Lesson 22 Coupling Assembly (Video Lesson)

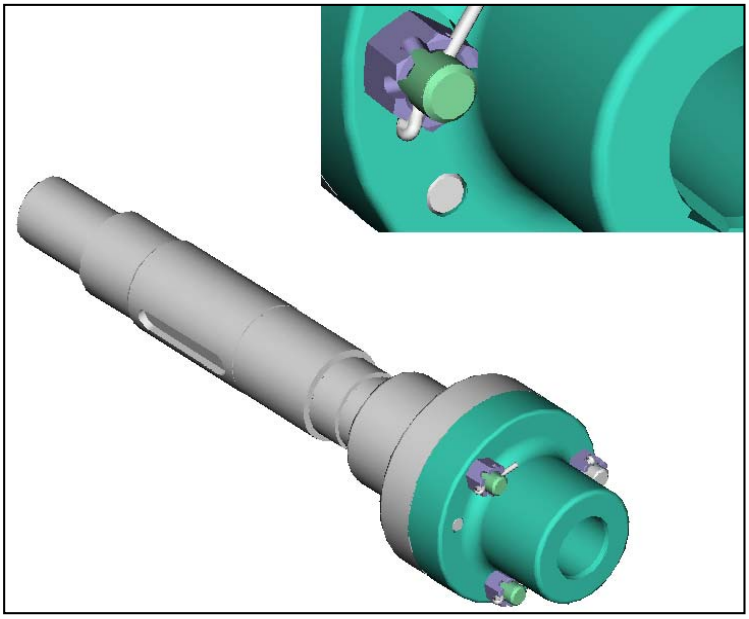


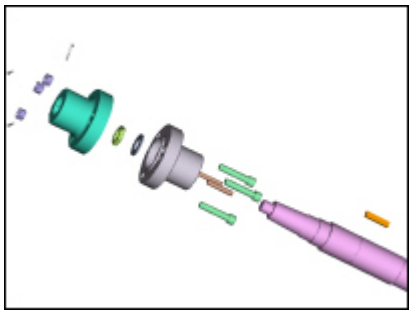
Figure 22.1 Coupling Assembly

OBJECTIVES

- Model the **Shaft**, **Taper Coupling**, and **Straight Coupling** components
- Use **Assembly** commands
- Apply **Analysis** to determine **Global Interference** and **Global Clearance**
- **Measure** features to analyze components fit
- Use **Edit Definition** features to resolve design problems
- Create an **Exploded View**
- Document the components in **Detail Drawings**
- Create an **Assembly Drawing** with **BOM** and **Balloons**

RESOURCES

- **Video Lecture** can be downloaded directly.
- **www.cengage.com > Search > Creo Parametric 3.0 > Free Materials**
- Parts download at **www.cad-resources.com** > click on the appropriate book cover > choose **commercial** or **academic**



Steps

Follow the Steps to complete the project:

- **Download** the Lesson Lecture onto your hard drive
- **Play** directly from your computer using *Windows Media Player* (**.wmv** file)
- **Model** the **Shaft**, **Taper Coupling**, and **Straight Coupling** components
- **Create** the assembly using the modeled parts
- **Create** an exploded view
- **Detail** the parts
- **Detail** the assembly
- **Follow** the procedures in the Lesson Lecture
- **Save** the completed assembly (and its components) as a single **Zipped** file
- **Upload** the **zipped** file to your Course Management System as an assignment if available.

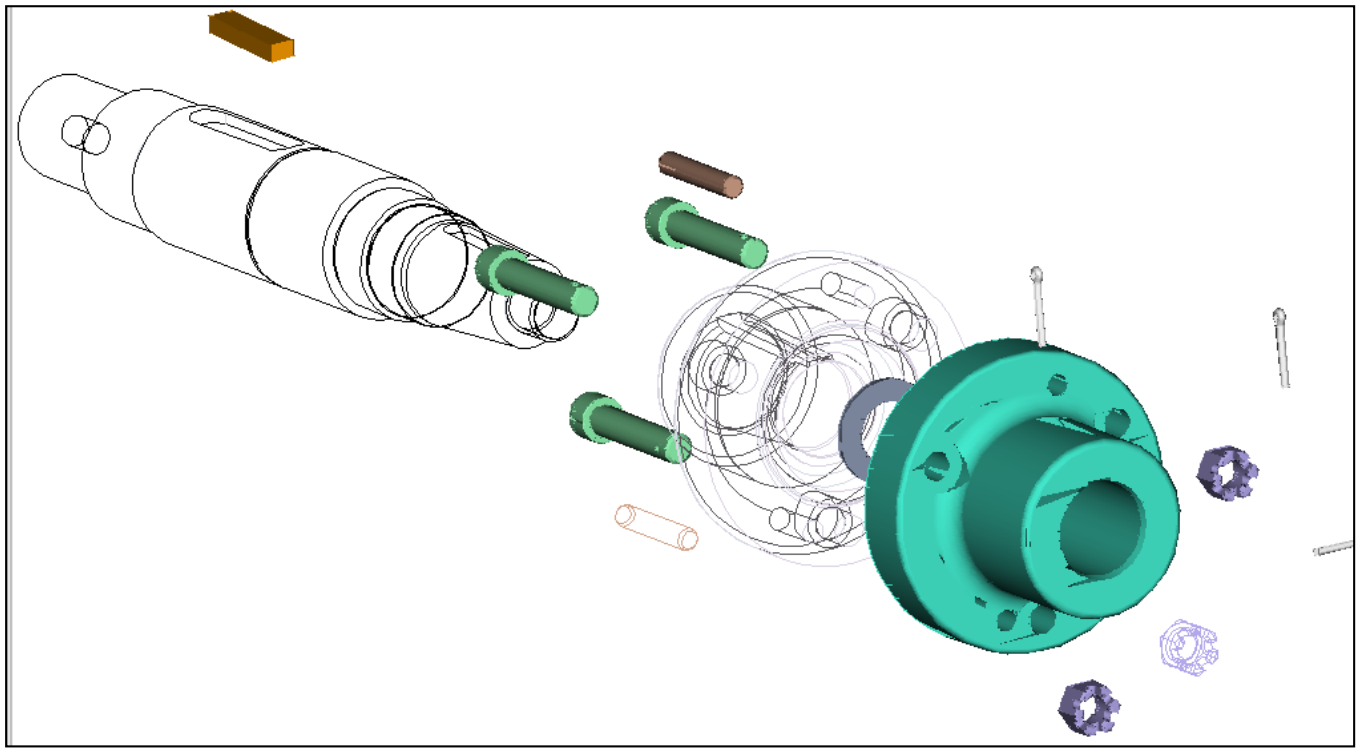


Figure 22.2 Exploded Coupling Assembly

Coupling Shaft

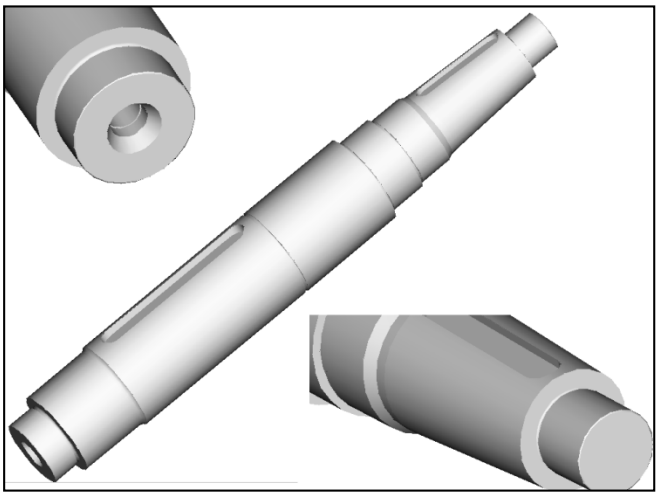


Figure 22.3 Coupling Shaft

Coupling Shaft

Remember to set up the model properties, set datum planes, and add layers to the parts.

