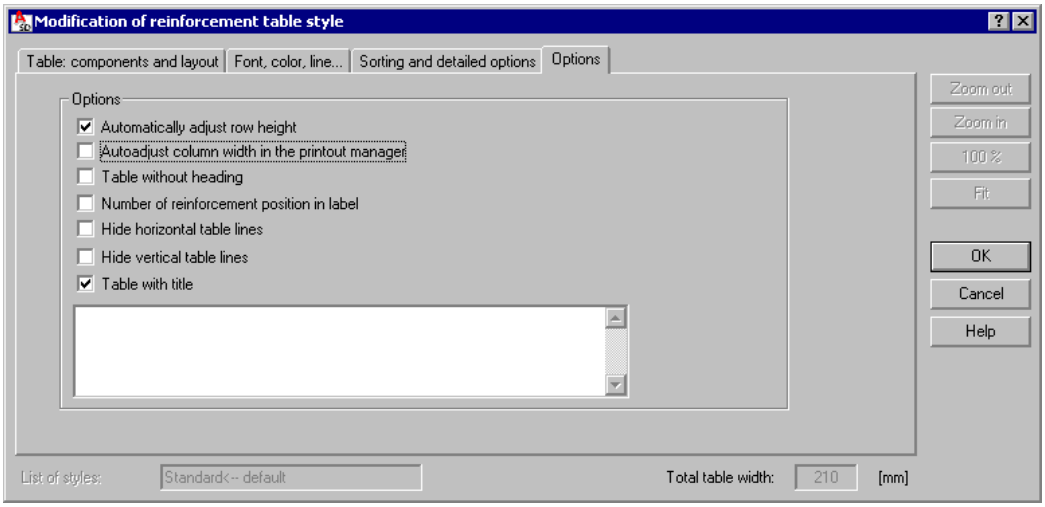


The following options are available:

- Determine a font used in the table (in the table header and all table cells): style, color and alignment of table header and texts in table cells
- Select table lines: thickness and color
- Define a font used in the table title (if the *Table with title* option is activated on the *Options* tab): style, color and alignment of table title.

23.2.4. Options

Once the *Options* tab is selected in the Definition/modification of reinforcement table style dialog, the following dialog displays:



The following options are available in the *Options* field:

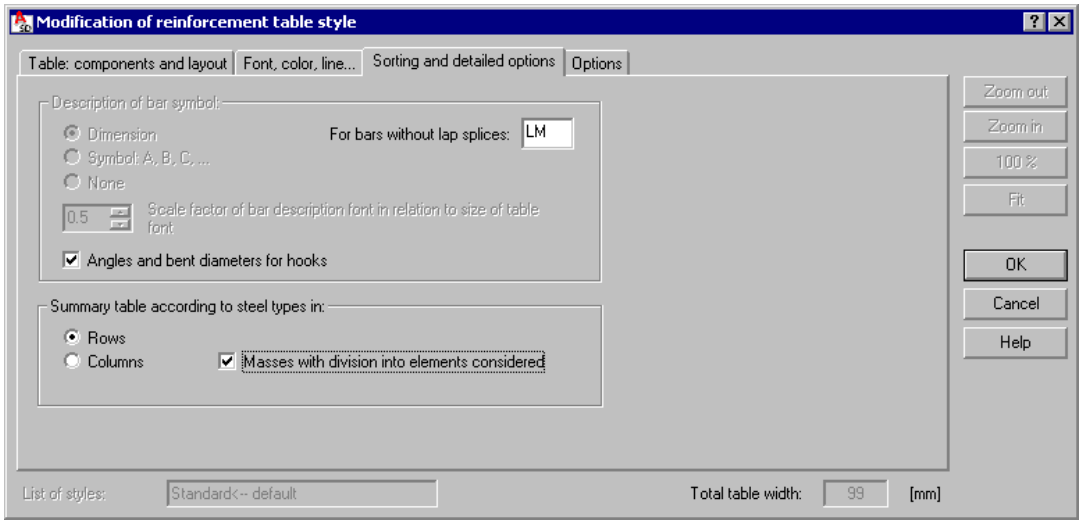
- *Automatically adjust row height* - if this option is selected (√ symbol appears), then height of table rows will be automatically adjusted to the size of symbols of element shapes presented in the table
- *Auto adjust column width in the printout manager* - if this option is selected (√ symbol appears), then widths of table columns are automatically adjusted to fit lengths of titles of table columns (see the description of the Table printout manager dialog)

© 2010 Autodesk, Inc. All rights reserved

- *Table without heading* - if this option is selected (√ symbol appears), then the table generated will not have a heading
- *Number of reinforcement position in label* - if this option is selected (√ symbol appears), then a number of reinforcement position in the table will be presented in a circular label
- *Hide horizontal table lines* - if this option is selected (√ symbol appears), then horizontal lines will not be shown in the table
- *Hide vertical table lines* - if this option is selected (√ symbol appears), then vertical lines will not be shown in the table.
- *Table with title* - if this option is selected (√ symbol appears), then the edit field in the lower part of the dialog becomes accessible and a table title may be entered; a font used in the table title is defined on the *Font, color, line* tab.

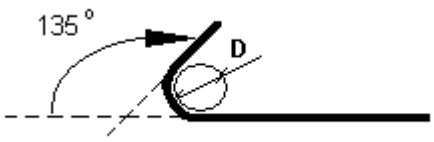
23.2.5. Sorting and detailed options

Once the *Sorting and detailed options* tab is selected in the Definition/modification of reinforcement table style dialog, the following dialog displays:



NOTE:
The tab is available only in case of reinforcement table types for bars (MAIN, SUMMARY, DETAILED).

In the top part of the dialog, the description of bar symbol is chosen; there are three possibilities of bar symbol description: by specifying a dimension, by presenting symbol of a bar or without any description. You can select a scale factor which determines the ratio of the size of bar description font to the size of font in the table. These options are available for the following table types: MAIN and DETAILED.
The *For bars without lap splices* field specifies a length designation in a bar symbol in the table; 'LM' bars are bars presented in running meters as a total sum of all segments formed as a result of distribution (it refers only to bars in surface distributions) - see Reinforcement lap.
If the *Angles and bent diameters for hooks* option is selected, then the table will include information concerning hooks at bar ends: a hook angle and a diameter of hook bending (see the drawing below).

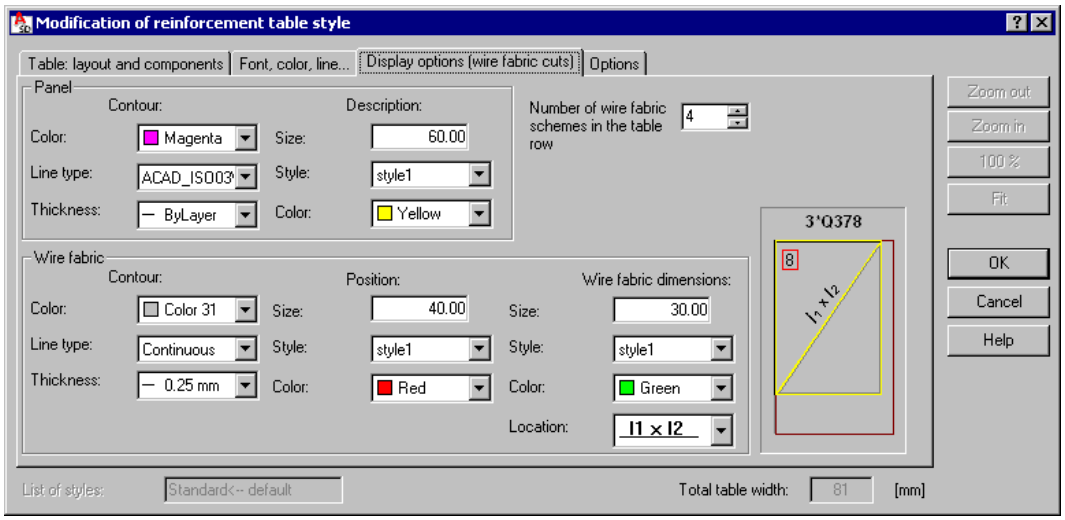


© 2010 Autodesk, Inc. All rights reserved

The option *Summary table according to steel types in:* rows or columns, is accessible only for the SUMMARY table. In the SUMMARY table, it is possible to add a row with bar masses (with division into individual elements).

