Autodesk Inventor Tips & Tricks:
Digital Prototypes in Inventor — Shaft Generator

Shaft Design Made Easier

In the Autodesk® Inventor® modeling environment it is possible to automate the creation and placement of shafts. Many shaft features can be created and edited using standard parameters right in the context of an assembly using a tool called the Shaft Generator. Using this tool, it is extremely efficient to create and place complex shafts in assemblies.

Many machines use power to accomplish their designed functions. One major component of power generation within a machine is the shaft. A particular machine may have a single shaft or many.

Shafts come in many shapes and sizes. They may consist of a single diameter, or have many different sections with differing diameters and lengths. Shafts may operate in conjunction with bearings, gears, sprockets, keys, and retaining rings to satisfy power transmission requirements.

The Setup

Imagine that you are responsible for completing the design of a gearbox for a particular project. The gearbox has been started. The design currently contains a portion of the gearbox, bearings, seals, and one shaft. The gearbox requires a second shaft. The shaft needs to interface with two bearings, and needs to have a keyway at one end to interface with a future pulley. In addition, features need to be added to the shaft to accommodate a spur gear.

Making use of the Shaft Generator in Inventor, it is relatively simple to create a shaft in place with the necessary features. Let's look at the steps necessary to create your shaft.

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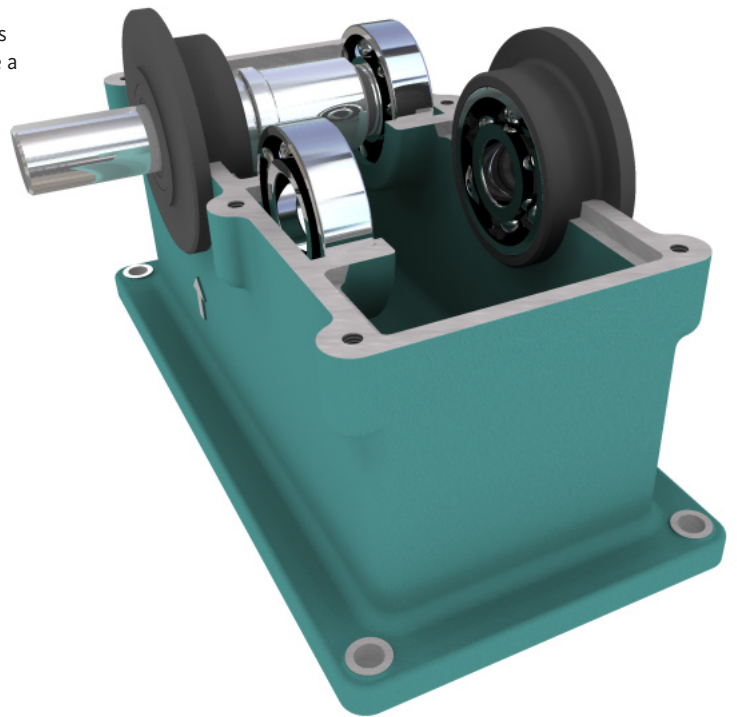
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1. With your partially designed gearbox assembly file open, start by initiating the Shaft Generator. The Shaft Generator dialog opens and displays several shaft creation features and options.

> *Tip:*
> The Shaft Generator is started by clicking at the top of the Panel Bar, selecting Design Accelerator, and selecting the Shaft Generator icon from the panel bar.

> *Tip:*
> The Shaft Generator tool starts with the features from the last shaft displayed.
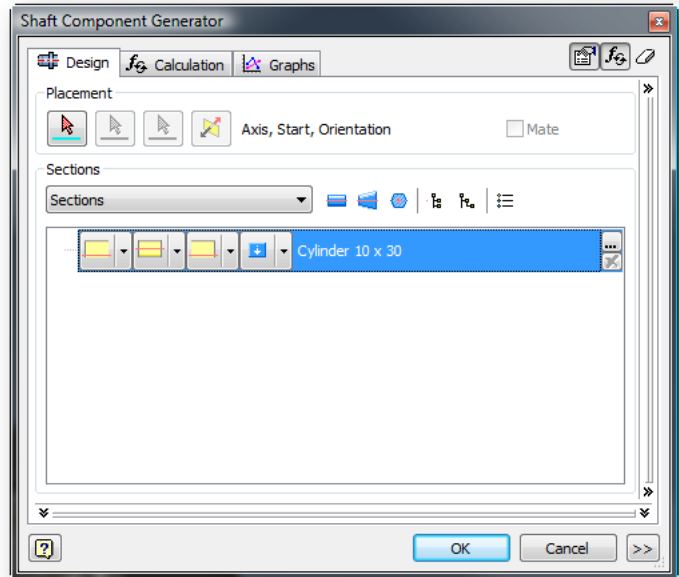