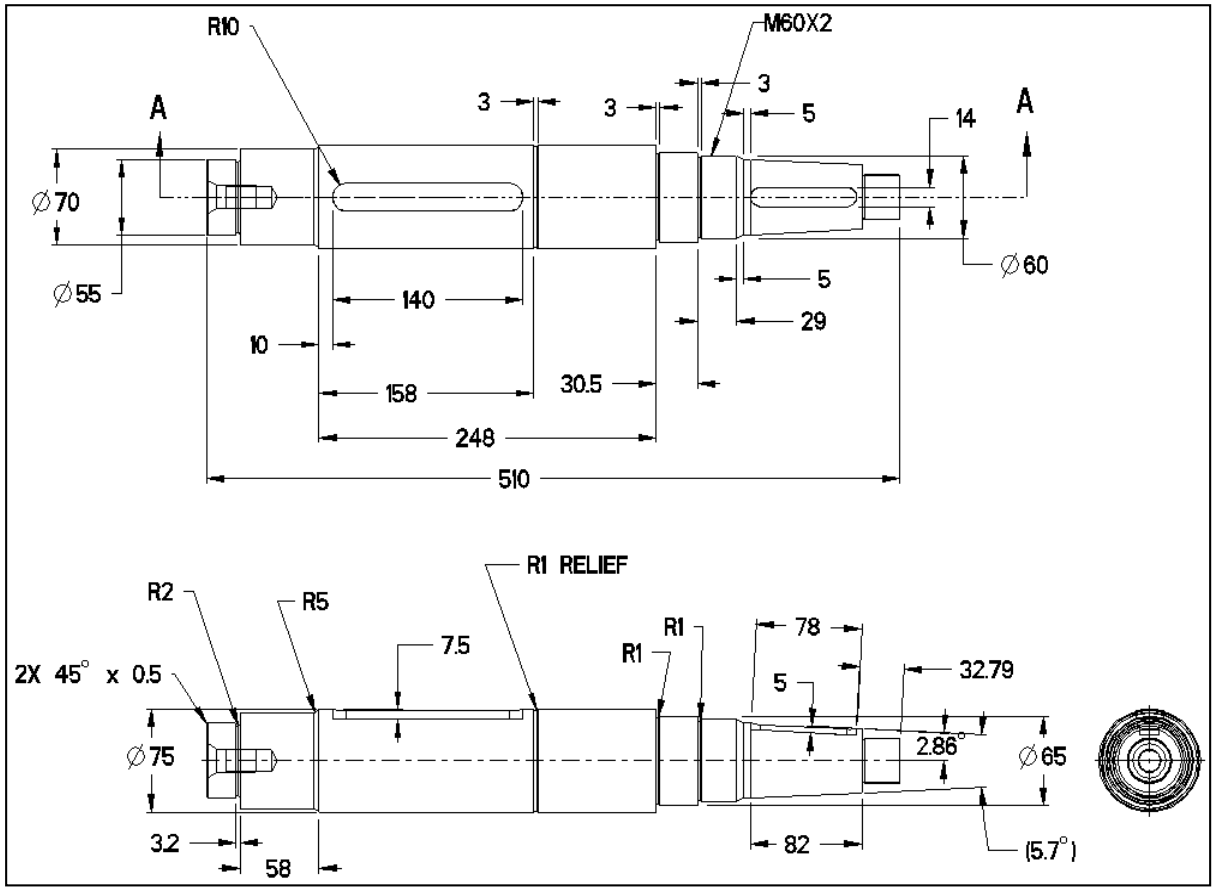


Figure 22.4 Coupling Shaft Drawing, Sheet One

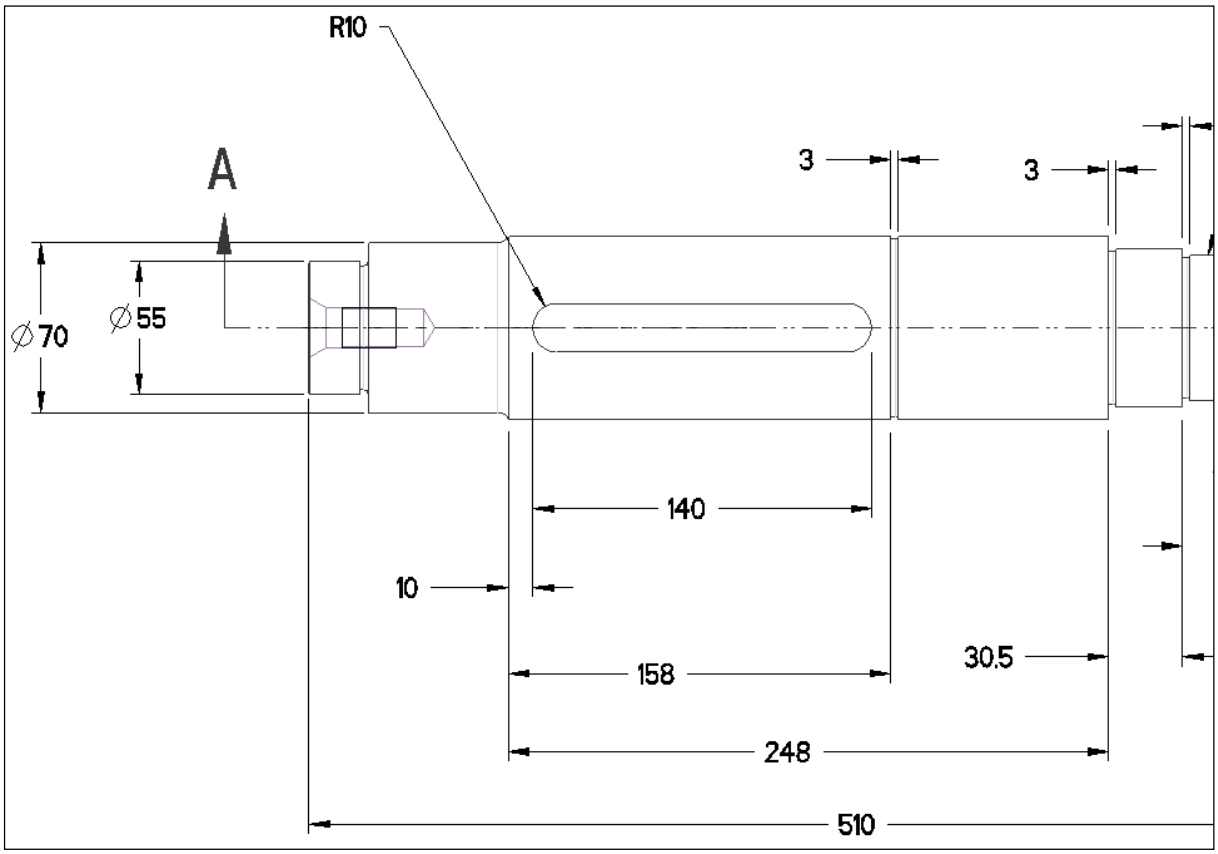


Figure 22.5 Coupling Shaft Drawing, Sheet One, Top View, Left Side

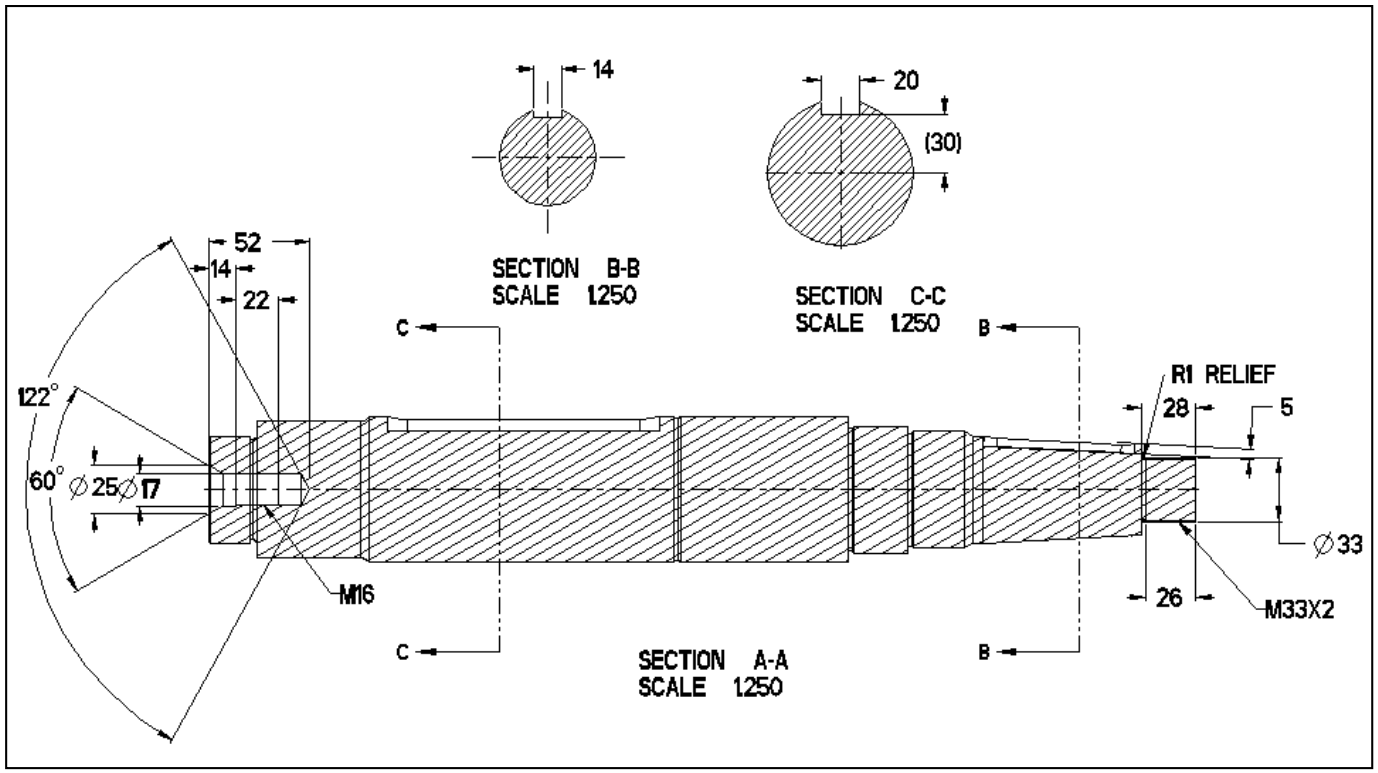


Figure 22.6 Coupling Shaft Drawing, Sheet Two

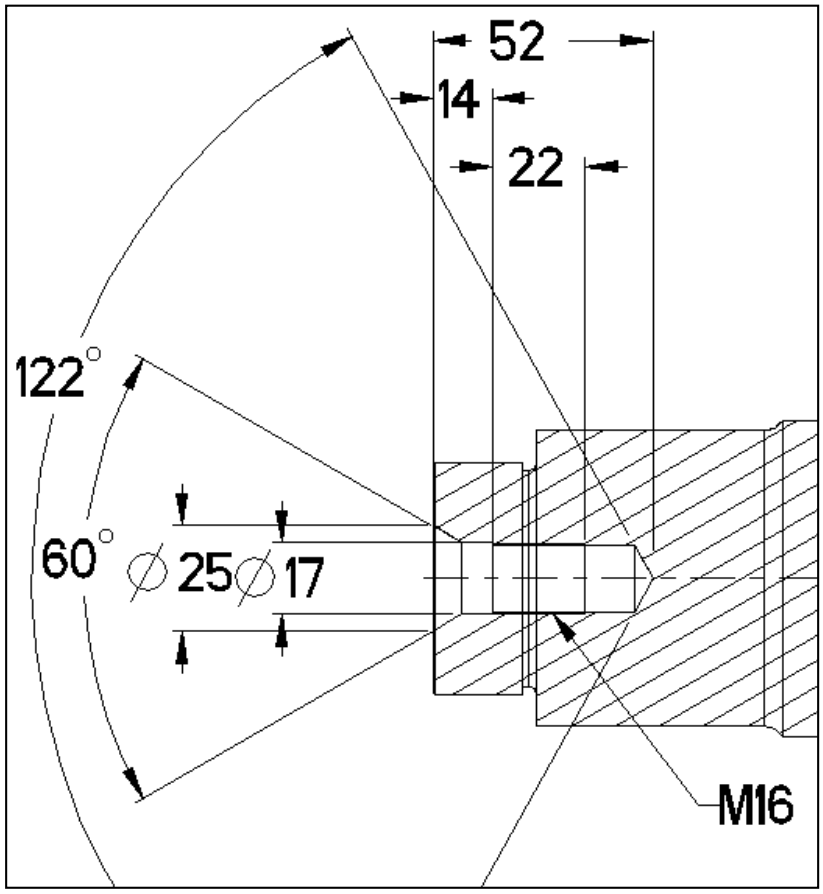


Figure 22.7 M16 X 2 Thread

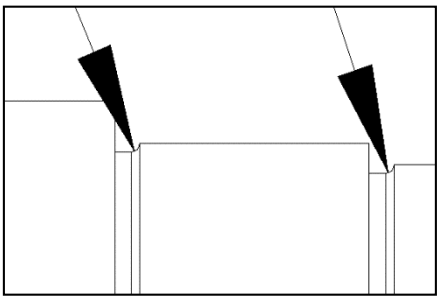


