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1. MT-Manager (Ghost-Tool)

There is a possibility to define a tool which does not exist in reality. This "ghost" tool can be used to define contours/ milling segments which only have a optical reason. The main reason for this feature is the display and positioning of clamping devices. Manufacturing definitions with this tool do have any effect on the machining program.

If needed, the ghost tool can be loaded in the tool manager.

right mousebutton	In folder Choose the file ghost.too		Tool Ghost_1 now available with **ID=9999**
Step 1	Step 2	Step 3	
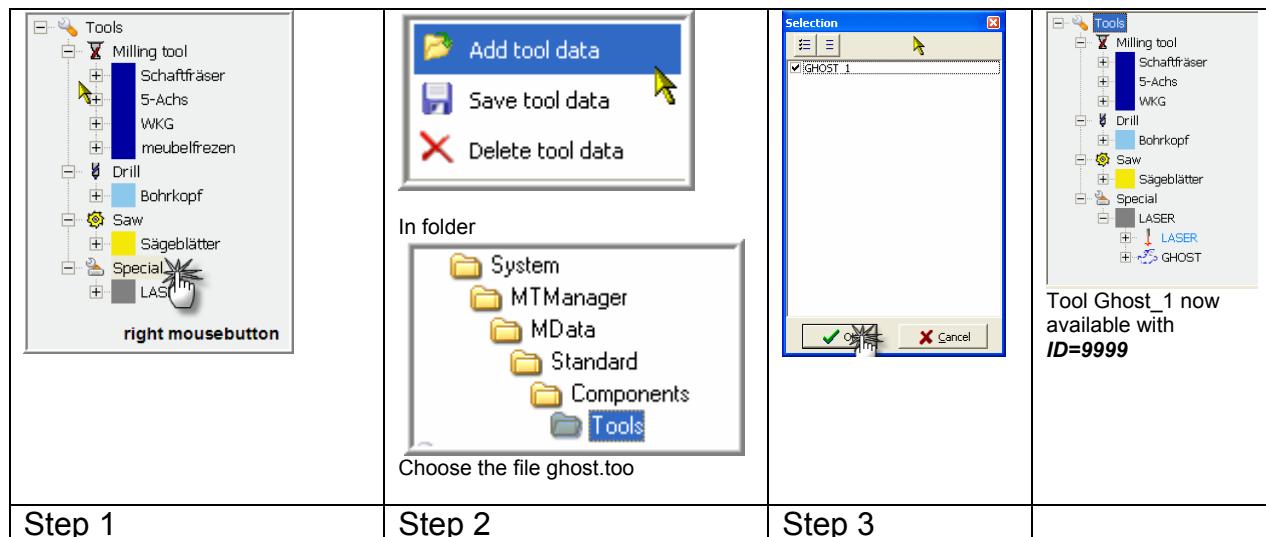
This tool can also be created manually as a special tool.
Important is the type = 2000
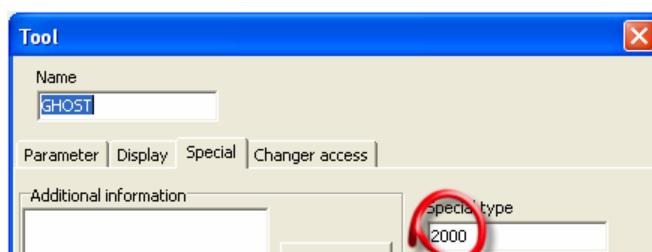
1.1 Example

```
;MAKROTYP=0
;BILD=xx1.wmf
;INFO=
;WZGV=TEST
;MASCHINE=HOLZHER
;NCNAME=xx1
;KOMMENTAR=
;DX=0.000
;DY=0.000
;DZ=0
;DIALOGDLL=Dialoge.Dll
;DIALOGPROC=StandardFormAnzeigen
;AUTOSCRIPTSTART=1
;BUTTONBILD=
;DIMENSION_UNIT=0
VARS
   DX := 600;*VAR*Dimension X
   DY := 400;*VAR*Dimension Y
   DZ := 19;*VAR*Dimension Z
START
FinishedPart (DX,DY,DZ,0,0,0,0,'',0,0,0)
CALL HH_Park ( VAL PARK:=3,X:=0,Y:=0)
TOOLM (9999,_VE,_V,_VA,_SD,_ANF,'1')
SP (0,0,0,0,0,_ANF,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0)
G01 (0,0,0,0,3,2)
G01 (0,0,0,0,5,2)
G01 (0,0,0,0,7,2)
G01 (0,0,0,0,1,2)
EP (0,_ANF,0)
SP (110,100,0,0,0,_ANF,0,0,0,1,1,0,0,0,0,0,0,0,0,0,0,0,0)
G01 (210,100,0,0,0,2)
G01 (210,295,0,0,0,2)
G01 (100,295,0,0,0,2)
G01 (100,100,0,0,0,2)
EP (0,_ANF,0)
```