23.2.6. Display options (wire fabric cuts)

Once the *Display options (wire fabric cuts)* tab is selected in the Definition/modification of reinforcement table style dialog, the following dialog displays:



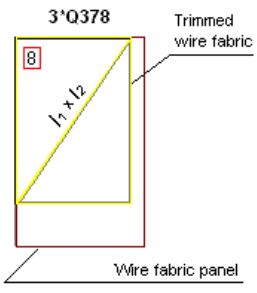
NOTE:
The tab is available only for one type of reinforcement table: SUMMARY for wire fabrics.

In the top part of the dialog, you can choose a number of schemes to be included in a row of the reinforcement table.

NOTE:
For the wire fabric cuts to be displayed in the table, the Wire fabric cuts option has to be selected on the Table: layout and components tab.

The options located on the tab above, define display parameters for wire fabric panels and generated (trimmed) wire fabrics:

- For wire fabric panels:
  - contour parameters (color, line type and thickness)
  - description parameters (font size, style and color)
- For trimmed wire fabrics:
  - contour parameters (color, line type and thickness)
  - description parameters (font size, style and color)
  - dimension parameters (font size, style, color and location).



© 2010 Autodesk, Inc. All rights reserved

24. PRINTOUT

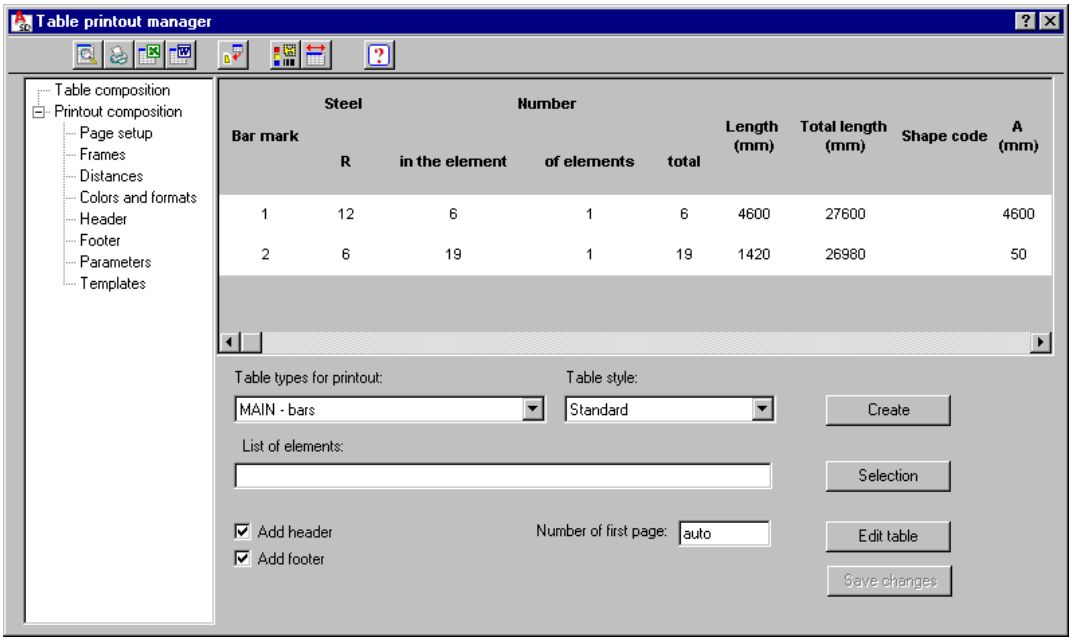
24.1. Table printout manager

Use this option to define/modify the printout layout for tables used to prepare steel summary tables.

To begin defining a printout layout, open the Table printout manager dialog from:

- Menu: Steel / Tables / Table Printout Manager (steel part) or Reinforcement / Reinforcement table / Table Printout / Export / Edit (reinforcement part)
- Ribbon: ASD - Drawings / Tables / Table Printout Manager (steel part) or ASD - Reinforcement / Reinforcement table / Table Printout / Export / Edit (reinforcement part)
- Toolbar: Table Printout Manager (steel part)  or Table Printout / Export / Edit (reinforcement part) 
- Command line: **RBCS_LISTPRINT** (steel part) or **RBCR_LIST_EXP** (reinforcement part).

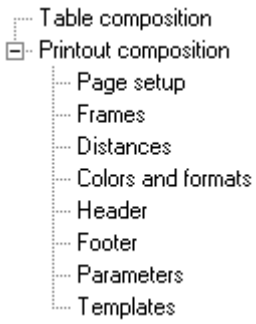
NOTE:
If you select Automatic table update on the Structural Detailing tab of the Options dialog, reinforcement tables in AutoCAD® Structural Detailing - Reinforcement will be updated automatically after changes are made in a drawing.



The Table printout manager dialog has 2 primary parts:

- On the left is the selection tree (see the drawing below) from which you can select one of the printout manager options

© 2010 Autodesk, Inc. All rights reserved



- To the right of the selection tree are the parameters that relate to the option you selected in the selection tree. The top part of the dialog shows the layout of a selected table type.
- Use the icons at the top of the dialog:

   Printout preview - click this to open a preview of a table printout; return to the dialog by clicking Close

   Print table - click this to start printing a table

   Save table - click this to open the dialog in which a table may be saved in MS Excel®:
  - o *.CSV (Comma Separated Values) format files which are text files
  - o *.XLS format files – this saving method fully reflects table settings that can be seen in a preview window

   Save table (MS Word) - click this to open the Save As dialog, where you can save a table in an MS Word file with the specified name

   Save graphical settings - click this to save current settings of the printout manager

   Automatic adjust of column width to header text - click this to adjust the width of table columns to the length of table column names

   Help - click this to open Help

 NOTE:

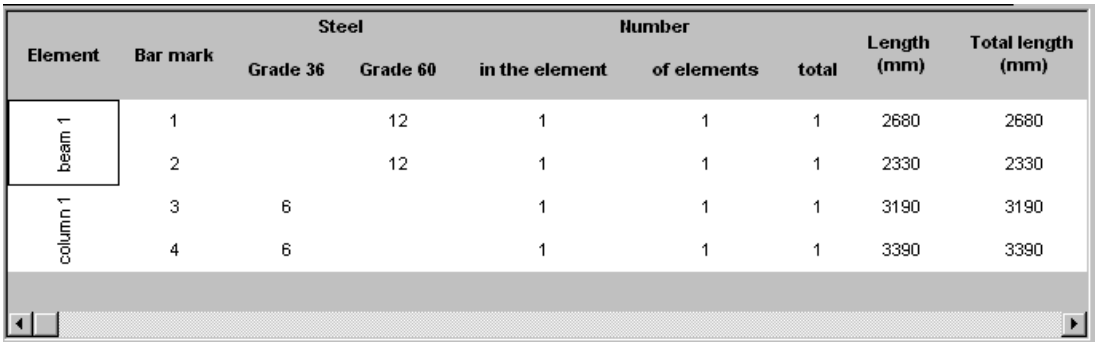
For AutoCAD® Structural Detailing – Reinforcement, an additional icon  lets you insert a table into an edited drawing.

