SYNERGIS
Engineering Design Solutions

# AUTODESK AUTOCAD INVENTOR 2012

## DESIGN ACCELERATOR: PRESS FIT CALCULATOR

The use of the Press Fit Calculator enables the end-user to Calculate elastic cylindrical co-axial pressure connections for compact or hollow shafts in either hot or cold state. The program calculates geometric parameters of the joint, minimal fit, standard or actual fit, and pressed-on parts material selection.

The calculation is only valid for press fits in which permanent deformations will not occur after the connection. The deformations do not include trueing of peaks and ridges on the surface texture.

This calculation is only valid for connections that are not loaded by outside pressure or are made from tubular parts with unlimited length. The parts are made from materials that behave according to Hooke's law.

The calculation does not consider the influence of centrifugal forces, ribs, or other reinforcement parts or in parts where the temperature is distributed unevenly.

A press fit joint with unlimited length is a joint with the length that equals the diameter or greater. If it is shorter, the real contact pressure is greater than calculated. This calculation provides more safety against the press fit loosing.

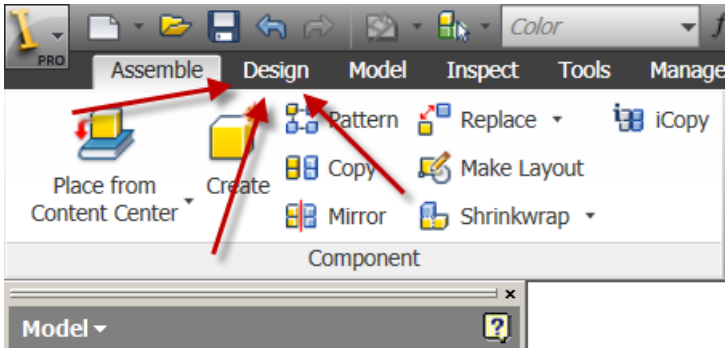
Minimal interference is determined when securing the least required loading capacity of the press fits, together with other factors.

The maximum interference is determined without existing plastic deformation, according to the HMH plasticity condition (Huber, Misses, Hencky) together with other factors.

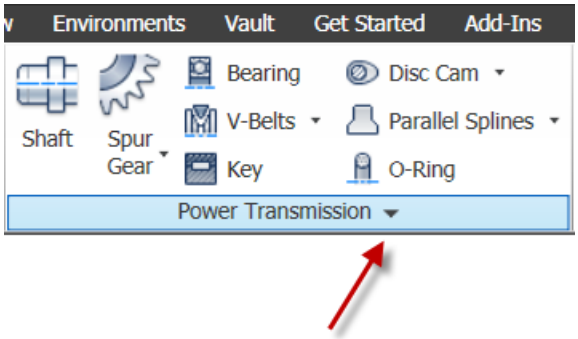
Pressing speed must be slow (about 3 mm/s ~ 0.12 in/s) while making the press fit. High speed reduces load capacity of the fit.

Calculated temperatures must be considered as minimum, because they do not consider temperature averaging during the pressing process, nor the hub cooling time after pulling it from the furnace, for example.

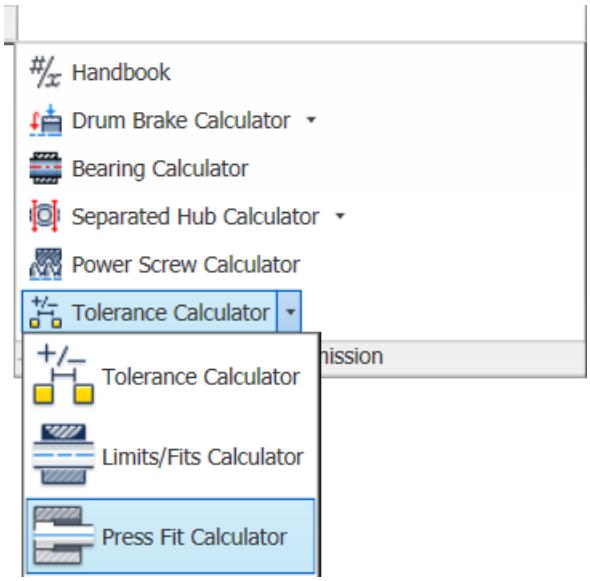
To access the Press Fit Calculator, In the Assembly environment, Click on the Design Tab:



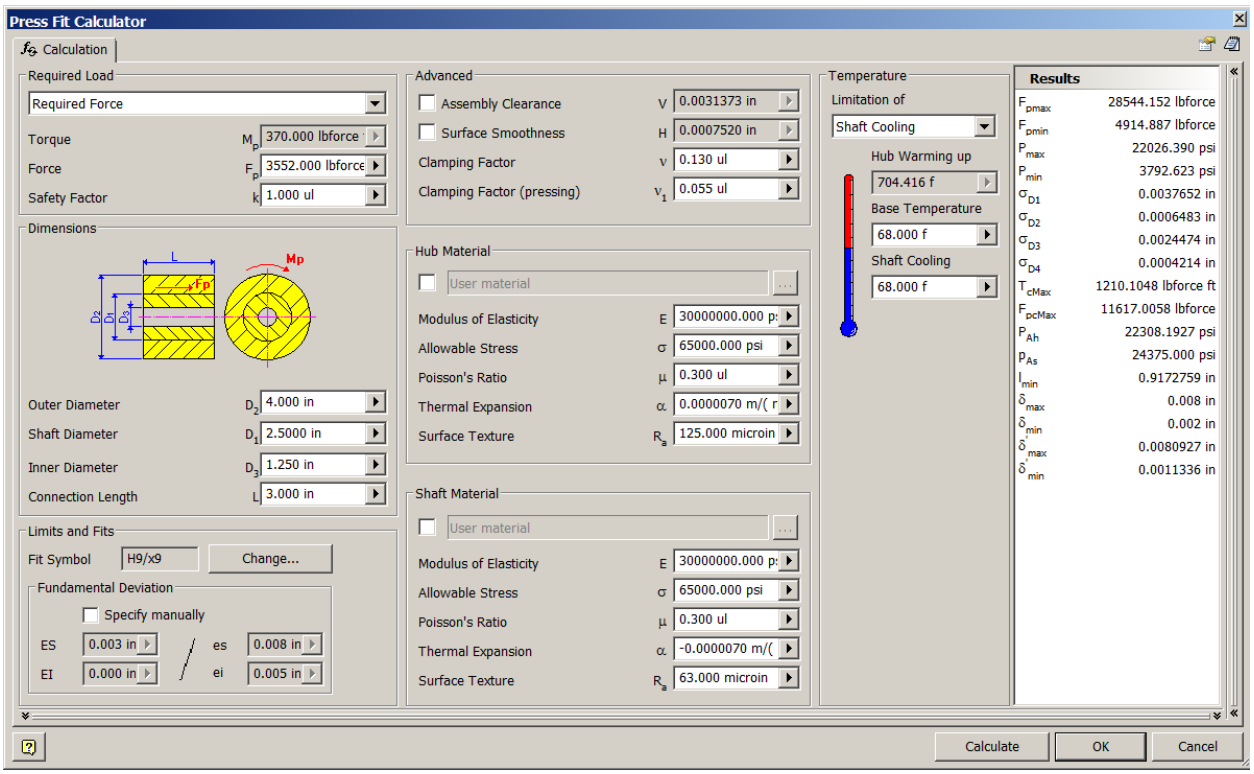

On the Power Transmission Panel, Click the Black Down Arrow:




Click the Black Down Arrow Next to Tolerance Calculator, and Click Press Fit Calculator:

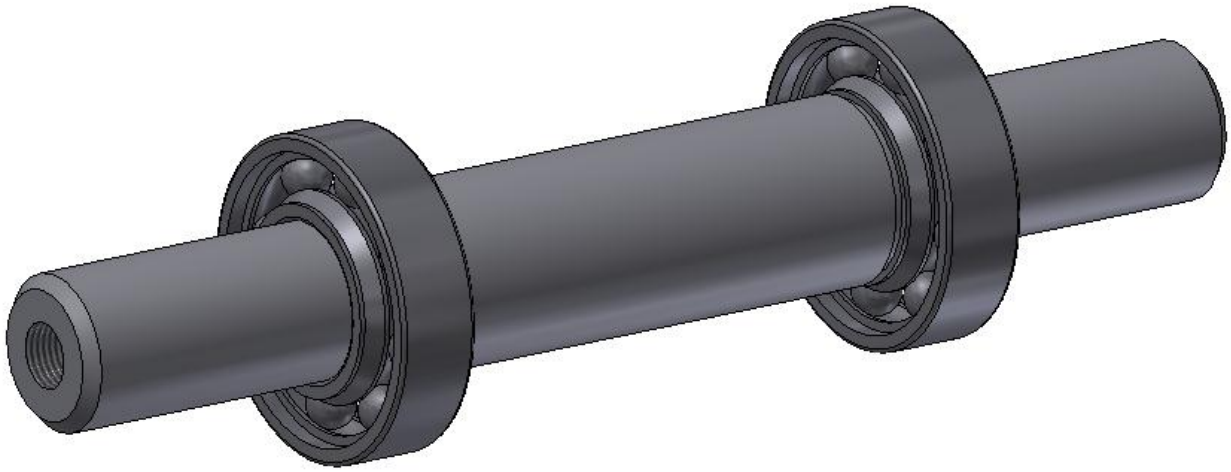



The Press Fit Dialogue Box now opens:



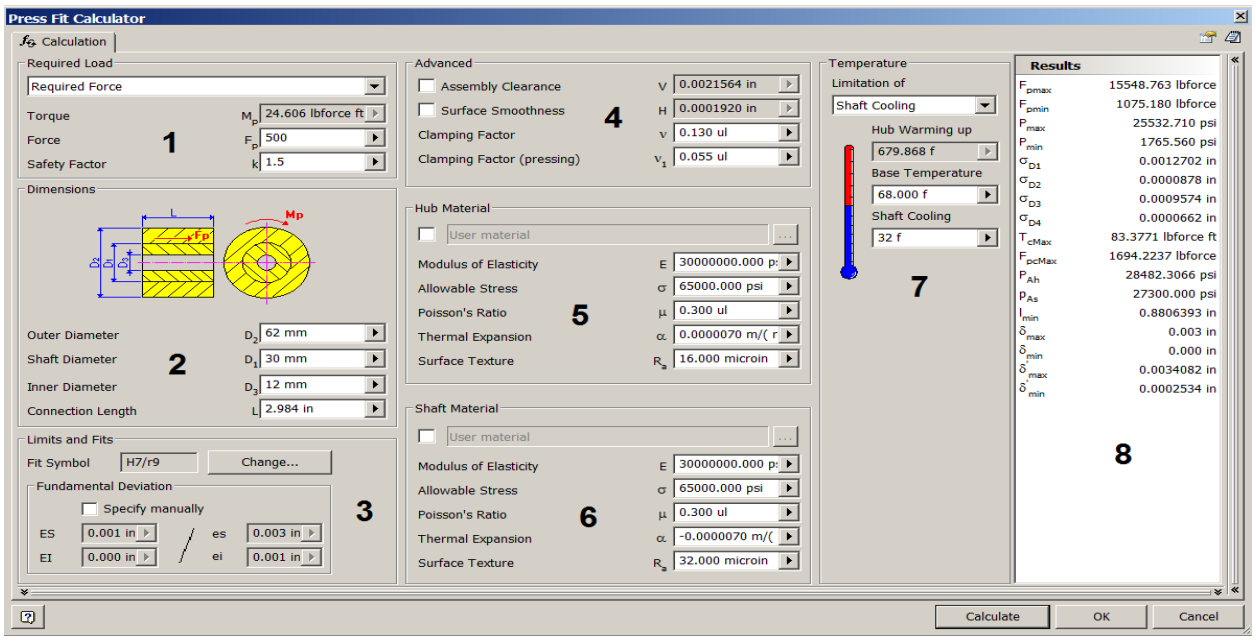

In the following example, we will use a 10” lg. steel shaft, 30mm Dia., with a 12mm bore running the entire length. 2 AFBMA 30X62x18 bearing will be press on from both journal ends.

We will calculate the Force required to press the bearing on to they hit the journal end:



For this example, we will heat up the bearings, and cool the shaft down to achieve our press fit.

An interference H7/r9 fit will be used.

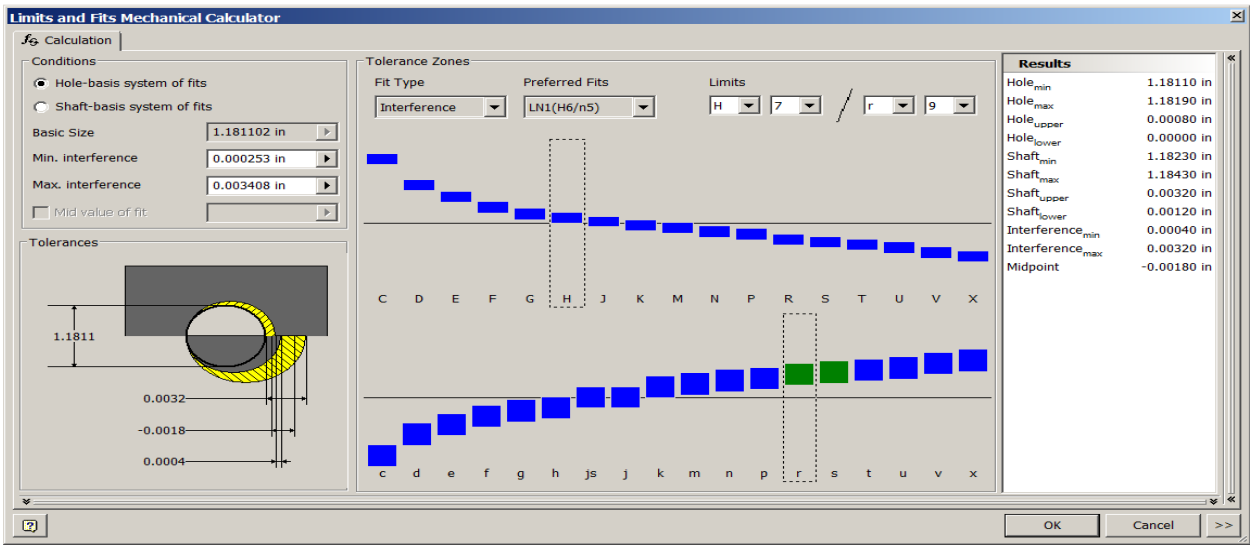



Section 1, Required Load: We are looking for the Required Force. Other option would be to Calculate for required torque. Basic Force to Start will be 500lbs.

Factor of Safety: 1.5

Section 2, Dimensions: We input our dimensions from our model!

Section 3, Limits/Fits: We can specify manually be checking the box and inputting data, Or We can click on change, and use the Limit/Fits Calculator:




Click OK after choosing the desired Fits(Note, second value(r9) must be green)

Section 4, Advance: We can manually specify Assembly Clearance, Surface Smoothness,

And clamping factors if known.

Section 5, Hub Material: We can accept the material from our model, or, click on the  icon

For additional Materials, or by checking the box. Surface Texture

Can also be specified along with thermal expansion.