Positioning the cups depending on the dummy – router ID 9999

2. Hop – Data command description

;MAKROTYP=0 ;BILD=FRAESEN.WMF ;INFO=Milling ;WZGV= 7123K _039 ;MASCHINE= HOLZHER ;NCNAME=FRAESEN ;KOMMENTAR= ;DX=0 ;DY=0 ;DZ=0 ;DIALOGDLL=Dialoge.Dll ;DIALOGPROC=StandardFormAnzeigen ;AUTOSCRIPTSTART=1 ;BUTTONBILD= ;DIMENSION_UNIT=0	Header – general information
VARS	**Key words**
DX := 600;*VAR*Dimension X DY := 400;*VAR*Dimension Y DZ := 19;*VAR*Dimension Z L := 80;Ausschnittlänge B := 40;Ausschnittbreite i := 0;	Definition of variables
START	**Key words**
FinishedPart (DX,DY,DZ,0,0,0,0,'',0,0,0) ;Workpiece outside milling TOOLM (1,_VE,_V,_VA,_SD,_ANF,'1') SP(0,0,-2,2,2,_ANF,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0) G01(600,0,0,0,0,2) G01(600,0,0,0,0,2) TP(_BL,_V/2,_DW,_KW) G01(600,400,_Z,0,0,2) TP(_BL,_V,_DW,_KW) G01 (0,400,_Z,0,0,2) TP(_BL,_V/2,_DW,_KW) G01(0,0,0,0,0,2) EP(2,_ANF,0)	Programm definition of manufacturing steps

1.2   Header - Area

;MAKROTYP=0	0=Standard macro 1=System macro
;BILD=FRAESEN.WMF	Dialog picture
;INFO=Milling	Information for standard dialogue (not relevant from Hops 4 on)
;WZGV= 7123K_039	Used tool management
;MASCHINE= HOLZHER	Used machine
;NCNAME=FRAESEN	Name of NC – Programs
;KOMMENTAR=	Comment
;DX=0	Offset in X
;DY=0	Offset in Y
;DZ=0	Offset in Z
;DIALOGDLL=Dialoge.Dll	Not relevant
;DIALOGPROC=StandardFormAnzeigen	Not relevant
;AUTOSCRIPTSTART=1	0: No automatic run when changes have been made 1: Macro will automatically be recalculated when changes have been made
;BUTTONBILD=	
;DIMENSION_UNIT=0	0= Measurement mm 1= Measurement inch

1.3   Variables - Area

VARS	Key words
DX := 600;*VAR*Dimension X DY := 400;*VAR*Dimension Y DZ := 40;*VAR*Dimension Z Variable name := value comment	

1.4 HOPS Macro – Commands

The description of the commands is based on the basic functions.

1.4.1 Command overview

	German	English	Description
Work piece Information:	FERTIGTEIL	FINISHED_PART FINISHEDPART	Finished part - Information
Tool calls:	WZF	TOOLM	Tool call router
	WZB	TOOLD	Tool call drill
	WZS	TOOLS	Tool call saw
Milling:	SP	SP	Milling Start point
	G01	G01	Linear interpolation
	G02R	G02R	Circular interpolation clockwise with radius
	G03R	G03R	Circular interpolation counter clockwise with radius
	G02M	G02C	Circular interpolation clockwise with centre point
	G03M	G03C	Circular interpolation counter clockwise with centre point
	EP	EP	Milling End point
	TANG	TANG	Interpolation tangential
	SBOG	TAILARC	Interpolation tail arc
	TP	TP	Technology point
Drill:	HORZB	HORD	Horizontal drilling
	BOHRUNG	DRILLING	
Sawing:	SAEGEN	SAWING	Sawing
Contours:	KB	CB	Contour start
	KG01	CG01	Contour linear
	KG02M	CG02C	Contour circular clockwise with centre point
	KG03M	CG03C	Contour circular counter clockwise with centre point
	KSPLIT	CSPLIT	Split contour
	KTANG	CTANG	Contour tangential to next point
	KSBOG	CTAILARC	Contour tail arc
	KVERRUNDUNG	CROUND	Round contour
	KG01ZUKB	CG01TOCB	Close contour
Milling contours:	KSP	CSP	Start point milling contour
	KONTURFRAESEN	CONTOURMILLING	Contour milling
Viewchange:	EBENEF	VIEW5	Free view definition
	EBENE0	VIEW0	Standard 0
	EBENE1	VIEW1	Standard 1
	EBENE2	VIEW2	Standard 2
	EBENE3	VIEW3	Standard 3
	EBENE4	VIEW4	Standard 4