Figure 22.8 Reliefs

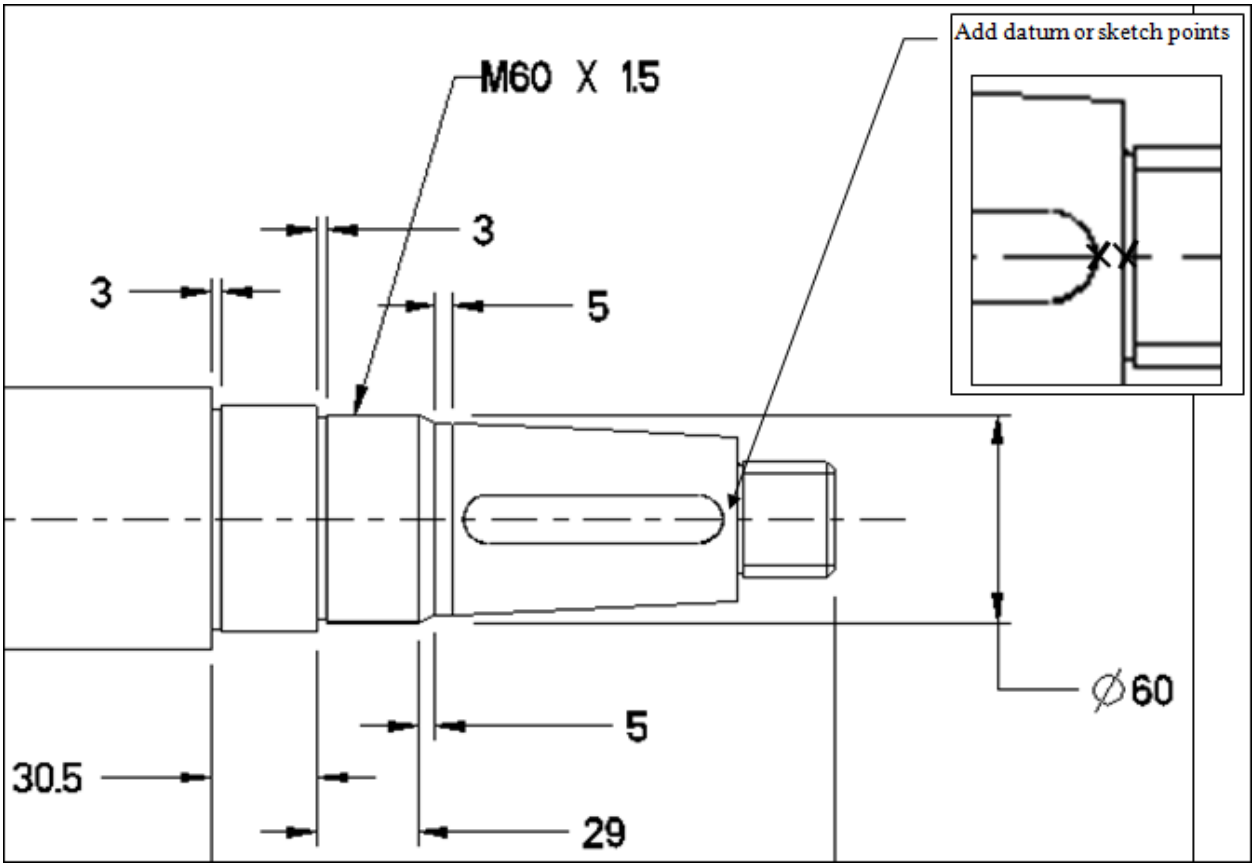


Figure 22.9 Coupling Shaft Drawing, Sheet One, Top View, Right Side

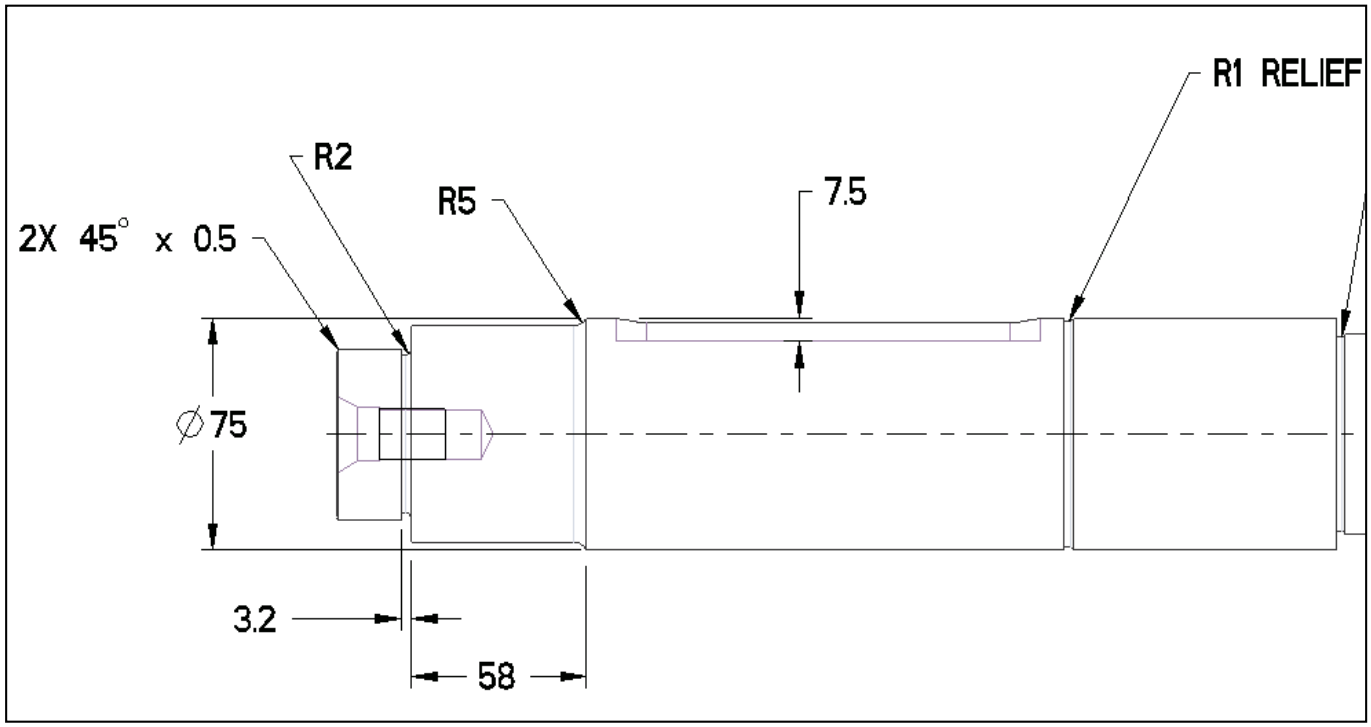


Figure 22.10 Coupling Shaft Drawing, Sheet One, Front View, Left Side

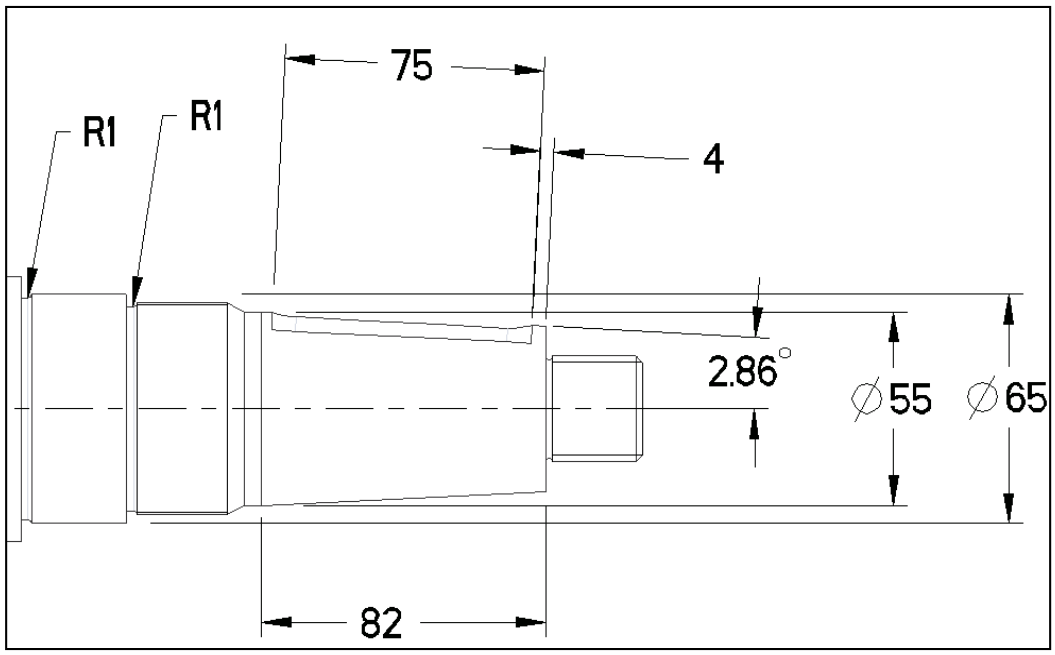


Figure 22.11 Taper

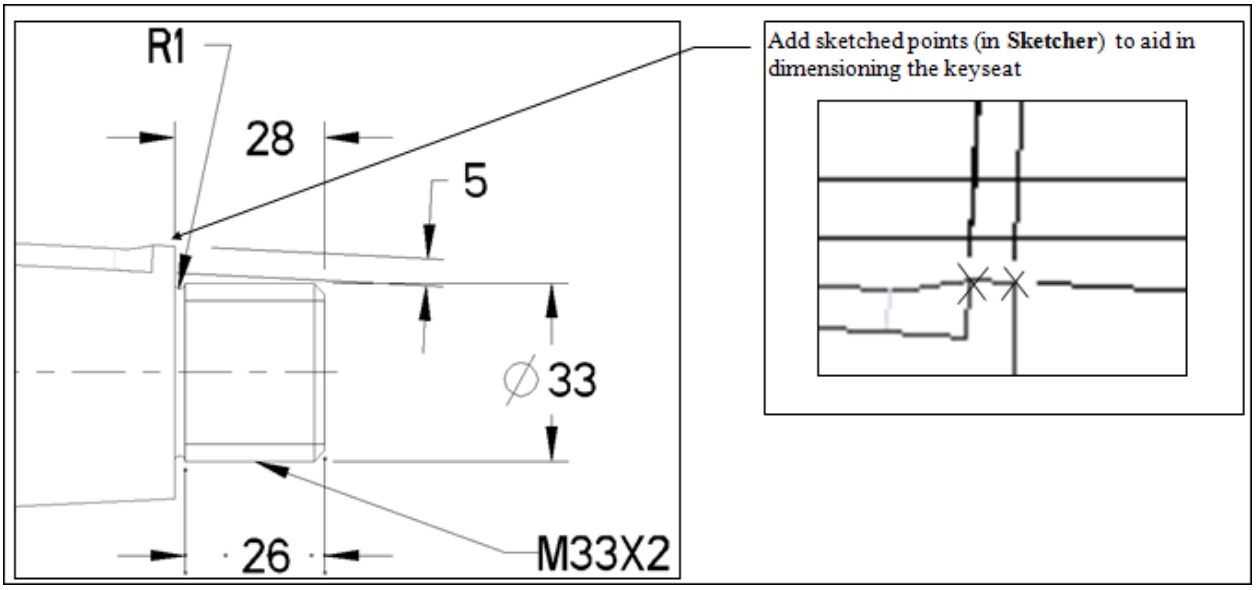


Figure 22.12 Coupling Shaft Drawing, Sheet One, M33 X 2 Threads