Although a table shape (cell height, column width) depends directly on a defined table style, you can determine the shape.
In addition, there is a context menu with the following options:

- Table cells – group (merges several table cells into one cell) or ungroup
- Text orientation – vertical, horizontal
- Adding or deleting a column in the table
- Adding or deleting a row in the table

The example below shows a table layout after adding a new column at the beginning of the table, merging several table cells, and changing text orientation to vertical. The table displays data for a few positions of structure element reinforcement.

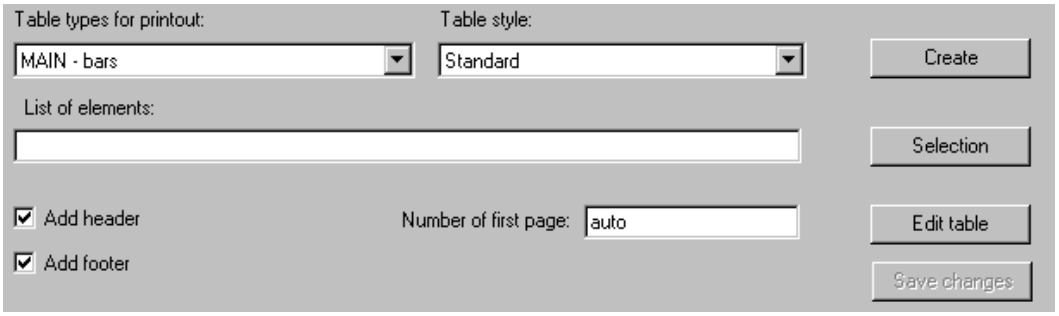
© 2010 Autodesk, Inc. All rights reserved



Element	Bar mark	Steel		Number			Length (mm)	Total length (mm)
		Grade 36	Grade 60	in the element	of elements	total		
beam 1	1		12	1	1	1	2680	2680
	2		12	1	1	1	2330	2330
column 1	3	6		1	1	1	3190	3190
	4	6		1	1	1	3390	3390

24.2. Table composition

After you select Table composition from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



For steel structure elements, choose a table type:

- Material summary
- Plate summary
- Profile summary
- User parts
- Element list
- Assembly list
- Bolt (rivet) list
- Cut list
- Bolt assign

For RC structure elements, choose a table type:

- Main (reinforcing bars)
- Summary (reinforcing bars)
- Detailed (reinforcing bars) - this requires graphically selecting the distribution varying linearly / surface bar distribution or entering a number of reinforcement position
- Main (elements) – see the description of the Element manager dialog
- Main (wire fabrics)
- Summary (wire fabrics)

For each table type, you can choose a table style defined previously for the selected table type.
Click Create to generate a table of a given type based on the current element list (if the list is empty, a printout of a whole structure is made) in the format of the active table style (see: Styles applied in tables).

The List of elements field displays numbers of the elements included in a table. Clicking Selection closes the dialogs and lets you graphically select elements to be included in the table.

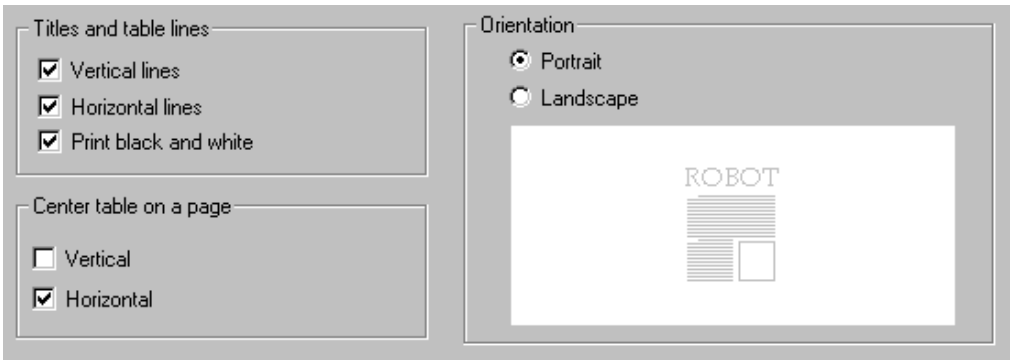
© 2010 Autodesk, Inc. All rights reserved

Clicking Edit table lets you graphically indicate the table to be edited. Changes made in a table may be saved after you click Save changes.
Use the options at the bottom of the dialog:

- Number of first page - specify a number of the first page to be printed
- Add header - if this is selected, a defined header will display on a printout
- Add footer - if this is selected, a defined footer will display on a printout.

24.3.Page setup

After you select Page setup from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.

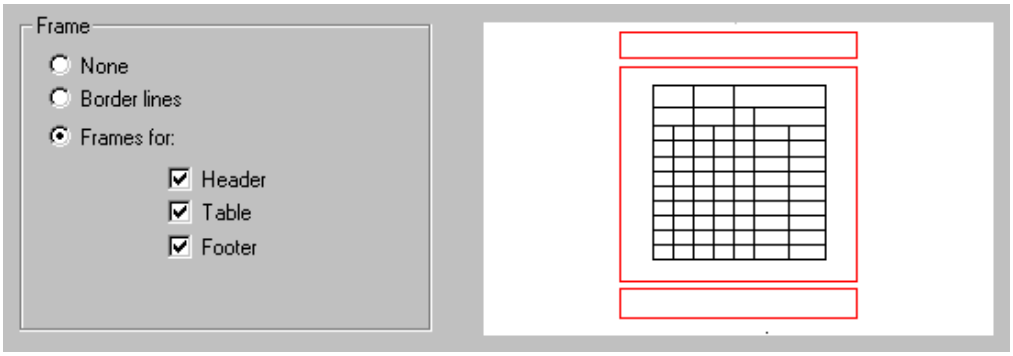


Determine the manner of table presentation:

- Under Titles and table lines:
  - Vertical lines – if this is not selected, no vertical lines are displayed in a table
  - Horizontal lines – if this is not selected, no horizontal lines are displayed in a table
  - Print black and white – if this is not selected, a table is printed with the defined colors applied
- Under Center table on a page, specify how a table is to be centered (horizontally, vertically, or both)
- Under Orientation, define paper orientation (Portrait - the longer side of a paper sheet is vertical or Landscape - the longer side of a paper sheet is horizontal)

24.4.Frames

After you select Frames from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



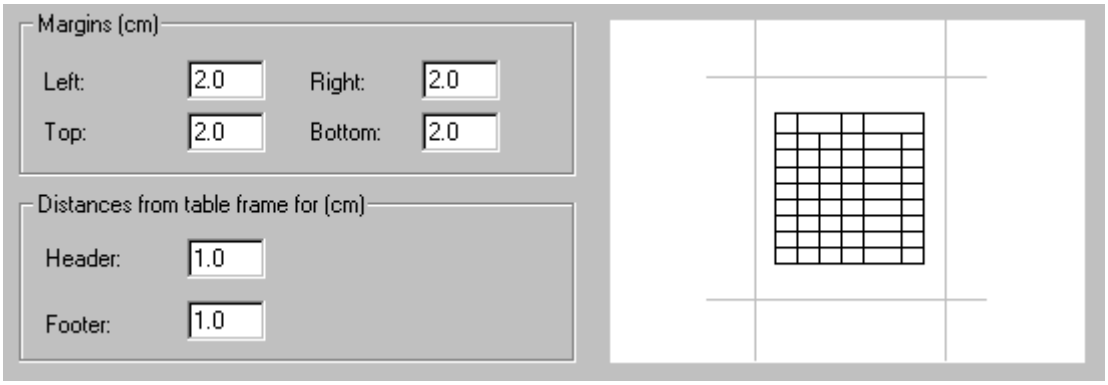
Determine the manner of table framing:

- None - no separation between a header/footer and table
- Border lines – includes lines that separate header and footer from the table
- Frames for – select to include frames for the header, the table, the footer, or any combination of the three

© 2010 Autodesk, Inc. All rights reserved

24.5.Distances

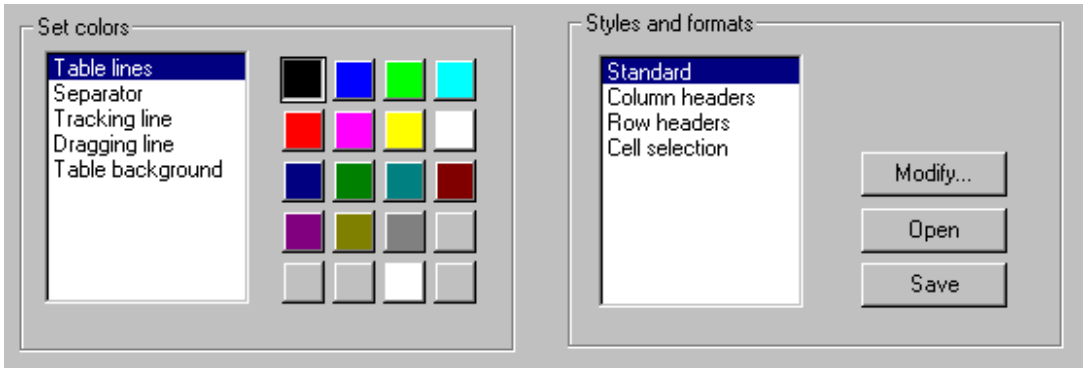
After you select Distances from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



Under Margins, specify left, right, top, and bottom page margins.
Under Distances, define distances between the table frame and the header or footer.
The size of a header and footer is calculated automatically in the software; the parameters mentioned depend on a size of the applied font, size of a drawing with the company logo, and number of lines required in a header or footer.

24.6.Colors and formats

After you select Colors and formats from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



Under Set colors, specify the color of:

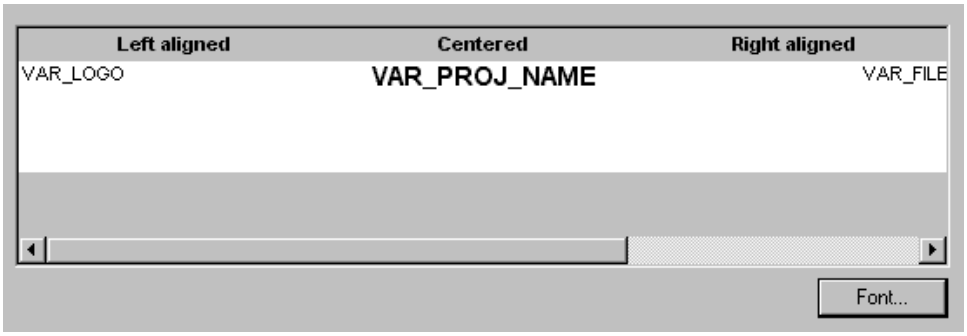
- Table lines
- Separator
- Tracking line
- Dragging line
- Table background

Under Styles and formats, you can select formats and styles applied in the following table elements: table column headers, table row headers, and text contained within a table.
ClickModify to open the dialog whereyou can format font, font color, and alignment method for the selected table elements.

© 2010 Autodesk, Inc. All rights reserved

24.7.Header

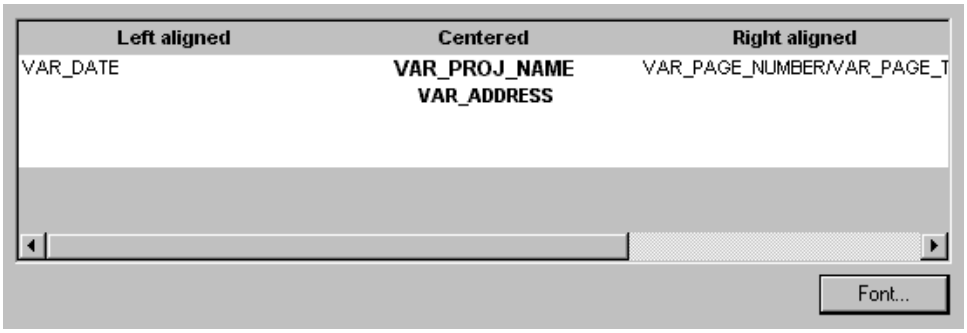
After you select Header from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



In order to change the layout of the printout header, select the table field you want to change, and then select a value from the list. To select a font for a particular field, position the cursor in the field, and click Font. In the dialog that opens, you can choose the font to be applied.

24.8.Footer

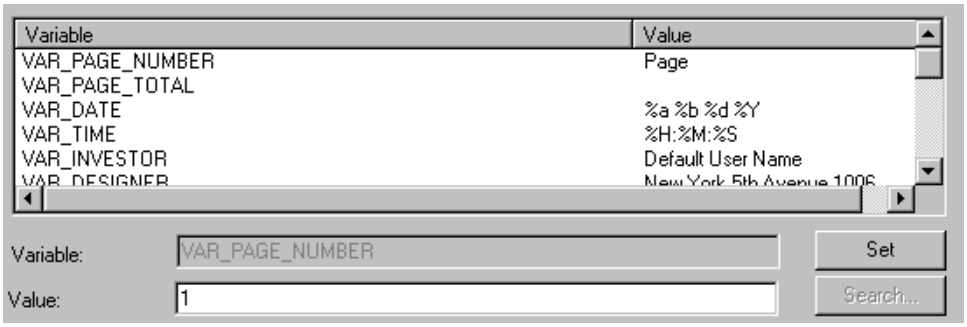
After you select Footer from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



In order to change the layout of the printout footer, select the table field you want to change, and then select a value from the list. To select a font for a particular field, position the cursor in the field, and click Font. In the dialog that opens, you can choose the font to be applied.

24.9.Parameters

After you select Parameters from the selection tree in the left part of the Table printout manager dialog, the options shown below display on the right.



The dialog contains all the variables defined in the system and their names.

© 2010 Autodesk, Inc. All rights reserved

NOTE:
In order to confirm a variable and its modifications, click Set.

Variables used for formatting the header and footer of the printout:
VAR_PAGE_NUMBER - lets you assign a current printout page. If VAR_PAGE_TOTAL is used, text assigned to the variable will precede the total number of pages (for example, Page 1, Page 2, and so on)
VAR_PAGE_TOTAL - value of this variable indicates the total number of printout pages. Text assigned to it may be preceded by a current page number, if the VAR_PAGE_NUMBER variable is used.
VAR_DATE, VAR_TIME - these variables may be assigned any text and combination of the key words displayed below (prints the current date/time on a printout):
%A - full week day name (Monday)
%a - abbreviated week day name (Mon)
%B - full month name (January)
%b - abbreviated month name (Jan)
%c - standard presentation of date and time
%d - month day (01-31)
%H - time (24-hour clock) (00-23)
%I - time (12-hour clock) (01-12)
%j - successive day of the year (001-366)
%M - minute (00-59)
%m - month (01-12)
%p - local equivalent of the English abbreviations AM / PM
%S - second (00-59)
%U - successive week of the year (first day - Sunday) (00-53)
%W - successive week of the year (first day - Monday) (00-53)
%w - day of the week (0-6, Sunday is denoted by 0)
%X - standard time representation
%x - standard date representation
%Y - year and century
%y - year without the century specified (00-99)
%Z - time zone name
%% - percent mark
Standard date representation is the following string of variables: %a %b %d %Y
Standard time representation is the following string of variables: %H:%M:%S
Standard date and time representation is the following string of variables: %a %b %d %H:%M:%S %Y.