Draw functions:	ZLINIE	DLINE	Draw line
	ZKBCCW	DARCCCW	Draw arc clockwise
	ZKBCW	DARCCW	Draw arc counter clockwise
	ZRECHTECK	DRECTANGLE	Draw rectangle
	ZTEXT	DTEXT	Draw text
Transformations:	SETURSPRUNG	PLACEORIGIN	Set origin
	SPROHX	MIRRORFPX	Mirror X
	SPROHY	MIRRORFPY	Mirror Y
	SPIEGELNEND	MIRROREND	End mirroring
	VERXY	SHIFTXY	Start moving
	VERXYEND	SHIFTXYEND	End moving
Generic functions:	HINWEISMELDUNG	GIVEOUTHINT	Message information in status line
	FEHLERMELDUNG	GIVEOUTERROR	Error message in status line
	NCINFO	NCINFO	NCINFO
	EINGABE	INPUT	Shows window for input export variables
	NCINFOPROCESS	NCINFOPROCESS	NCINFOPROCESS
Comments	;	;	Comment text in macro
	_DINISO_CALL	_DINISO_CALL	
DINISO			Tool call, view call, din iso code
	_DINISO	_DINISO	Direct code for nc program

Types of variables (TYPE)

|	
N=numeric	Numeric value
S=string	Alphanumeric value
B=boolean	Logical value 0/1
V=System variable	System variable can be used

1.4.2 Finished part (Work piece Definition)

<table>
<tr><td colspan="4">**HOP – Syntax**</td></tr>
<tr><td colspan="4">**Finishedpart** (x,y,z,rf,sf,ox,oy,oz,co,fl,l,p)</td></tr>
<tr><td rowspan="13"></td><td>Var</td><td>Type</td><td></td></tr>
<tr><td>X</td><td>N</td><td>Work piece dimension in X</td></tr>
<tr><td>Y</td><td>N</td><td>Work piece dimension in Y</td></tr>
<tr><td>Z</td><td>N</td><td>Work piece dimension in Y</td></tr>
<tr><td>rf</td><td>N</td><td>Rotation flag (angle=rf*90°)</td></tr>
<tr><td>sf</td><td>N</td><td>Not used</td></tr>
<tr><td>ox</td><td>N</td><td>offset x</td></tr>
<tr><td>oy</td><td>N</td><td>Offset y</td></tr>
<tr><td>oz</td><td>N</td><td>offset z</td></tr>
<tr><td>co</td><td>S</td><td>Comment</td></tr>
<tr><td>Fl</td><td>B</td><td>Field linking</td></tr>
<tr><td>I</td><td>B</td><td>Activates Laser</td></tr>
<tr><td>P</td><td>N</td><td>Stop flag: Stop situation (0↔LU, 1↔RU,2↔RO, 3↔LO,)</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td colspan="4">**Example:**
FinishedPart (800,400,20,0,0,0,0,0,'',0,0,0)</td></tr>
</table>

1.4.3   TOOLM;TOOLD;TOOLS (TOOLCALL Router,Driller,Saw)

HOP – Syntax			
TOOLM (BoxNo,VE,V,VA,SD,ANF,HId)	Tool call Router		
TOOLD (BoxNo,VE,V,VA,SD,ANF,HId)	Tool call Driller		
TOOLS (BoxNo,VE,V,VA,SD,ANF,HId)	Tool call Saw		
	Var	Type	
	BoxNo	N	Tool „ID"
	VE	N/V	Lead in Feed rate (System Variable =_VE)
	V	N/V	Feed rate (System Variable =_V)
	VA	N/V	Lead out Feed rate (System Variable =_VA)
	SD	N/V	RPM (System variable =_SD)
	ANF	N/V	Lead in / Lead out Factor (System Variable =_ANF)
	Hid	S	Head ID
Example:			
TOOLM (125,_VE,_V,_VA,_SD,_ANF,'1')			
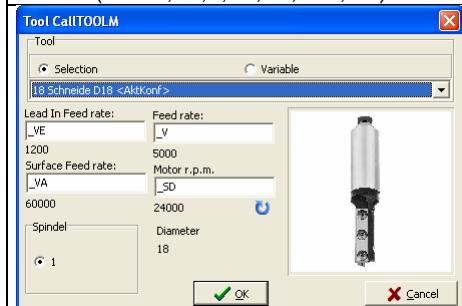
1.4.4 SP (Starting point Milling)