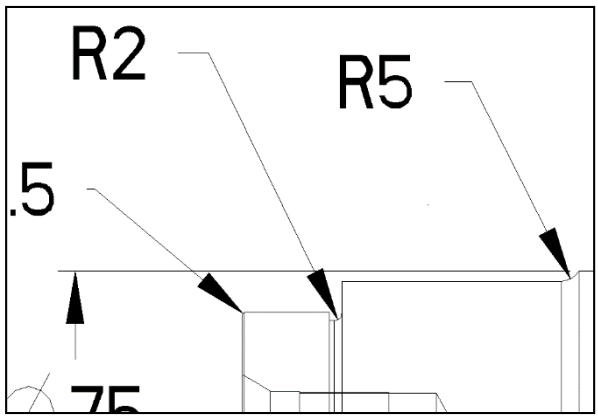


Figure 22.13 Coupling Shaft Drawing, Relief

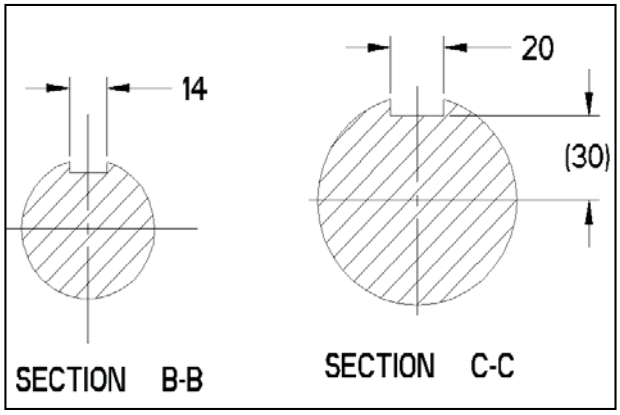


Figure 22.14 SECTION B-B and SECTION C-C

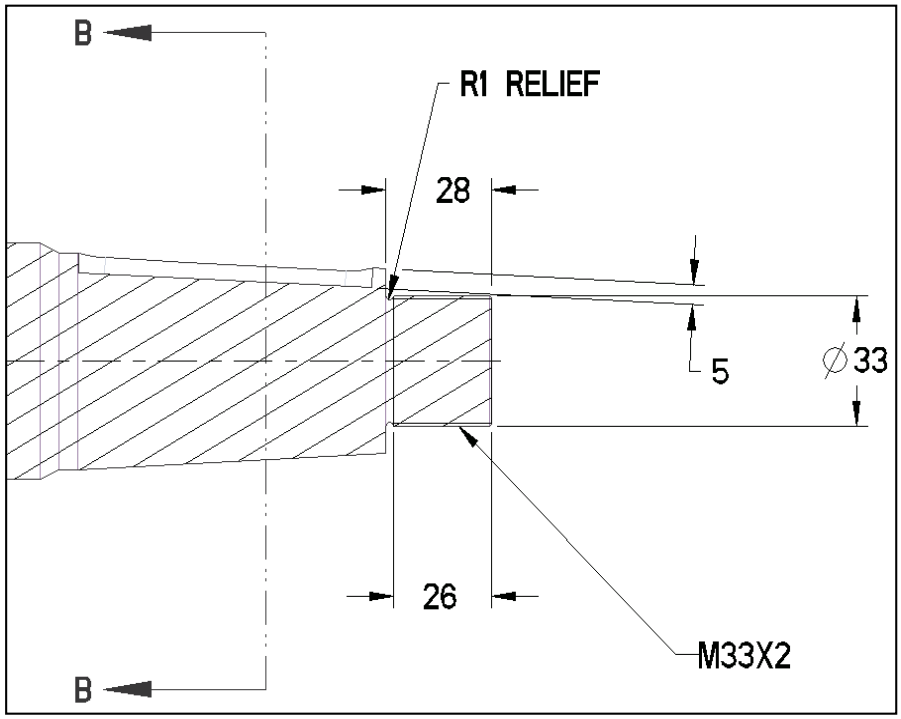


Figure 22.15 Coupling Shaft Drawing, Sheet Two, SECTION A-A Right Side

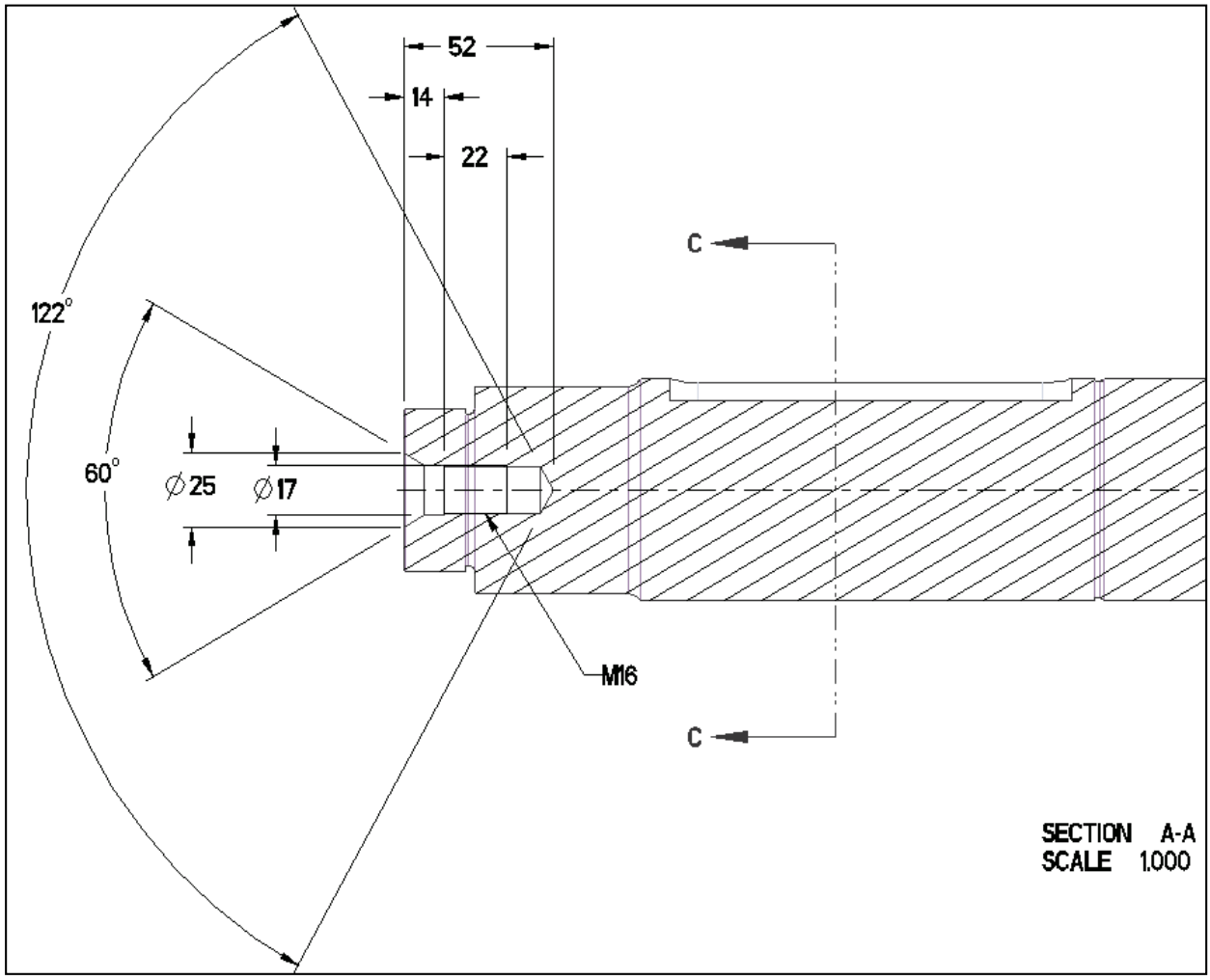


Figure 22.16 Coupling Shaft Drawing, Sheet Two, SECTION A-A Left Side