The remaining variables listed below do not contain other values than user-defined text. Their names serve only for the purpose of convenient classification while formatting.

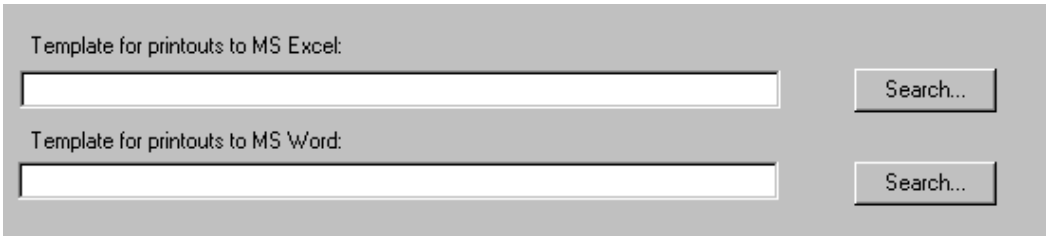
The following printout variables may be used in AutoCAD® Structural Detailing - Reinforcement:
VAR_INV_NAME – investor name
VAR_INV_ADDRESS – investor address
VAR_INV_PHONE – investor phone
VAR_INV_FAX – investor fax
VAR_INV_EMAIL – investor e-mail address
VAR_OFF_NAME – design office name
VAR_OFF_ADDRESS - design office address
VAR_OFF_PHONE - design office phone
VAR_OFF_FAX - design office fax
VAR_OFF_EMAIL - design office e-mail address
VAR_SCALE – drawing scale
VAR_DRAW_NAME – drawing name
VAR_FILE – name of a DWG file including a drawing
VAR_DESIGNER - designer

© 2010 Autodesk, Inc. All rights reserved

VAR_VERIF - verification
VAR_PROJ_NAME, VAR_PROJ_NUM
VAR_REV_NAME, VAR_REV_NUM
VAR_LOGO – access path to a BMP file
You can also use these variables when creating your own printout layouts. When you insert such a layout, the software will automatically fill out variables with values specified in the table printout manager.

24.10. Templates

After you select Templates from the selection tree located in the left part of the Table printout manager dialog, the options shown below display on the right.



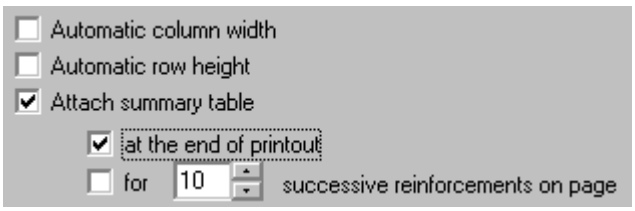
You can select templates for printing tables to the following programs:

- MS Word®: DOT format files
- MS Excel®: XLT format files

In the edit fields, specify file names with a full access path. After you click Search, you can specify a template file from the computer hard disk.

In AutoCAD® Structural Detailing - Reinforcement, there are additional options available for printouts to MS Word®. They let you insert an additional summary table that includes information about the reinforcement (if Attach summary table is selected). You can set the table either at the end of the entire printout or for several successive reinforcements on a page.
Additional options:

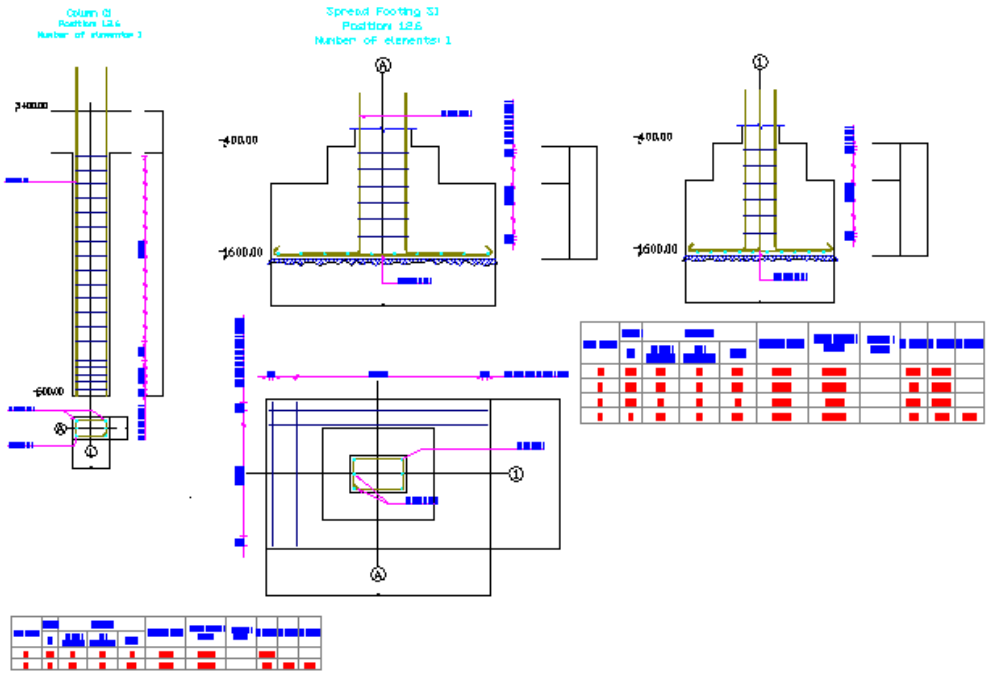
- Automatic column width - when this is selected, widths of table columns are automatically adjusted to fit the length of names of table columns.
- Automatic row height - when this is selected, heights of table rows are automatically adjusted to contents of table rows.



24.11. Example of definition of views and generation of the final drawing

The following example illustrates the generation of drawings of a spread footing and an RC column generated with the use of the macros available in ***AutoCAD® Structural Detailing – Reinforcement***. (Use the *Model* tab to define which views display in the illustration).

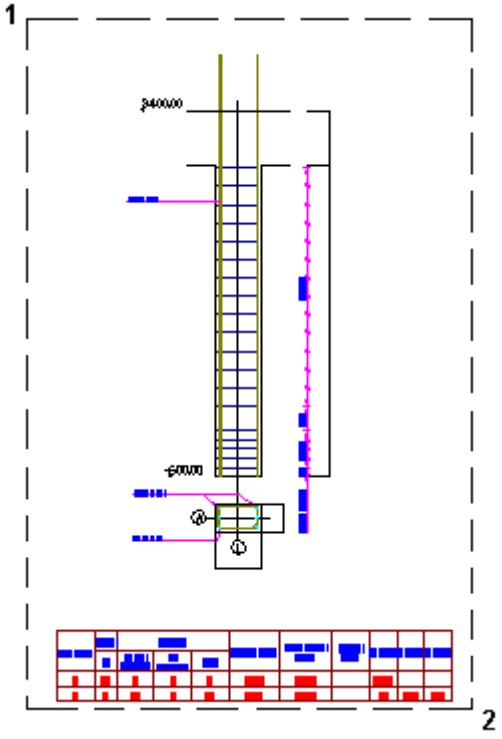
© 2010 Autodesk, Inc. All rights reserved



The first stage of drawing generation is to create views in the model space. Create views for projections of the spread footing and the column as follows:

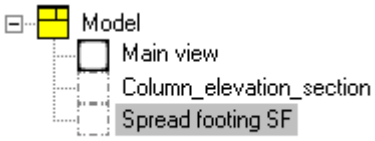
1. Click  (Create View).
2. Select the views, e.g.: a view of the column with a reinforcement table (see the drawing below).