Figure 1, Shaft Generator Tool.

2. In this case, you know the location of your shaft. The next step is to specify this with the selection tools in the dialog. Begin by selecting the axis, start plane and orientation plane that define the shaft location.
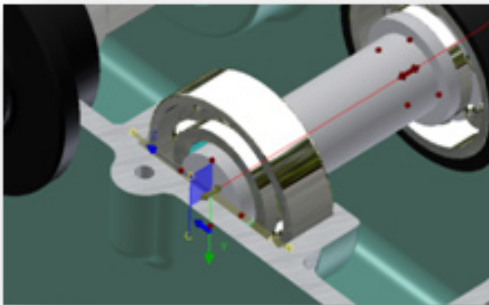

Figure 2, Shaft Location Definition.

3. Once the shaft is located, you can define each section of the shaft. This can be done by entering the values for each section or by dragging the preview glyphs in the graphics area. In this particular case the shaft consists of the sections shown.
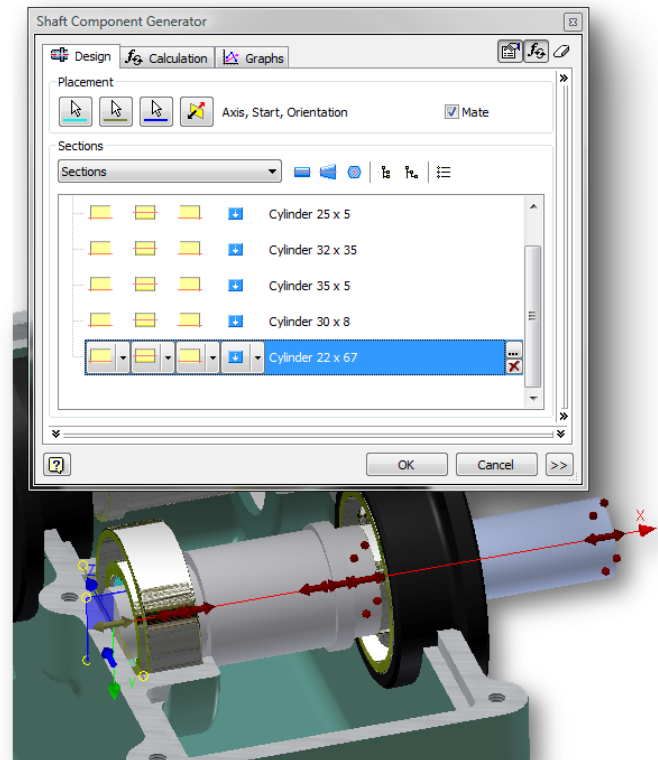

Figure 3, Shaft Section Definition.

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4. After creating the shaft sections, it is necessary to add the edge features to each section. Fillets, Chamfers and Undercuts can be added to each section of the shaft. This shaft requires the edge features shown.