Taper Coupling

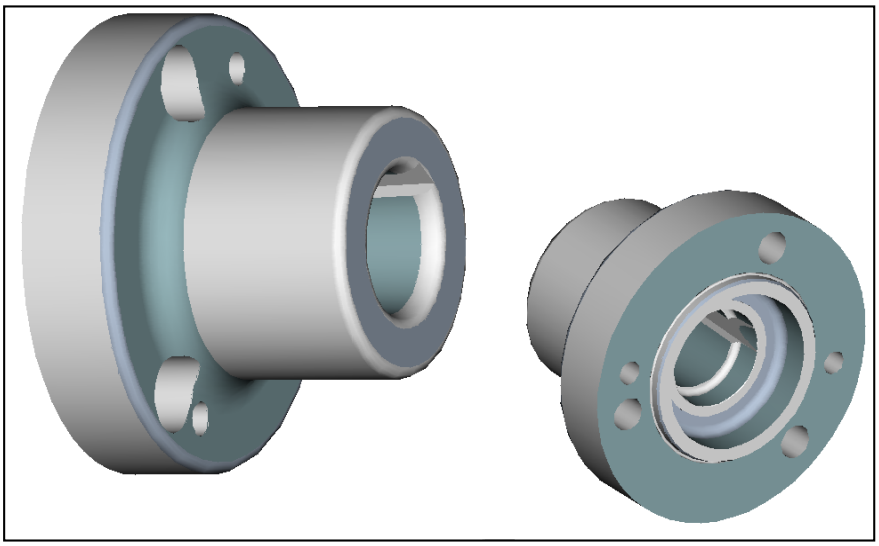


Figure 22.17 Taper Coupling

Taper Coupling

Plan the feature creation and the parent-child relationships for the part. The machined face of the coupling mates with and is fastened to a similar surface when assembled. Plan your geometric tolerancing requirements accordingly. Set the datums to anticipate the mating surfaces.