NOTE:
A column view and a table view can be created separately (the table and the column in separate views).



© 2010 Autodesk, Inc. All rights reserved

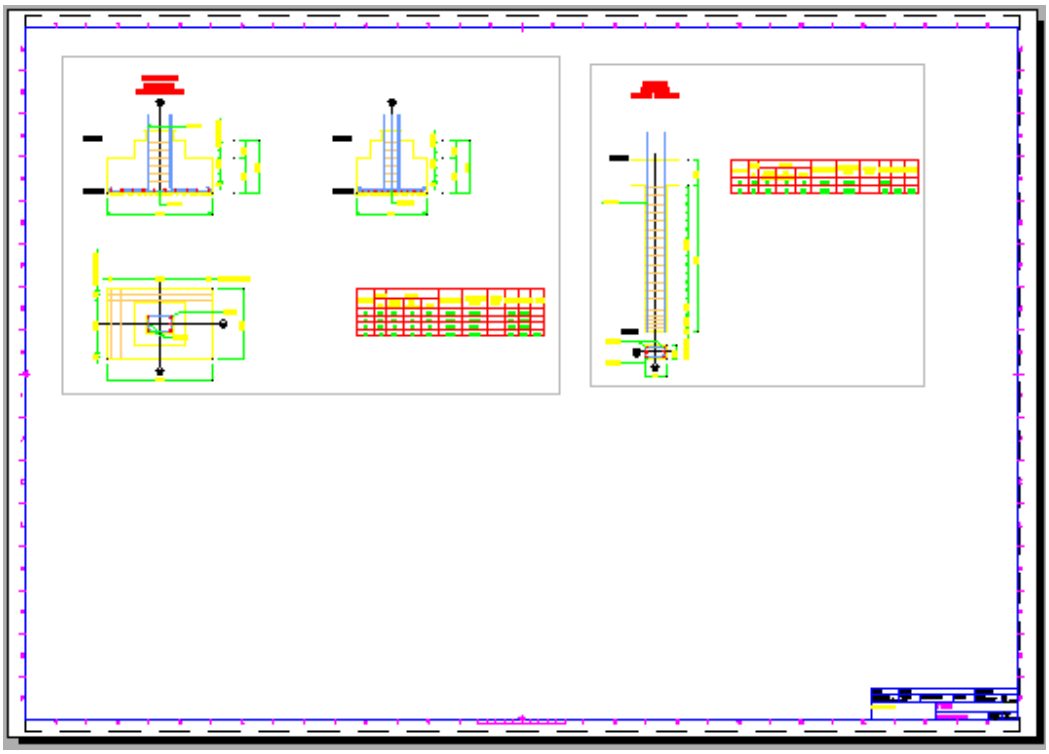
3. In the command line, enter a view name, e.g. *Column_elevation_section,* and click ENTER.
4. Select the default scale value 1:20, and press ENTER; the name of the defined view appears on the *Positions* tab in the ***Object Inspector*** dialog.
5. Use the same method to create a view of the spread footing projections (enter Spread footing SF1 for name, and use the default scale)



The second stage of drawing generation is to move the created views to the printout layout. Place the views in the printout layout as follows:

1. Click the *Printouts* tab in the ***Object Inspector*** dialog; add a new printout tab, e.g. template A1 ASD.
2. Right-click the new tab (*A1 ASD)*, and click the *Activate* option from the context menu.
3. Move to the *Positions* tab in the ***Object Inspector*** dialog.
4. Right-click the column view (the view *Column_elevation_section*), and click the *Add to current printout* option from the context menu.
5. Indicate the location of the view in the printout layout.
6. Use the same method to place the spread footing projections on the printout.

The generated printout (the final drawing) is shown below.



© 2010 Autodesk, Inc. All rights reserved

24.12. List of commands available in the printout module

This module enables printouts. The following commands are available:

RBCT_ACTDOC
Available for a selected document located in the option tree; activates a selected document (for its edition) in the edition layout. There may be many documents created, but only one is active, i.e. may be edited.

RBCT_ADDTOPRINT
Available for a selected view located in the position tree; composes a final printout. The layout, to which the view is to be added, must be active. The command adds a selected view to the current layout (printout); NOTE: a view may be contained only on one printout.

RBCT_ADDALLTOPRINT
Available for a selected document provided in the position tree; composes a final printout. The layout, to which the view is to be added, must be active. The command adds all the views belonging to a given document (not added to other printout, yet) to the current layout.

RBCT_FITVIEWS
Available for an active document – provides greater work convenience to the user. The edition layout must be active. The command results in adjusting dimensions of views included in the edition layout to the current size of the AutoCAD® program window.

RBCT_DELPRINTOUT
Available for a selected printout in the printout tree; the command is used to delete a printout. The command also deletes the corresponding layout.

RBCT_REMFROMRINT
Available for a selected view provided in the printout tree; the command removes a view from a printout; the command removes the view only from a printout - it remains in a document and may be reused (e.g. by adding it to other printout).

RBCT_DELALLFROMPRINT
Available for a selected document located in the printout tree; the command removes views belonging to a selected document from the printout. The views remain in a document and may be reused (e.g. by adding them to other printout).

RBCT_DELDOC
Available for a selected document located in the position tree; the command deletes a document from the list of documents created for a given position.

RBCT_EDITVIEW
Available for a selected view provided in the printout tree; the command switches to the edition mode for a selected view. The command enables you to switch from edition of a printout to edition of a view (drawing) included in it. The command activates the edition layout and a document whose component is the selected view.

RBCT_EDITDOC
Available for a selected document provided in the printout tree; the command used to switch to the edition mode of a selected document. The command enables you to switch from edition of a printout to edition of views (drawings) included in it. The command activates the edition layout and the selected document.

RBCT_MEDIT_ON
Available for an active document containing one view; the command allows editing a document in the model layout.

© 2010 Autodesk, Inc. All rights reserved

RBCT_MEDIT_OFF
The command restores the standard functionality of the model layout.

RBCT_REG_LAYER
Available for the active document and view; after adding a layer, you can change its name by means of the options available in the AutoCAD® program. The program manages layers within the available views and documents. A layer must be added using the ***AutoCAD® Structural Detailing*** options (the problem concerns only the layers used in the edition layout).

RBCT_DELETEPOS
Available for a position selected in the position tree; the command is used to delete a position; NOTE: only positions that are defined may be deleted - positions created on the basis of model elements cannot be deleted.

RBCT_RENAMEPOS
Available for a position selected in the position tree; the command enables changing the name of a position.

RBCT_RENAMEVIEW
Available for a view selected in the position tree; the command enables changing the name of a view.

RBCT_RENAMEDOC
Available for a document selected in the position tree; the command enables changing the name of a document.

RBCT_RENAMEPRINTOUT
Available for a printout selected in the printout tree; the command enables changing the name of a printout; a printout name is always identical to the name of a layout (printout) corresponding to it.