HOP – Syntax		
SP (x,y,z,rk,ab,_ANF,dc,oa,ta,es,esz,pm,fm,zs,us,cm,l)		
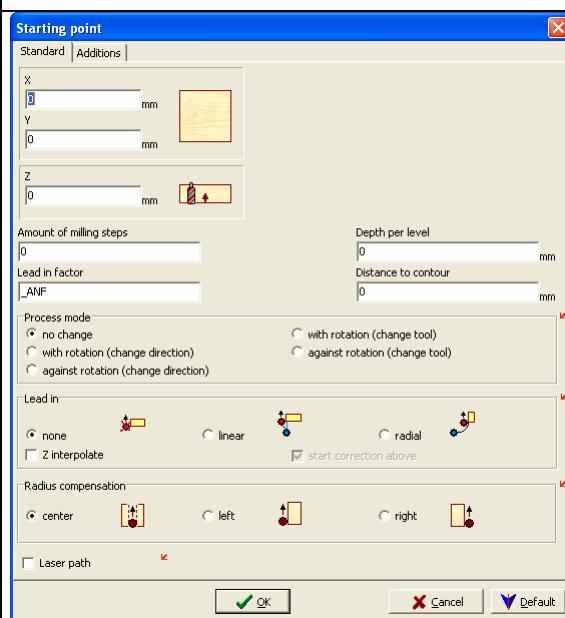
var	Type	
x	N	Start coordinate X
y	N	Start coordinate Y
z	N	Start coordinate Y depending on esz
rk	N	Radius compensation (0↔centre, 1↔left, 2↔right)
ab	N	Lead in mode (0↔none, 1↔linear, 2↔radial, 4↔linear with radius compensation after Z-Positioning, 5↔radial with radius compensation after Z-Positioning) -1 to -5 equal with 1 to 5 but with Z-Interpolation while Lead in movement
ANF	N/V	Lead in factor (System Variable =_ANFAKT)
dc	N	Distance to contour
Oa	N	Offset angle
Ta	N	Tip angle
Es	N	
Esz	N	2=relative
Pm	N	Process mode 0↔no change 1↔with rotation 2↔against rotation 3↔with rotation (using mirror tool) 4↔against rotation (using mirror tool)
Fm	N	Milling steps
Zs	N	Depth per level
Us	N	Excess depth (when ta not zero)
Cm	B	Interpolation with rotation Axis
l	B	Activates Laser
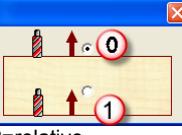
Example:
SP (0,0,-2,2,1,_ANF,1.5,0,0,0,1,0,2,0,0,0,0,0,0,0,0,0,0)

1.4.5 G01 (Linear Interpolation)

HOP – Syntax			
G01(x,y,z,r,es,esz)			
	var	Type	
	x	N	End point X
	Y	N	End point Y
	Z	N	End point Z
	R	N	Corner radius with next element
	es	N	Easy snap X/Y
	Esz	N	Easy snap Z 2=relativee
Example: G01 (210,100,0,0,0,2)			
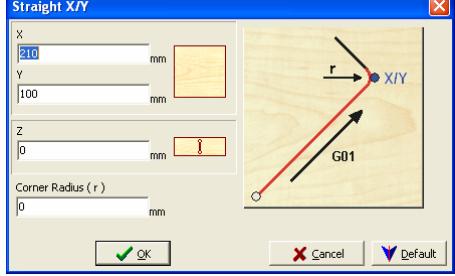
I.4.6   G02M/G03M (arc G2/G3 with centre point)

HOP – Syntax			
G02m (x,y,z,mx,my,r,ess,esz,esm) **G03m** (x,y,z,mx,my,r,ess,esz,esm)	var	Type	
	x	N	End point Arc in X
	Y	N	End point Arc in Y
	Z	N	End point Arc in Z
	Mx	N	Centre point X
	My	N	Centre point Y
	R	N	Corner radius to next element
	ess	N	Easy snap End point XY
	Esz	N	Easy snap Z 2=relativee
	esm	N	Easy snap centre point X/Y
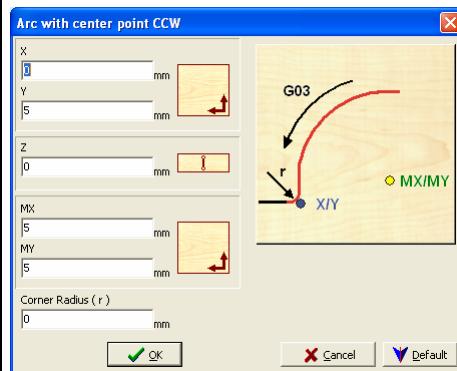
Example:
G03M (0,5,0,5,5,0,3,2,3)