> **Tip:**
> Depending on the relation between adjacent shaft sections, the Shaft Generator determines the correct Edge Feature orientation.
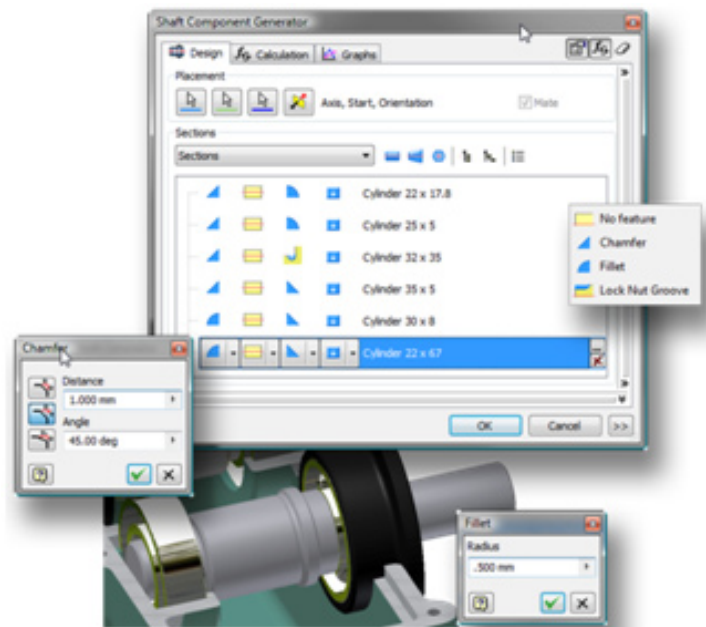

Figure 4, Section Edge Feature Definition.

5. Shafts quite often require other features such as retaining ring grooves, wrench flats, keyways, through holes and reliefs. These features can also be added with the Shaft Generator toolset. This particular shaft requires a retaining ring groove on the inboard end of the shaft.

> **Tip:**
> Multiple features can be added to each shaft section. For example, a single section could have a through hole and a retaining ring groove.
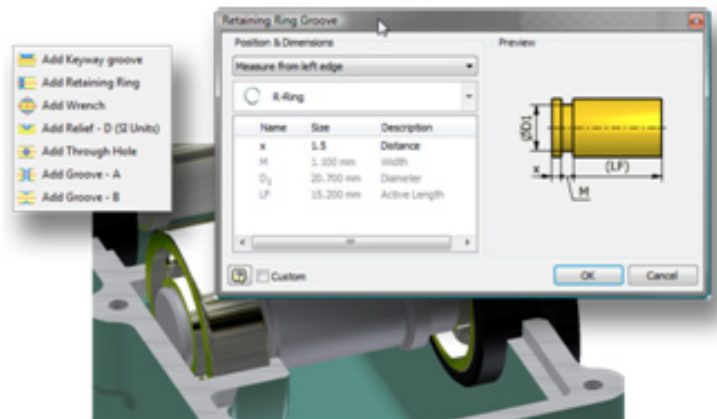

Figure 5, Retaining Ring Groove Definition.

6. To complete our shaft, the outboard end requires a keyway. This feature can be added just as the keyway was added to the inboard end. Standard keyways can be chosen, or a custom keyway can be created.

> **Tip:**
> Multiple keyways can be created as a single feature. Keyway rotation can be controlled.
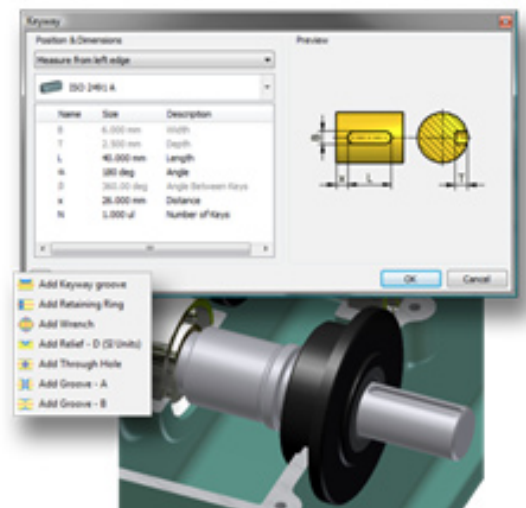

Figure 6, Keyway Definition.

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Conclusion

A shaft can be created, placed, and edited quickly and efficiently using the Shaft Generator. This workflow utilizes tools that provide functionality to create feature-rich shafts conforming to accepted design practices, without compromising your ability to create custom features in the context of your shaft.

Using the Shaft Generator permits you to spend less time modeling standard shaft features or looking them up in standards reference manuals, allowing you to dedicate your valuable time to designing other areas of your product.

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