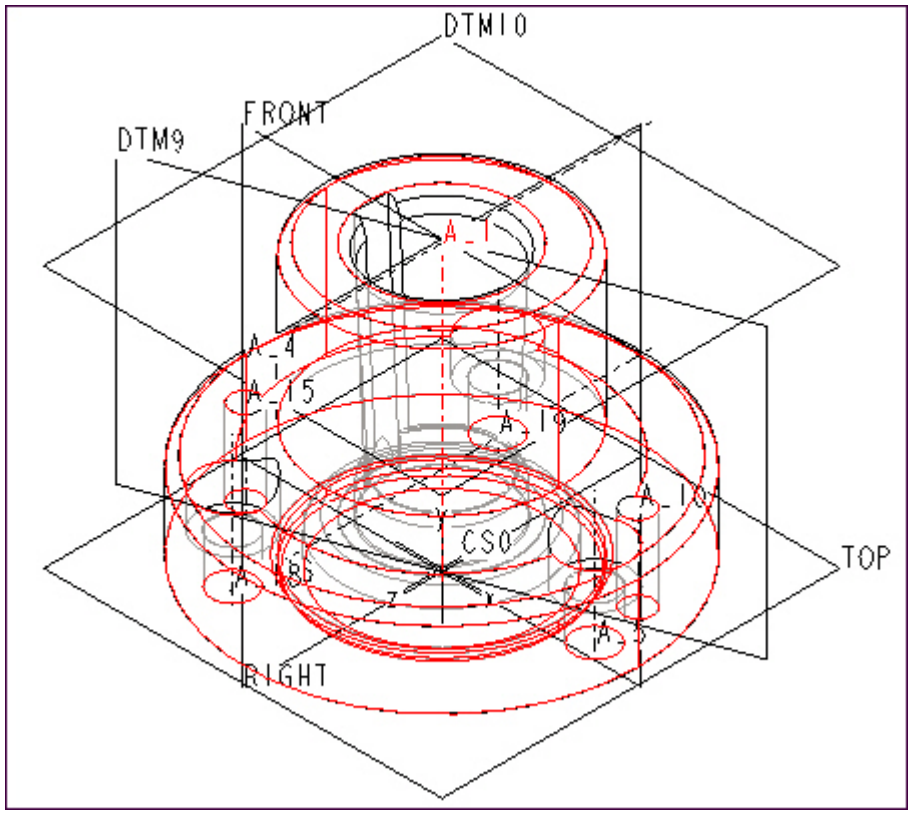


Figure 22.18 Taper Coupling Model with Datum Planes

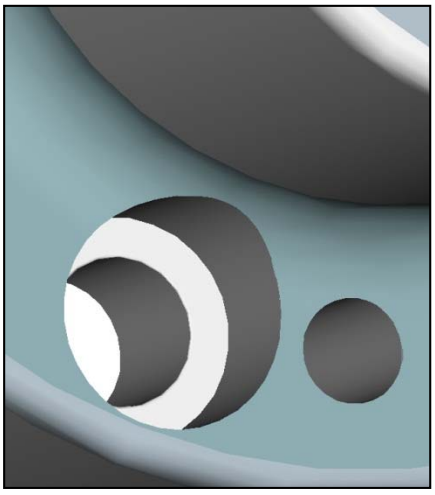


Figure 22.19 Counterbore

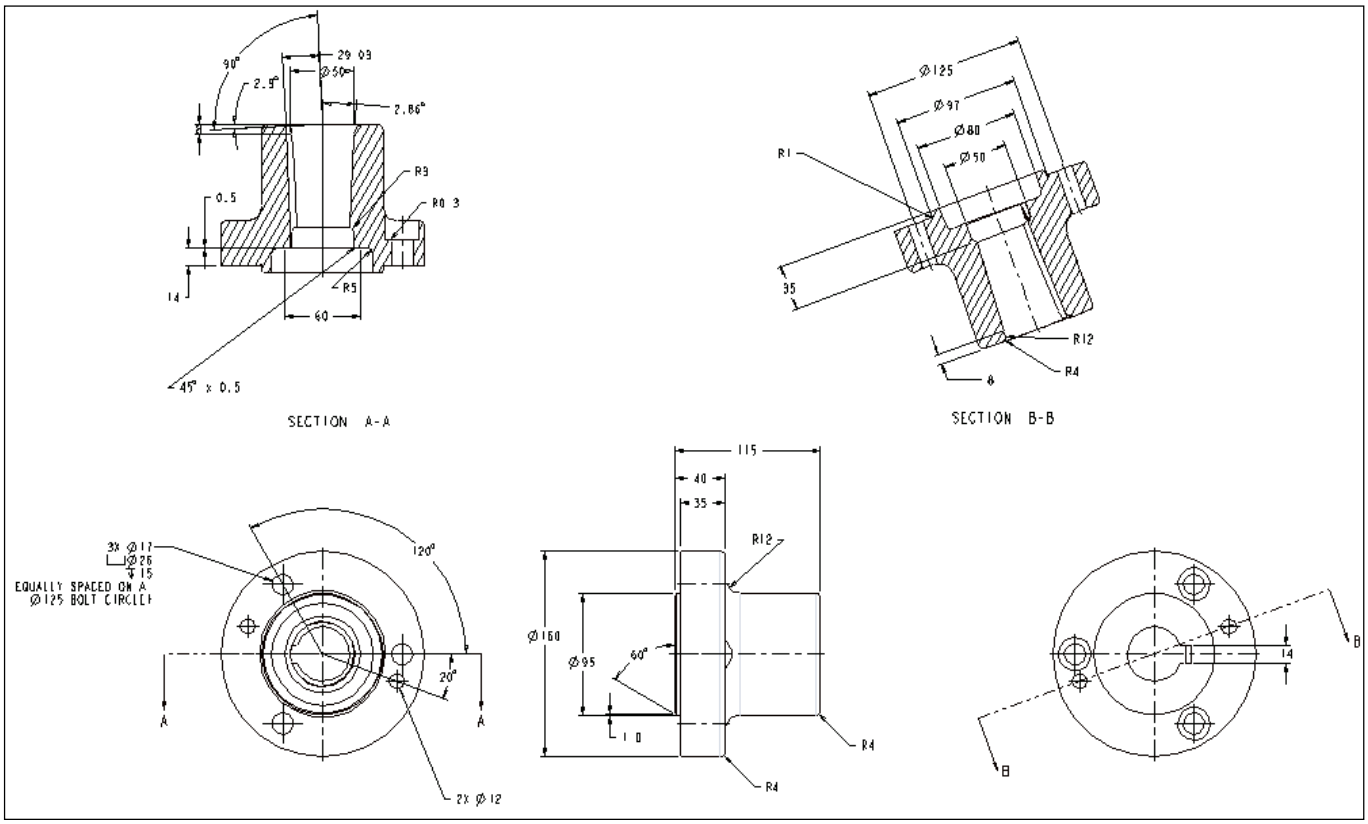


Figure 22.20 Taper Coupling Drawing

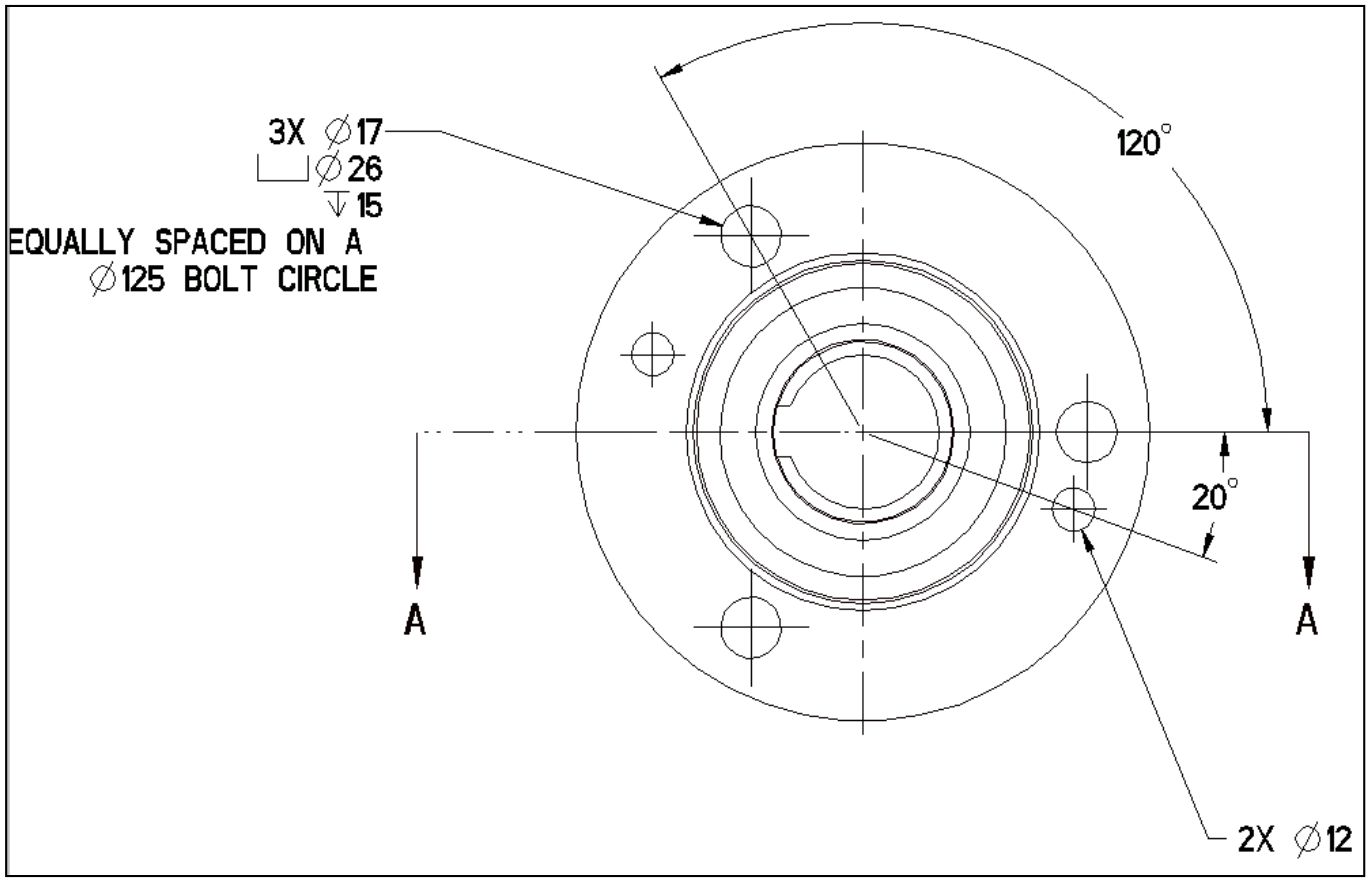


Figure 22.21 Taper Coupling Drawing, Bottom View

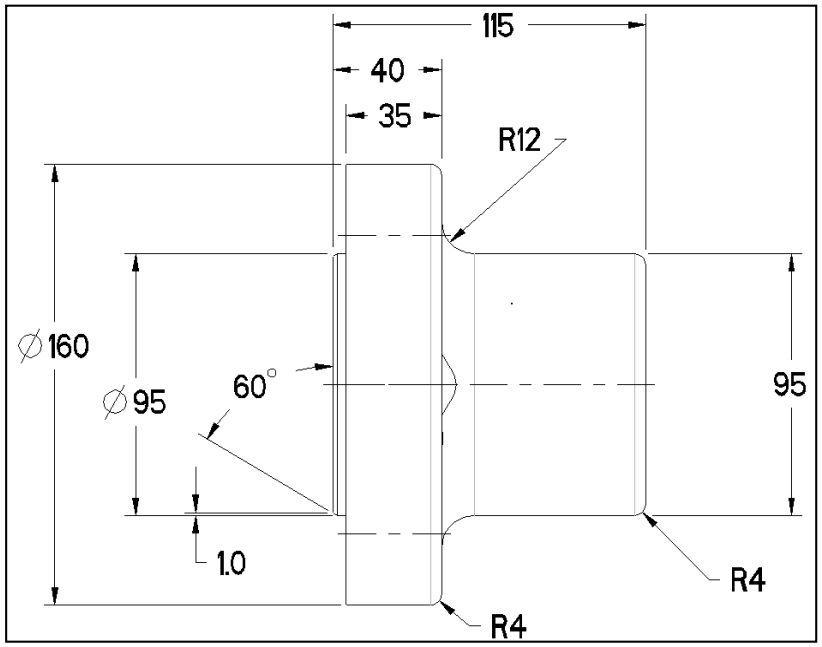


Figure 22.22 Taper Coupling Drawing, Side View