I.4.7   EP (End point milling)

HOP – Syntax			
EP (ab,anf,bu)	var	Type	
	ab	N	Lead out mode (0↔none, 1↔linear, 2↔radial, 4↔linear with radius compensation before Z-Up Positioning, 5↔radial with radius compensation before Z-UP Positioning
	anf	N/V	Lead out factor (System variable =_ANFAKT)
	bu	B	1↔Reverse direction
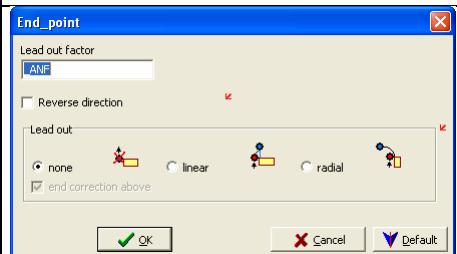
Example:
EP (0,_ANF,0)

I.4.8 EbeneF (free View)

HOP – Syntax			
EbeneF(x,y,z,ß2,ß1,es,esz)			
	var	Type	
	x	N	Zero of view in X
	y	N	Zero of view in Y
	z	N	Zero of view in Z
	ß1	N	Tilt angle of view
	ß2	N	Rotation angle of view
	es	N	Easy snap XY
	Esz	N	Easy snap Z
Example:			
EbeneF (0,0,0,90,0,0,2)			
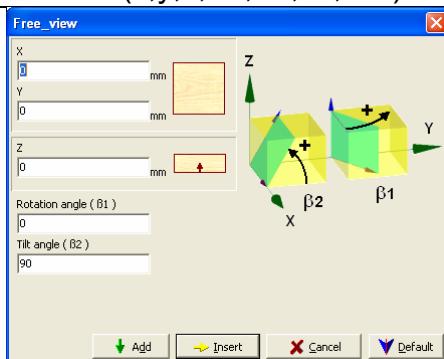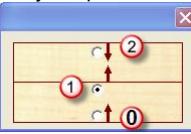
I.4.9 DRILLING

HOP – Syntax			
DRILLING(X,Y,D,T,Flag,es,esz)	var	Type	
	x	N	position in X
	y	N	position in Y
	d	N/V	Diameter (_WZD depending on the active Tool)
	T	N	Drilling depth
	Flag	N	Drilling flag
	es	N	Easy snap XY
	Esz	N	Easy snap Z 2=relative
Example:			
Drilling (0,0,5mm,-13,10,0,0,0,0,0,0,0)			

1.4.10 HorD (horizontal Drilling)

HOP – Syntax			
HorD(x,y,z,d,t,flag,ß2,ß1,es,esz)			
	var	Type	
	x	N	position in X
	y	N	position in Y
	z	N	position in Z
	d	N/V	Diameter (_WZD depending on the active Tool)
	T	N	Drilling depth
	Flag	N	Drilling flag
	ß1	N	Rotation angle (0 ↔ plus X-Direction)
	ß2	N	Tilt angle (0 ↔ horizontal)
	es	N	Easy snap XY
	Esz	N	Easy snap Z 2=relative
Example:			
HorD (0,0,0,_WZD,-40,2,-8,0,8,1,0,0)			
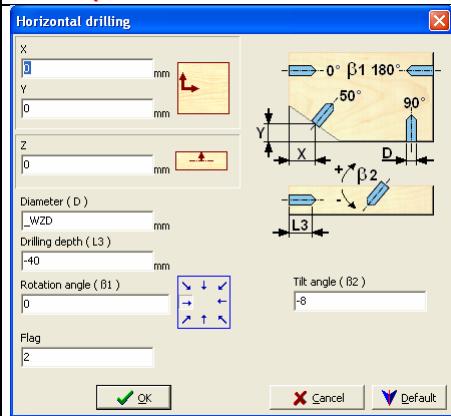
1.4.11 Sawing

