



Autodesk Inventor 2013 Functional Design: Design Accelerators - Key Connections

Robert Reid

Functional Design Definition: Functional design is a knowledge content tool that represents the trend to move from geometrical descriptions to capturing knowledge.

Designers use functional design to analyze the function of their products and the design problems they are trying to solve, rather than spending time on the modeling operations necessary to create 3D representations.

Functional design is not only a set of functions. It supports design by function and adds mechanical content and intelligence. Using functional design, you can create mechanically correct components automatically by entering simple or complex mechanical attributes.

Design Accelerator Definition: The Design Accelerator represents an important component of Functional Design. It provides engineering calculation and decision support to identify standard components or create standards-based geometry. The Design Accelerator commands simplify the design process. They automate the selections and geometry creation, improve initial design quality by validating against design requirements, and increase standardization by selecting the same components for the same tasks.

Design Accelerator provides a set of generators and calculators that can create mechanically correct components automatically by entering simple or detailed mechanical attributes. For example, use the bolted connection generator to insert a bolted connection at once by offering to select the right parts, select holes, and assemble components together.

To insert components using Design Accelerator generators and calculators, work within the assembly or weldment environment simply go to the ribbon and click the Design tab. The available generators and calculators commands are displayed. Generators and calculators are grouped according to functional areas, for example, all welds are grouped.

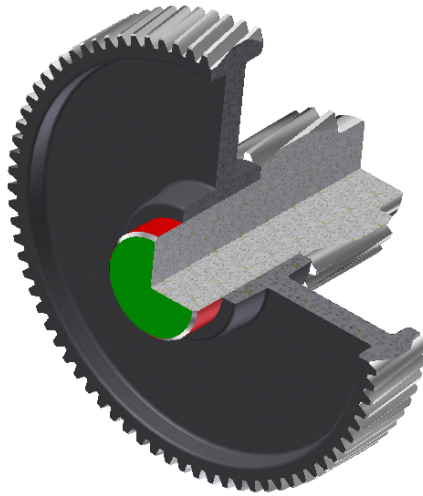
Parallel Key Connection Concept: Designs key joints and performs strength checks. After you enter the shaft diameter, the corresponding key is selected as well as the shortest length that can carry the required load. You can calculate up to four keys.

Design Accelerators - Key Connections

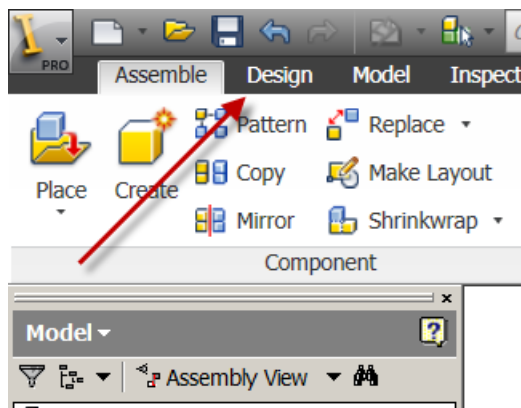
In the Parallel Key Connection Generator:

- Enter information in Design tab to design a key without calculation.
- Select the calculation method or type of strength calculation in the Calculation tab.

In the following example, we will insert a key to connect the gear to the shaft. We will design the key to be strong enough to transmit 7.5 kW of Power at 260 RPM:

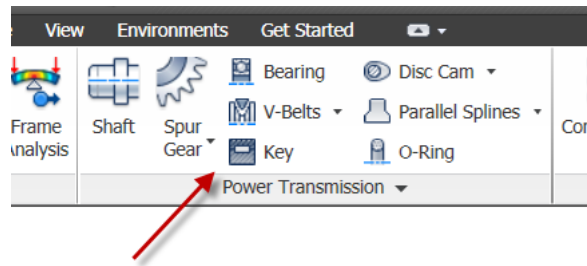


- 1) Gear/Shaft is assembled in a "Saved" Assembly File.
- 2) Click on the Design Tab to access the Design Accelerator:

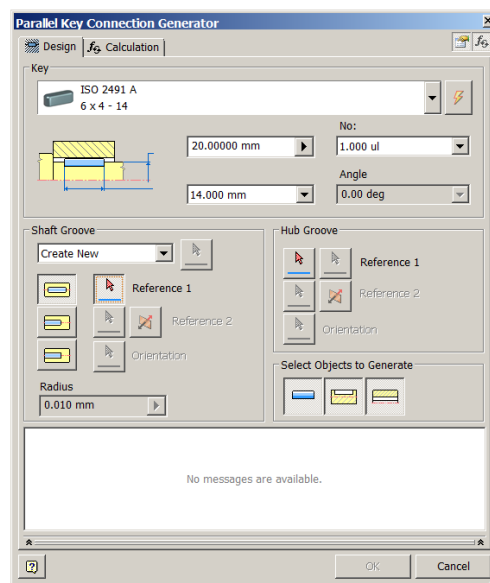


Design Accelerators - Key Connections

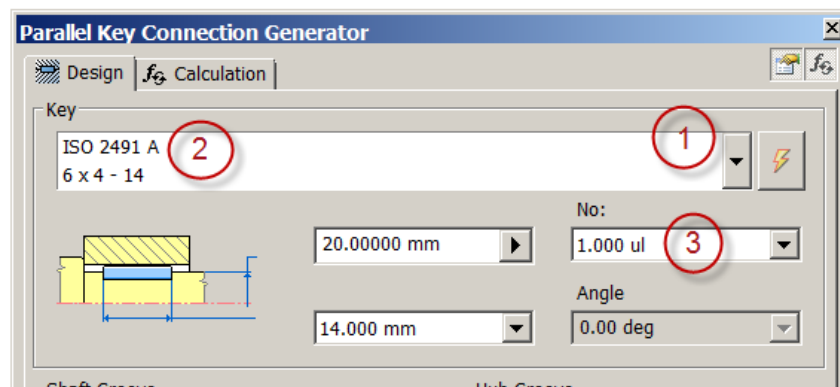
3) Click on Key, on the Power Transmission Panel:



4) This will open the Parallel Key Connection Generator:



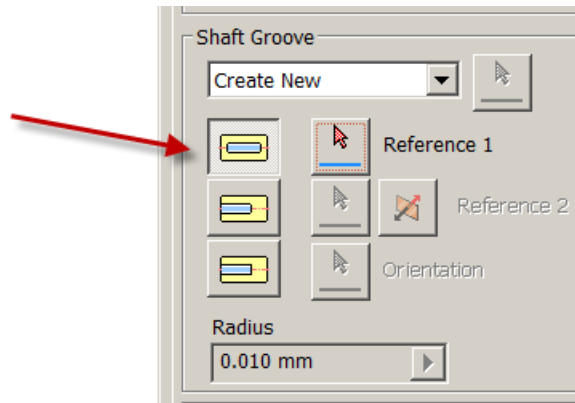
5) 1-Under Key, Select what type of Key to use, for this example, we will choose the 2-ISO 2491 A. 3-No: of keys will be 1:



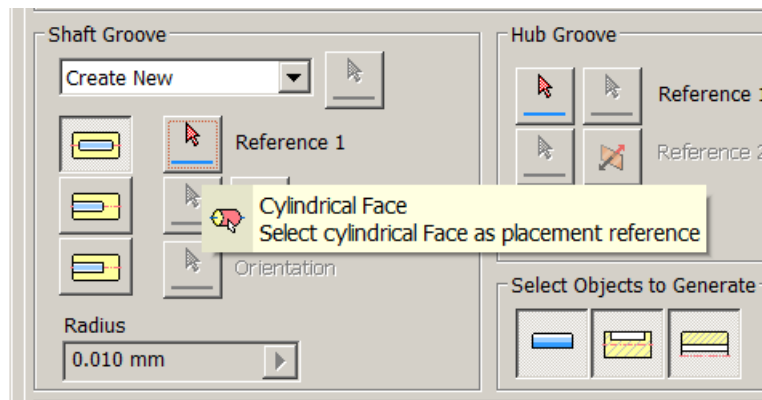


Design Accelerators - Key Connections

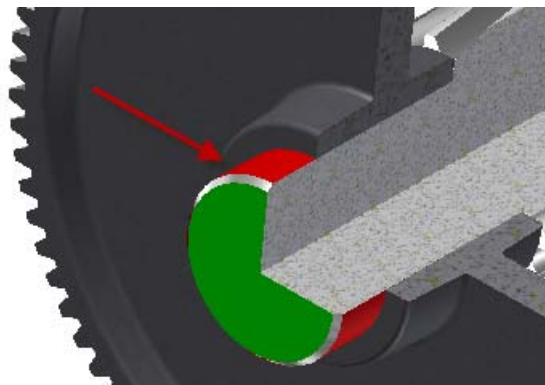
- 6) For Shaft Groove, we will choose: Groove with Rounded Ends:
(Other choices would be: Groove with 1 Rounded End or Plain Groove)



- 7) For Reference 1, we need to select a cylindrical face:

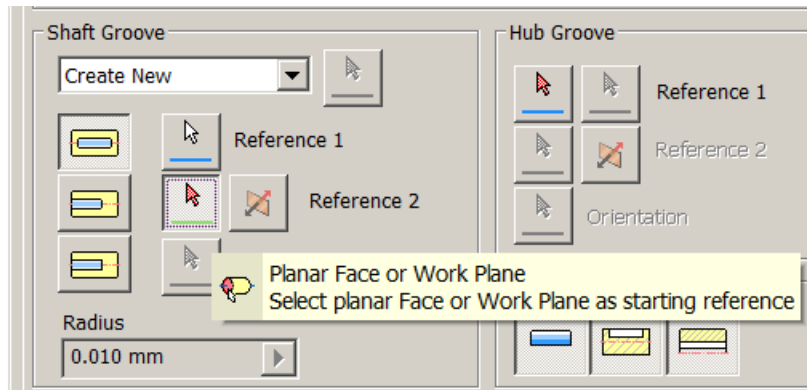


In this example, we will select the Red Circular Face of the Shaft:

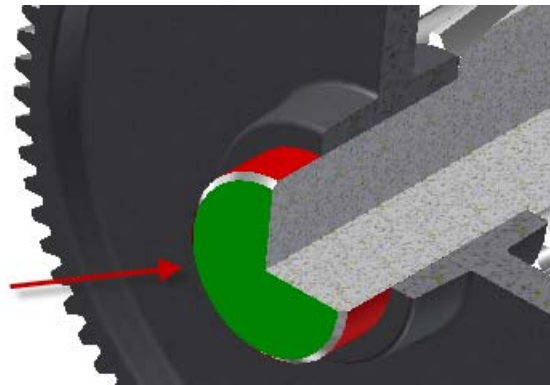


Design Accelerators - Key Connections

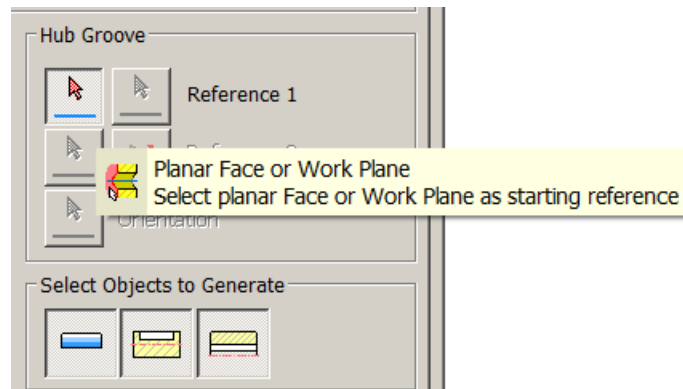
8) For Reference 2, we need to select a Planar Face or Work Plane



In this example, we will select the Green Face of the Shaft:



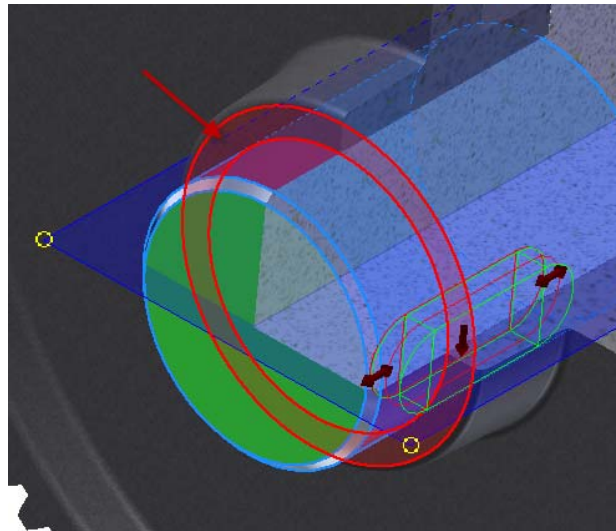
9) For the Hub Groove, Reference 1, we need to Select a Planar Face or Work Plane:



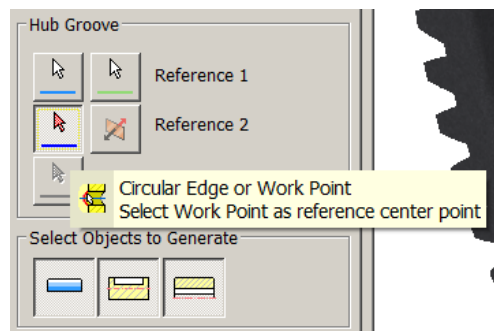


Design Accelerators - Key Connections

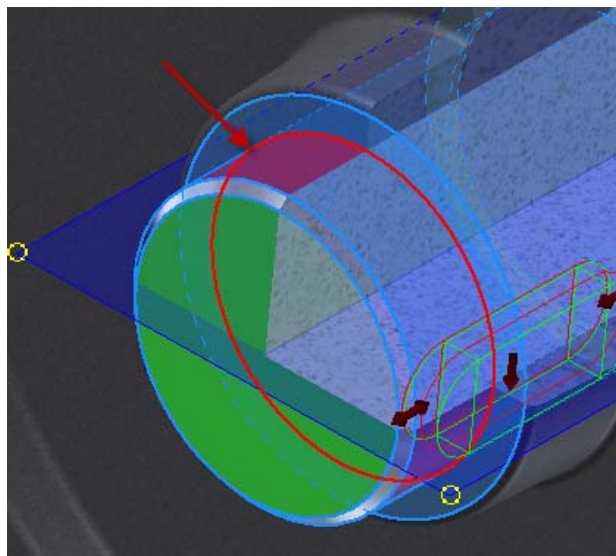
In this example, we will select the Face of the Gear Hub:



10) For Reference 2, we need to select a Circular Edge or Work Point:



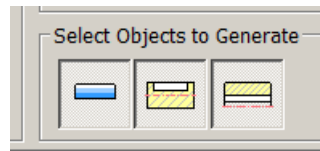
In this example, we will select the circular edge of the hub to start the key groove:



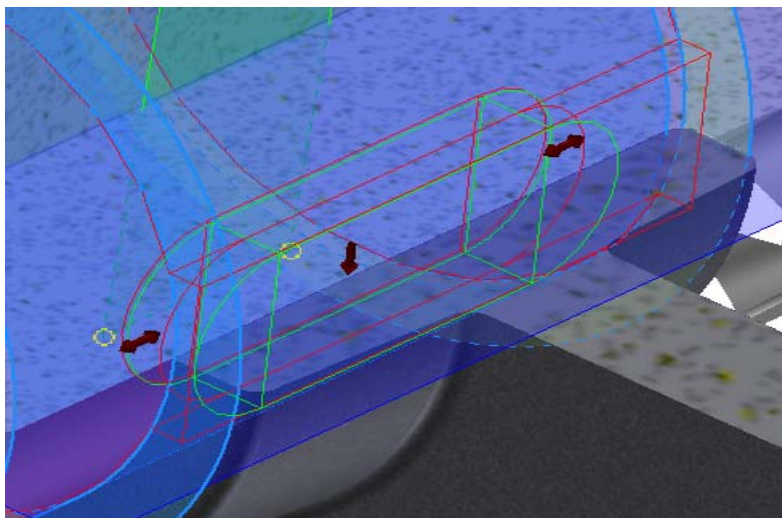


Design Accelerators - Key Connections

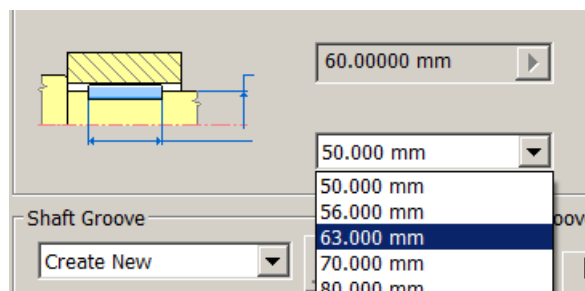
- 11) For Objects to Generate, we will select all 3: Inserts Key, Inserts Shaft Groove, and Inserts Hub Groove:



In the following image, note the Red Arrow Grips! The ones on the end with the 2 arrows can be used to drag the length of the key to make it longer or shorter. The Red Arrow in the middle can be used to drag the key around the shaft to any angle.



- 12) Change key length from 50mm to 63 mm:

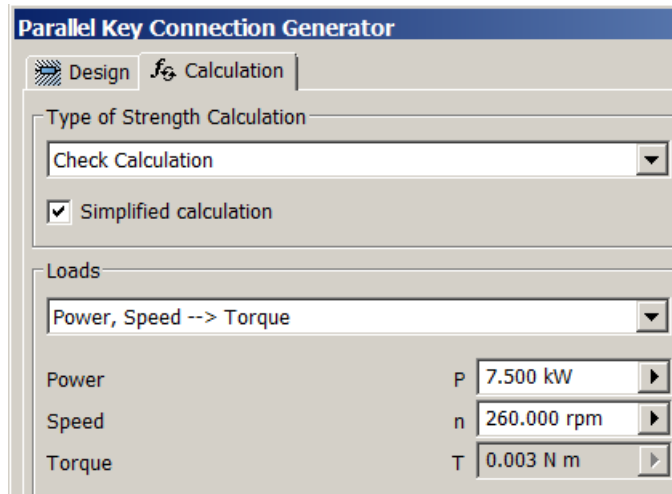


- 13) Click on the Calculation Tab

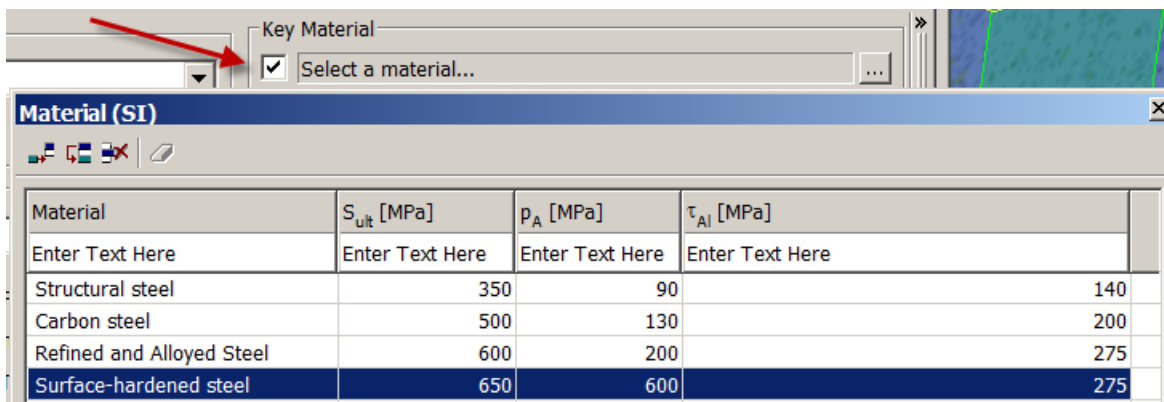


Design Accelerators - Key Connections

14) Change Power to 7.5kW, and Speed to 260 RPM:



15) Key Material will be Surface Hardened Steel:



16) Click Calculate! We are within Design Compliance meaning the strength of the Key Connection meets our design parameter criteria!



Design Accelerators - Key Connections

- 17) Click the Design Tab, Click OK, Click Ok to File Naming, Our Keyed Connection is added into our Assembly along with the Key, Shaft Groove, Hub Groove!