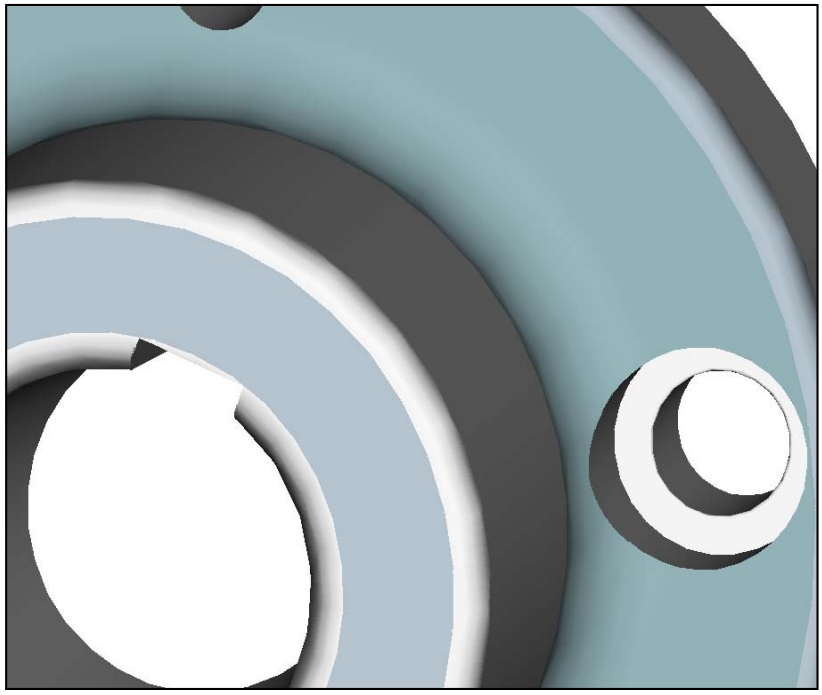
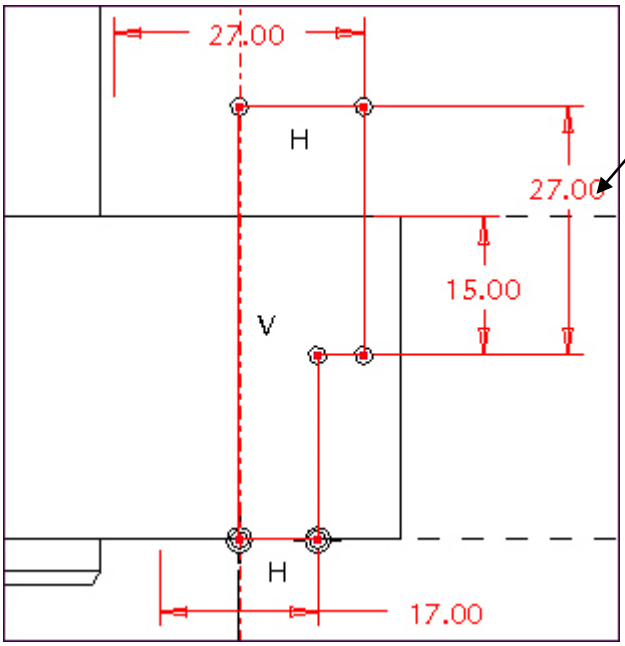


Figure 22.23 Counterbore



Write a relation that will keep this dimension equal to the depth of the counterbore plus the radius of the large round (**R12**).

Dim=15+Radius

d18=d9+d6

Your dim values (**d#'s**) may differ.

Figure 22.24 Section, Counterbore

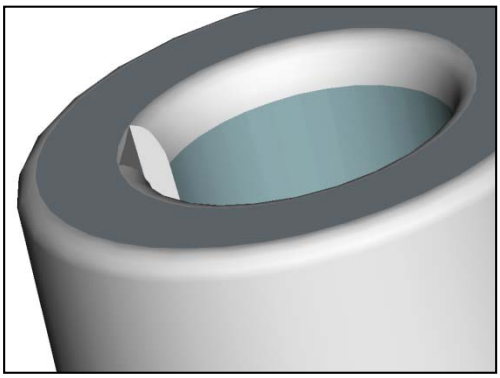


Figure 22.25 Taper and Keyseat (14mm Wide)