HOP – Syntax		
Sawing (sx,sy,sz,ex,ey,ez,bl,ep,al,K,ß2,bh,ess,ese,esz,0,0)		
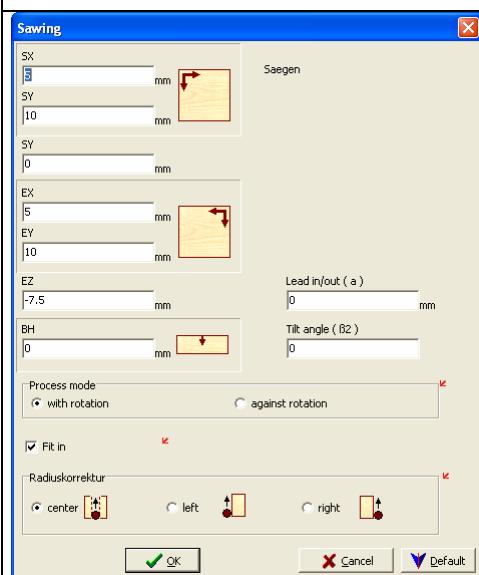
var	Type	
sx	N	Start point X
Sy	N	Start point Y
sz	N	Start point Z
Ex	N	End point X
Ey	N	End point Y
Ez	N	End point Z
bl	N	Radius compensation (0 ↔ centre, 1 ↔ left, 2 ↔ right)
Ep	N	Fit in
al	N	Lead in/out (a)
K	N	Process mode
ß2	N	Tilt angle
Bh	N	Z-Level
Ess	N	Easy snap Start point
Ese	N	Easy snap End point
Esz	N	Easy snap Z-Level

1.4.12 _DINISO_CALL

Using this macro, any NC-Code for example a program call can be integrated.

Before the call of this macro a tool call has to happen.

WZF(116,_VE,_V,_VA,_SD,_ANF,'1')
DINISO_BLOCK(0,0,0,0,0,0,0,0,0,0,0,0,0,0,';R10=23'+'|'+';R11=19.3'+'|'+'EXTCALL""PRG4711"')

HOP – Syntax	DINISO – Code
CALL _DINISO_CALL (TC,Speed,V,LP,SX,SY,SZ,EBX,EBY,EBZ,EBKW,EBDW,ESXY,ESZ,ESXYSP,ESZSP,CODESTR)	

	var	Type	
	TC	n	0=without tool call 1=with tool call
	Speed	n	With or without rpm – call
	V	N	1=activates View change call
	LP	N	0=default 1=Liftpos1 2=Liftpos2
	SX	N	Start point X on view
	SY	N	Start point in Y on view
	SZ	n	Start point in Z on view
	EBX	n	Start position view X
	EBY	n	Start position view Y
	EBZ	n	Start position view Z
	EBKW	n	Tilt angle of view
	EBDW	n	Rot. angle of view
	ESXY	n	Easy snap Start point view
	ESZ	n	Easy snap Z 0↔Work piece bottom 1↔Work piece middle 2↔top of work piece
	ESXYSP	n	Easy snap XY
	ESZSP	n	Easy snap Z 0↔Work piece bottom 1↔Work piece middle 2↔top of work piece
	CODESTR	s	DINISO – CODE The line break can be realized using +"|". Example ;R10=23 ;R11=19.3 EXTCALL""PRG4711" CodeSTR= ';R10=23'+'|'+';R11=19.3'+'|'+'EXTCALL""PRG4711"'

1.4.13 _DINISO

HOP – Syntax	DINISO – Code Sent through any string as code into the NC-program.		
CALL _DINISO (VAL CODE:='G1 G91 X200 Y230 Z-23 F8500')			
	var	Type	
	Code	S	0=without tool call 1=with tool call