RBCT_ACTVIEW
Available for a view selected in the position tree; the command makes the view of the AutoCAD® program which corresponds to the selected view, become active; NOTE: a view must be a component of the active document.

RBCT_ADDTEMPLATE
The command results in adding a new template in the dialog; which opens once this option is selected. You can specify the name of a new template and choose one of the registered template types.

RBCT_DELTEMPLATE
Available for a template selected in the template tree; the command deletes a selected template.

RBCT_RENAMETEMPLATE
Available for a template selected in the template tree; the command allows changing a name of a selected template.

RBCT_ACTTEMPLATE
Available for a template selected in the template tree; the command activates a selected template in the template layout (it enables its edition).

RBCT_ADDVIEWPORT
Accessible for an active template in the template layout; the command adds a view to the active template in the dialog box; which opens once this option is selected. You choose view name, scale and type; name and scale of the view may be changed at any time, as regards the type, it cannot be modified.

© 2010 Autodesk, Inc. All rights reserved

RBCT_DELVIEWPORT
Accessible for a view selected in the template tree; the command enables deleting a view.

RBCT_APPENDDOC
Available for a position selected in the position tree; the command adds a document to the selected position in the dialog; which opens once this option is selected. You can specify the name of a document and select a template based on which the document is to be created.

RBCT_CNGSCALE
Accessible for the active view located in the edition layout; the command allows changing the view scale; the scale is expressed as the natural number ***n***, which denotes the scale 1 : ***n***.

RBCT_SETVIEWRANGE
Available for the active view located in the edition layout; the command allows setting the view area visible on the printout. You select (with a rectangle) a part of the view which is to be visible on the printout. Edit operations in the edition layout do not result in modification of a defined print area.

RBCT_REFRESHDOC
Accessible for a document selected in the position tree; the command enables refreshing a selected document. If the element of a structure model (for which the position has been defined), changes, then the documents created for this position are refreshed. A document that needs to be refreshed is marked with a red diagonal.

RBCT_REFRESHALLDOC
Available for a position selected in the position tree; the command enables refreshing all the documents belonging to a selected position. If the element of a structure model (for which the position has been defined), changes, then the documents created for this position are refreshed. A document that needs to be refreshed is marked with a red diagonal.

RBCT_PRINTVFRAMEON
Available for all defined, printout views.

RBCT_PRINTVFRAMEOFF
Available for all defined, printout views; areas marked with rectangles (they determine views of the AutoCAD® program) will not be printed.

RBCT_ADDDETAILVIEW
Accessible for the active view provided in the edition layout; the command enables adding a new view based on the active view. Once the command is selected, you select (with a rectangle) a part of the active view that is to become a new view. A view created in this manner is of the same type as the initial view and is positioned in the same place in the edition layout. A new view is added to the position tree; the new view contains copies of the elements included in the selected rectangle. The created view may be edited independently of the initial view. The command is useful when it is necessary to have another drawing (of the same part) to edit it independently or two drawings of different scales.

RBCT_ADDVIEW
Accessible for the active view provided in the edition layout; the command enables adding a new view based on the active view. Once the command is selected, you can select (with a rectangle) a part of the active view that is to become a new view. A view created in this manner is of the same type as the initial view and is positioned in the same place in the edition layout. A new view is added to the position tree; the new view contains the same elements as those included in the selected rectangle. If the created view is to be edited; it also makes changes in the initial view. The command is useful when several independent views are to be created out of one large view (drawing) which is not added to the printout; all the views created are assigned the same scale.

© 2010 Autodesk, Inc. All rights reserved

RBCT_DELVIEW
Available for a view selected in the position tree; the command enables deleting a view that has been added by means of the following commands: RBCT_ADDDETAILVIEW or RBCT_ADDVIEW.
NOTE: The original view contained in a template, from which the document has originated, cannot be deleted.

RBCT_SHOWIEW
Accessible for a view selected in the position tree; the command allows edition in the active view; if additional views have been added to the document during edition, then not all the views are visible in the edition template.

RBCT_REGMODELLAYERS
Available for the whole project; the command enables work optimization; once this command is selected, you can declare the layers intended for work in the model; while working in the edition layout. Layout (printout) or template layout, the layers are frozen. It brings about optimization of the **REGENALL** command operation.

25. TOOLS

25.1.Drawing scale

Use the Job Preferences dialog (the *Codes / Units* tab) to define the units for all objects drawn using the options available in ***AutoCAD® Structural Detailing***. Units are selected for reinforcement length, reinforcement cover, reinforcement diameter, etc.
While working in ***AutoCAD® Structural Detailing***, you may adopt different work units (mm, cm, and m). The default model scale is 1: 20. All descriptions of bars and bar distributions as well as dimensions will be inserted in the default scale. The default scale may be changed in the lower part of the ***Object Inspector*** dialog.

NOTE: bars are always drawn in the scale 1:1.

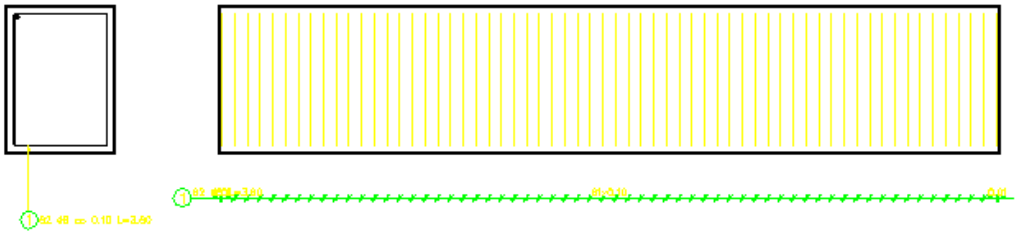
It is possible to work in several scales at the same time using active views. To do this, create a few views and define an appropriate scale for them, e.g.: 1:20, 1:25 or 1:50.
To draw objects in the scale, e.g. 1:50, activate the view with this scale (it will be highlighted in red) and insert reinforcing bars (the scale of their description will be 1:50). The scale of an active view is set on the *Model* tab.
The scale of a drawing presented in a selected view, may be changed by modifying the scale. Scale modification includes description of reinforcement distribution, dimension lines, texts and line scale (ltscale) of reinforcement description; once this option is selected, a drawing presented on the *Model* tab displays the changes (size of letters, labels and dimension lines). When views created in different scale are inserted into a printout layout, the size of fonts and dimension lines are identical.

For more information see the following topics:
Definition of the view scale
Different scale of drawings in a view and printout preparation

© 2010 Autodesk, Inc. All rights reserved

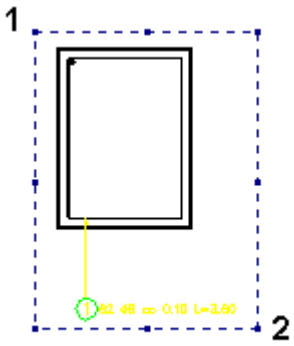
25.2. View scale definition

In the following procedure, you create views for the following section views (cross section of an RC beam with a stirrup and longitudinal beam section with stirrup distribution along the beam length).



To create views:

1. Click  (Create View).
2. Indicate the first and second apex defining a view of the beam cross section as shown.



3. Specify the name of the view e.g. *Cross section view* and click ENTER.
4. Define the scale of the view or assume the default scale value 1:20, and click ENTER.