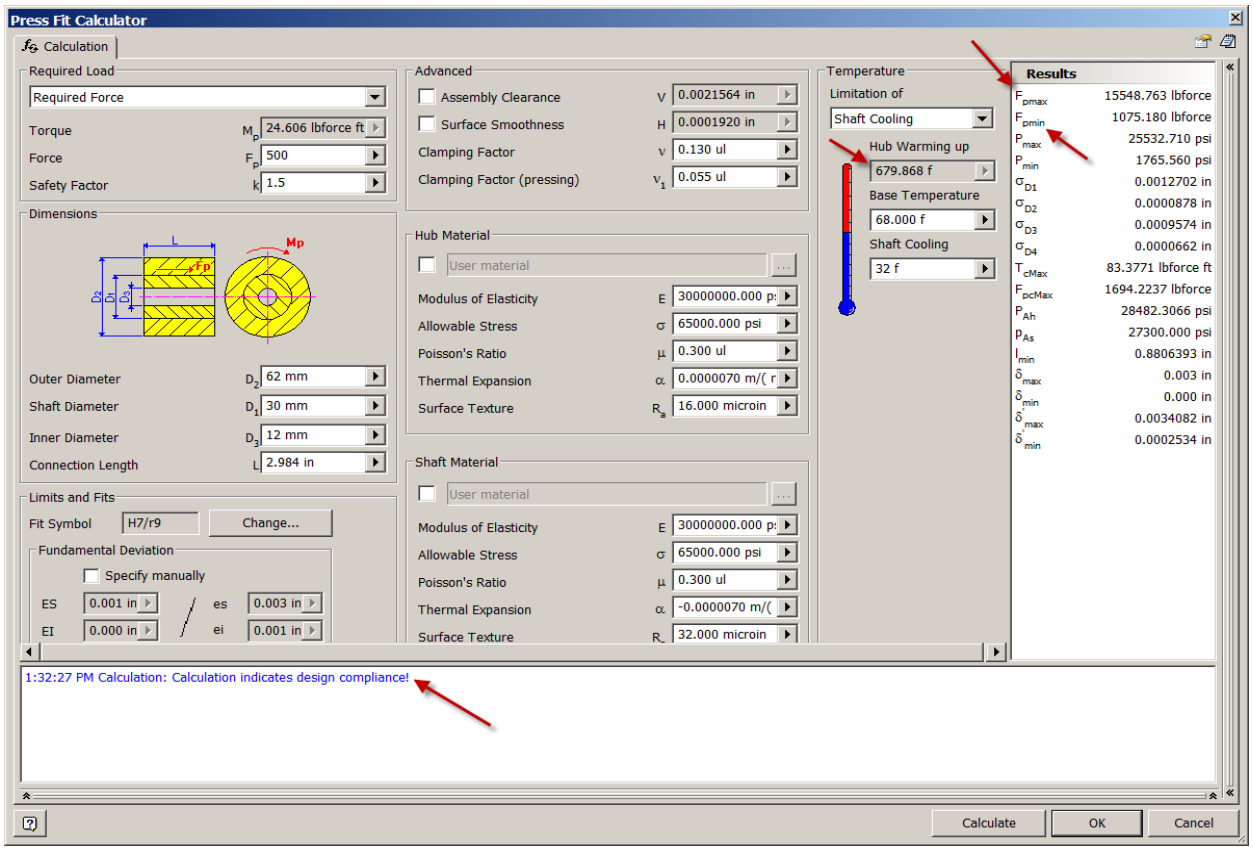
Section 6, Shaft Material: We can accept the material from our model, or, click the  icon

For additional Materials, or by checking the box. Surface Texture

Can also be specified along with thermal expansion.

Section 7, Temperature: We can specify either heating of the shaft, or heating of the hub.

Once all design criteria has been added, Click Calculate!




We see our design is within compliance, also, we can read what our max/min force needed to drive the bearing up to the journal seat! Also, what temp our bearing should be heated too.