1.4.13.1 Example DINISO

```
Example DINISO:
;MAKROTYP=0
;BILD=test1_lehne1.wmf
;INFO=
;WZGV=7123F_001
;MASCHINE=HOLZHER
;NCNAME=test1_lehne1
;KOMMENTAR=
;DX=0.000
;DY=0.000
;DZ=0
;DIALOGDLL=Dialoge.Dll
;DIALOGPROC=StandardFormAnzeigen
;AUTOSCRIPTSTART=0
;BUTTONBILD=
;DIMENSION_UNIT=0
VARS
  DX := 600;*VAR*Dimension X
  DY := 200;*VAR*Dimension Y
  DZ := 28;*VAR*Dimension Z
  Stepp := -10;*VAR*
  z := 0;
  Stri := ';
  Radius := 2500;
  A := 15;Abstand von oben
START
Fertigteil (DX,DY,DZ,0,0,0,0,0,'',0,0,0)
CALL HH_Park ( VAL PARK:=3,X:=0,Y:=0)
WZF (20,_VE,_V,_VA,_SD,_ANF,'1')
;CALL _Format_V5 ( VAL ECKENVERRUNDUNG:=0,TIEFE:=-2,AUFMASS:=0,ANF:=_ANF,ESMD:=1,GGL:=0,LASER:=0,DEPTH:=0)
CALL _DINISO_CALL ( VAL TOOLCALL:=1,SPEED:=1,VIEWCHANGE:=1,LIFTPOS:=0,SX:=-
10,SY:=0,SZ:=45,EBX:=0,EBY:=0,EBZ:=0,EBKW:=90,EBDW:=0,ESXY:=1,ESZ:=0,ESXYSP:=1,ESZSP:=0,CODESTR:='')
z := 0
Stri := 'G01 X=-10 Y='+FloatToStr(_RZ-A,4,3)+' Z='+FloatToStr(z,4,3)+' F'+FloatToStr(_V,4,3)
CALL _DINISO ( VAL CODE:=Stri)
Stri := 'G01 X=0'
CALL _DINISO ( VAL CODE:=Stri)
WHILE ABS(z)<_RY
Stri := 'G01 Z='+FloatToStr(Z,4,3)
CALL _DINISO ( VAL CODE:=Stri)
Stri := 'G02 X='+FloatToStr(_RX,4,3)+' Y='+FloatToStr(_RZ-A,4,3)+' CR='+FloatToStr(Radius,4,3)
CALL _DINISO ( VAL CODE:=Stri)
;jetzt zustellen in z
z := z+Stepp
Stri := 'G01 Z='+FloatToStr(z,4,3)
CALL _DINISO ( VAL CODE:=Stri)
Stri := 'G03 X='+FloatToStr(0,4,3)+' CR='+FloatToStr(Radius,4,3)
CALL _DINISO ( VAL CODE:=Stri)
;jetzt zustellen in Y
z := z+Stepp
END
;--
;-- visual
WZF (9999,_VE,_V,_VA,_SD,_ANF,'1')
EbeneF (0,0,0,90,0,1,0)
SP (0,_RZ-A,-_RY,0,0,_ANF,0,0,0,1,0,0,0,abs(Stepp),0,0,0,0,0,0,0,0,0)
G02R (_RX,_Y,0,Radius,0,0,2)
EP (0,_ANF,0)
Ebene0()
```
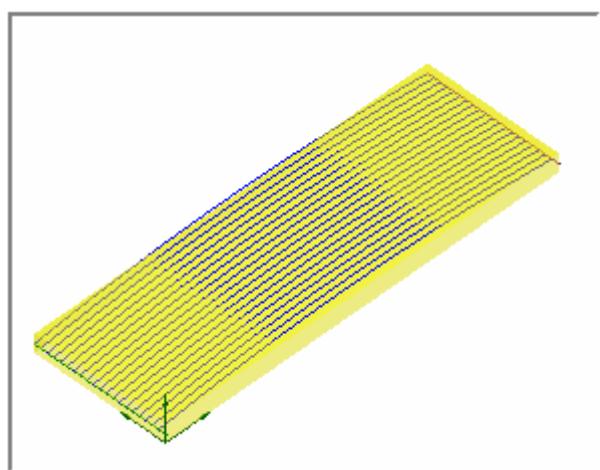
; (comment line)

HOP – Syntax	
;comment	Comment

1.5   Additional functions

1.5.1   HH_Park

| **HOP – Syntax**	Defines the park mode of the machine at program end			
CALL HH_Park (VAL PARK:=11,X:=0,Y:=0)				
	var	Type		
	park	N	Park position 0=without 1=left rear 2=right rear 3=middle rear 4=left front 5=right front 6=middle front 7=left middle 8=right middle 9=machine centre 10=manual 11=automatic	
	X	N	Park position in X active when park=10	
	Y	N	Park positi9on in Y active when park=10	