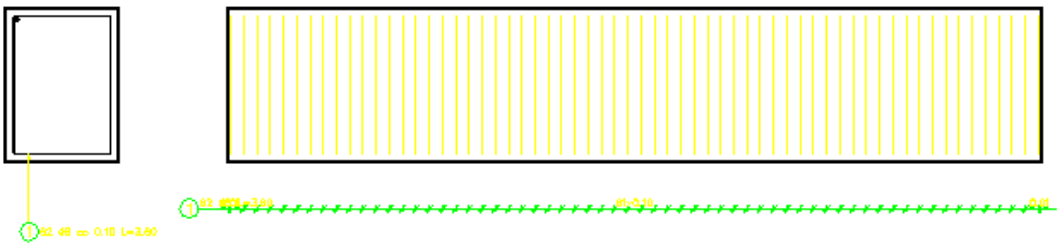
The view is generated with the specified name in the active document for the current position.

Using the same method to create a second view – view of the beam longitudinal section.

25.3. Different scale of drawings in a view and preparation of printout

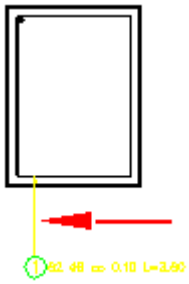
In the following procedure, you create drawings with different scales for the document shown below (cross section of an RC beam with a stirrup and view of a beam with stirrup distribution along the beam length).

© 2010 Autodesk, Inc. All rights reserved



Create views using the same method described in View scale definition.
To change scale of one of the views (the scale of the view named *Cross section view* will be changed):

1. Highlight the cross section view (from the context menu, right-click the *Show view* command or double-click on Cross section view) in the ***Object Inspector*** dialog.
2. In the lower part of the ***Object Inspector*** dialog, define appropriate scale for a given view. All the descriptions included in the cross section view will be modified.



To add the created views to the printout:

- Click the printout layout tab (e.g. layout1 which is by standard provided in the **AutoCAD®** program).
- Choose the printout size (e.g. A2 paper size).
- Select the previously created view (e.g. *Cross section view)* in the ***Object Inspector*** dialog.
- In the context menu, right-click the *Add to current Printout* option.
- Position the view on the printout.

Using the same method, create a second view (*Longitudinal view*). The printout now included a beam cross section and a beam longitudinal section with transversal reinforcement.

25.4.Find reinforcement

Use this option to find a reinforcement element with a given position number in a drawing. The option is available from:

- Menu: Reinforcement / Tools / Find reinforcement
- Ribbon: ASD - Reinforcement / Tools / Find reinforcement
- Toolbar: Tools / Find reinforcement 
- Command line: RBCR_TOOL_FINDR.

In the command line, enter a number of reinforcement positions. It is also possible to find the next (previous) reinforcement position of the same type (bar, distribution, etc.).

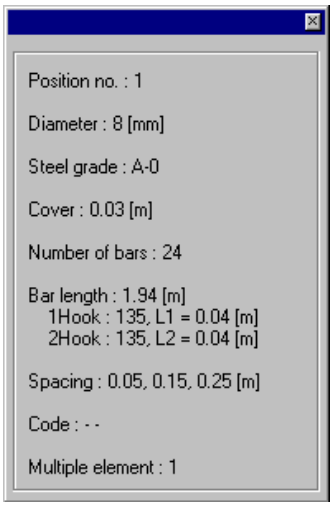
© 2010 Autodesk, Inc. All rights reserved

25.5. Reinforcement - information

Use this option to display basic information about a reinforcing bar or distribution. The option is available from:

- Menu: Reinforcement / Tools / Reinforcement – Information
- Ribbon: ASD - Reinforcement / Tools / Reinforcement – Information
- Toolbar: Tools / Reinforcement - Information 
- Command line: RBCR_TOOL_INFO.

When selected, the cursor changes to a 'cross'. When the cursor is located close to a reinforcement position (reinforcing bar, reinforcement distribution) presented in a drawing, a small dialog displays, and information concerning the selected reinforcement is presented. If any information about reinforcement is inaccessible (e.g. position no. or spacing), then a '---' symbol displays. An example of reinforcement information is shown below.



25.6. Renumbering of reinforcement position

Use this option to change the numbering of reinforcement. The option is available from:

- Menu: Reinforcement / Tools / Renumbering of reinforcement position
- Ribbon: ASD - Reinforcement / Tools / Renumbering of reinforcement position
- Toolbar: Tools / Renumbering of reinforcement position 
- Command line: RBCR_TOOL_RENUM.

To renumber the reinforcement position, choose the element or group of elements whose numbers will be changed. Renumbering is carried out in an active document.
After generating a final drawing (printout), the numbering in the model is changed automatically. The printout preserves the consistency of the numbering; the consistency of numbering in a printout implies checking if a given layout does not include different reinforcement elements with the same position number.

The default work mode selection of the option causes a single change of a position number of the indicated reinforcement. Additionally, there are the following modes of renumbering available in the program:

- Global renumbering

© 2010 Autodesk, Inc. All rights reserved

Consolidation of renumbering

- Renumbering of identical bars.

Command line:

Select/enter reinforcement no. or [Shift / Consolidation / Identical reinforcement]:
Indicate the reinforcement description (reinforcement with position) graphically or enter a position number

New reinforcement no.:
Enter a new position number to verify if the number entered already exists. If yes, then it is verified if both numbers are assigned to identical reinforcement. If not, then a warning displays and a new reinforcement number should be entered again. After completing the renumbering, tables are updated automatically.

Shift

Shift of numbering from position <1>: 5
By default, a first reinforcement position (the one with the lowest number) is automatically specified. If a different position number (higher number) is entered, then operation of renumbering is performed for all the positions whose numbers are higher than the specified position number (and for the position with the number entered).

NOTE: The specified position number (in this case 5) must be included in a drawing. If such a position number does not exist, then a warning is displayed and a new position number should be entered.

Position [5] will be changed to: 13
Enter a new position number; after completing the renumbering, tables are updated automatically.

Example of shift operation:

- Positions nos.: 1 2 3 4 5 6 13 14 15.
- Shift of numbering from position <1> : 5.
- Position [5] will be changed to: 13.
- Result of the renumbering: 1 2 3 4 13 14 21 22 23.
- Shift of numbering has preserved numbering discontinuities.

Consolidation

Renumbering from position <1>: 5
By default, a first reinforcement position (the one with the lowest number) is automatically specified. If a different position number (higher number) is entered, then operation of renumbering is performed for all the positions whose numbers are higher than the specified position number (and for the position with the number entered).

NOTE: The specified position number (in this case 5) must be included in a drawing. If such a position number does not exist, then a warning is displayed and a new position number should be entered

After completing the renumbering, tables are updated automatically.

Example of consolidation operation:

- Positions nos.: 1 4 5 6 13 14 15.
- Renumbering from position <1>: 5.
- Result of the renumbering: 1 4 5 6 7 8 9.
- Discontinuities in the numbering starting from the selected position number that have been removed.

Identical reinforcement

Renumbering from position <1>: 5

© 2010 Autodesk, Inc. All rights reserved

By default, a first reinforcement position (the one with the lowest number) is automatically specified. If a different position number (higher number) is entered, then operation of renumbering (finding identical reinforcement) is performed for all the positions whose numbers are higher than the specified position number (and for the position with the number entered).

NOTE: The specified position number (in this case 5) must be included in a drawing. If such a position number does not exist, then a warning is displayed and a new position number should be entered.

Once the search is completed, the program displays a report presenting changes made in position numbering. Changes in position numbering are always made in such a manner that a higher number is changed to a lower one.

Example of the operation of finding identical reinforcement:

- Position: 12,15,65 - changed to [5]
- Position: 99 – changed to [13]

© 2010 Autodesk, Inc. All rights reserved