1.6 Example

```
;INFO=TEST
;WZGV=7123F_001
;MASCHINE=HOLZHER
;NCNAME=Test
;KOMMENTAR=
;DX=0.000
;DY=0.000
;DZ=0
;DIMENSION_UNIT=0
VARS
  DX := 600;*VAR*Dimension X
  DY := 400;*VAR*Dimension Y
  DZ := 40;*VAR*Dimension Z
START
FinishedPart (DX,DY,DZ,0,0,11,21,31,'',1,0,0)
CALL HH_Park ( VAL PARK:=10,X:=0,Y:=0)
;this is a comment
TOOLM (18,_VE,_V,_VA,_SD,_ANF,'1')
CALL _DINISO_CALL ( VAL
TOOLCALL:=1,SPEED:=1,VIEWCHANGE:=0,LIFTPOS:=0,SX:=0,SY:=0,SZ:=0,EBX:=0,EBY:=0,EBZ:=0,EBKW:=0,E
BDW:=0,ESXY:=0,ESZ:=0,ESXYSP:=0,ESZSP:=0,CODESTR:=';R10=23'+'|'+';R11=19.3'+'|'+'EXTCALL
'''PRG4711''')
SP (0,0,-2,1,2,_ANF,0,0,0,8,1,1,2,0,0,0,0,0,0,0,0,0,0)
G01 (0,0,0,0,7,2)
G01 (50,0,0,1.5,5,2)
g02m (0,50,0,50,50,0,5,2,5)
G01 (0,0,0,0,3,2)
G01 (0,0,0,0,2,2)
G01 (0,0,0,0,8,2)
EP (2,_ANF,0)
VIEW5 (0,0,0,90,270+arctan((dx/2)/(dy/2)),8,0)
TOOLD (501,_VE,_V,_VA,_SD,_ANF,'1')
DRILLING (20,20,_WZD,-13,10,0,0,1,0,0,0,0)
DRILLING (20+32,20,_WZD,-13,10,0,0,1,0,0,0,0)
DRILLING (20,20,_WZD,-13,10,0,0,3,0,0,0,0)
DRILLING (20+32,20,_WZD,-13,10,0,0,3,0,0,0,0)
VIEW0()
HorD (50,0,0,8,-25,0,0,90,3,1,0,0)
HorD (50,0,0,8,-25,0,0,90,2,1,0,0)
TOOLS (220,_VE,_V,_VA,_SD,_ANF,'1')
SAWING (0,20,0,0,20,-9,0,1,0,0,0,0,7,5,2,0,0)
```

Sawing

Vertical milling

Horizontal drilling
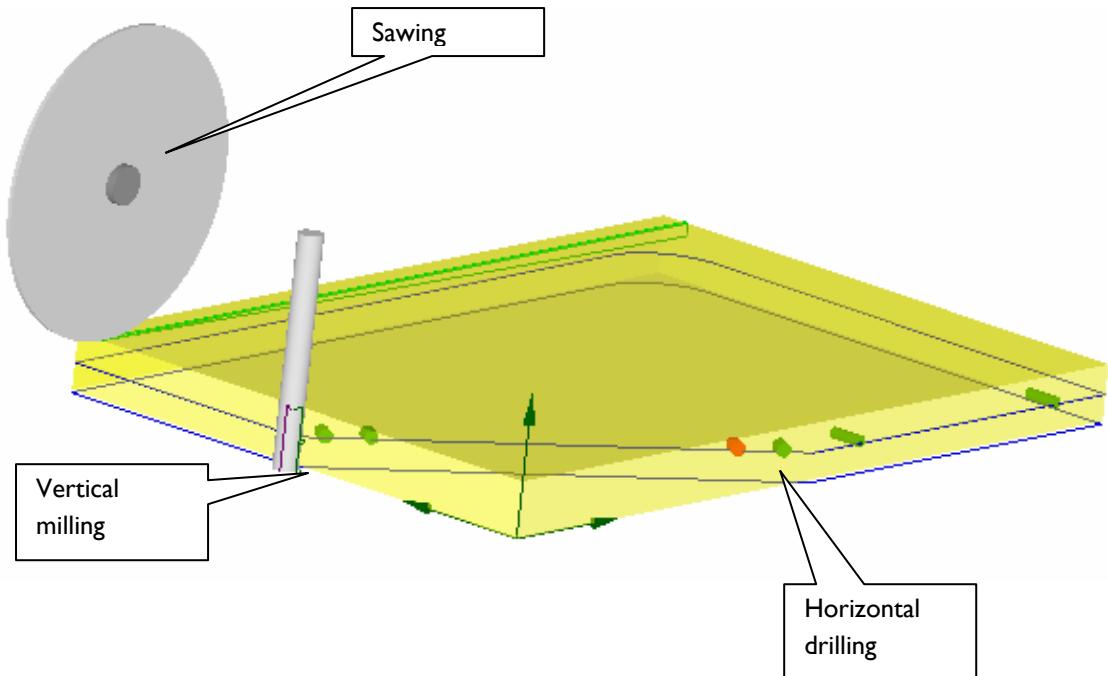
3. Document-Reference:

1.7 System\Help\de\GlobaleVariablen.pdf, System\Help\en\GlobalVariables.pdf

Overview on the system variables.