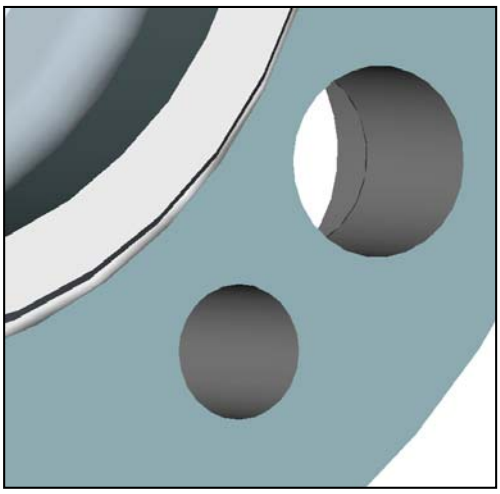


Figure 22.26 Holes

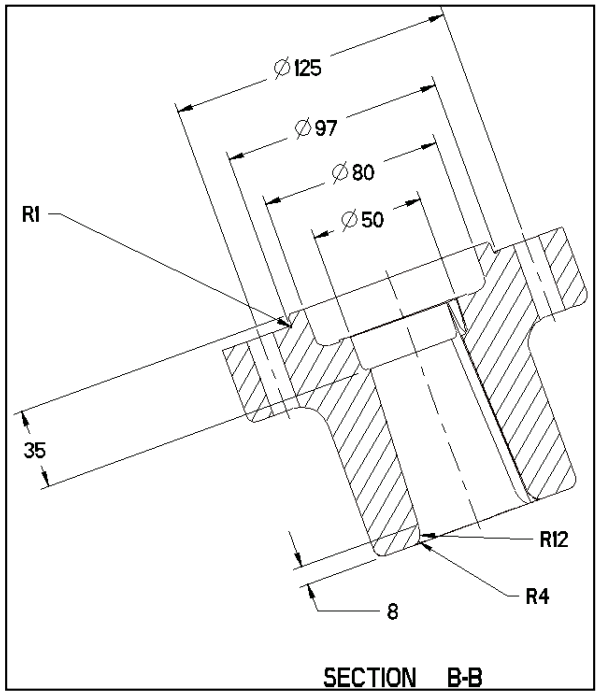


Figure 22.27 SECTION B-B

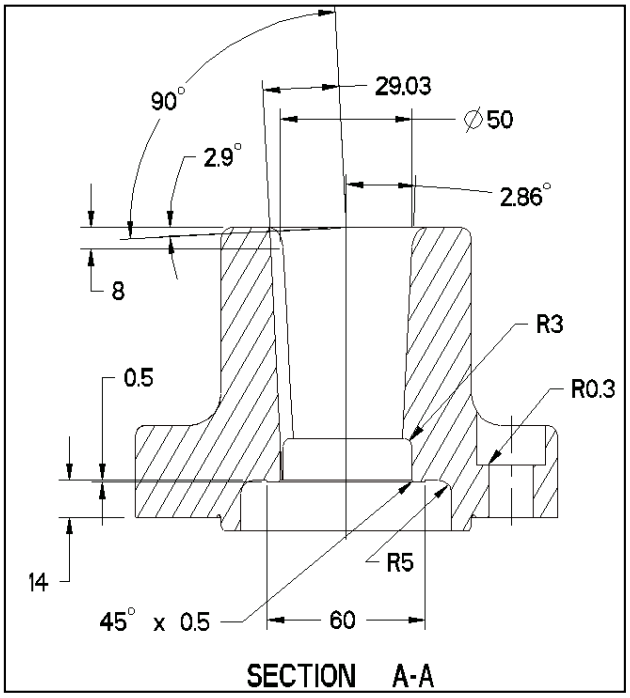


Figure 22.28 SECTION A-A

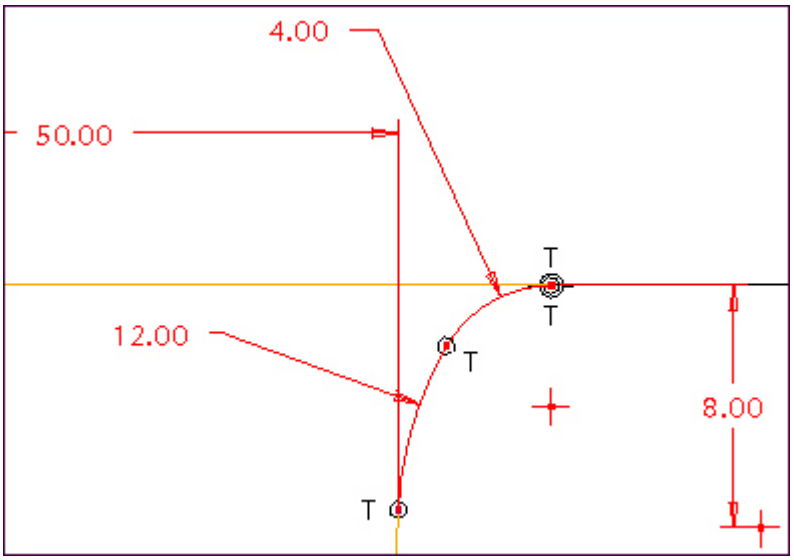


Figure 22.29 Section Sketch Rounds

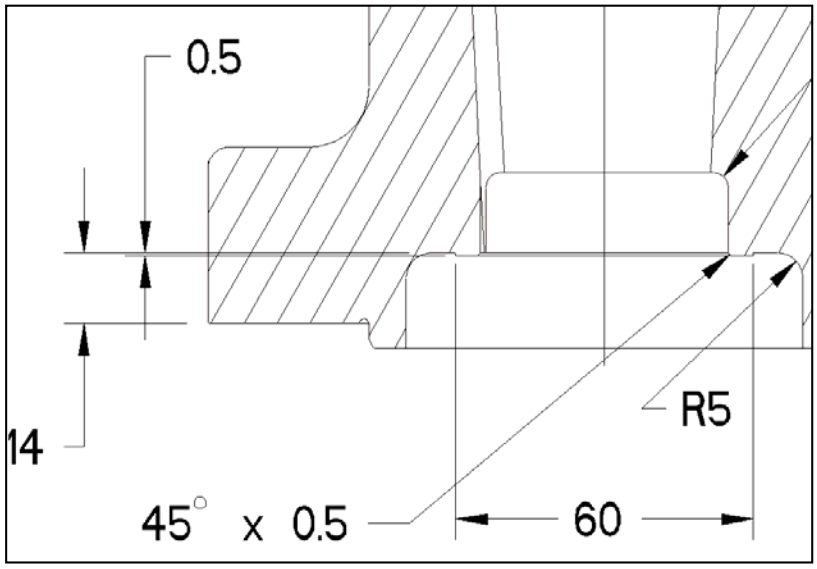


Figure 22.30 Section A-A

When creating the assembly you may need to modify this dimension to **54** for the *taper coupling* and the *shaft* to correctly seat

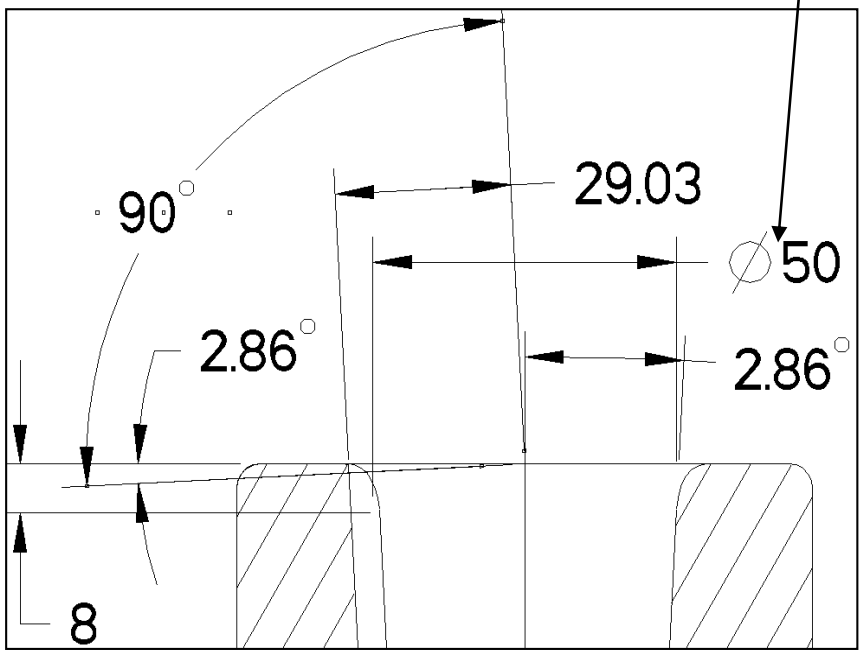


Figure 22.31 Taper

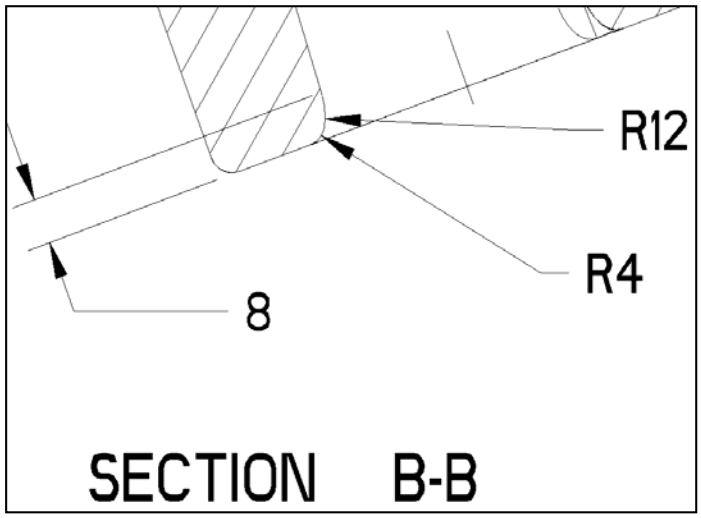


Figure 22.32 Taper Coupling Drawing, Radii

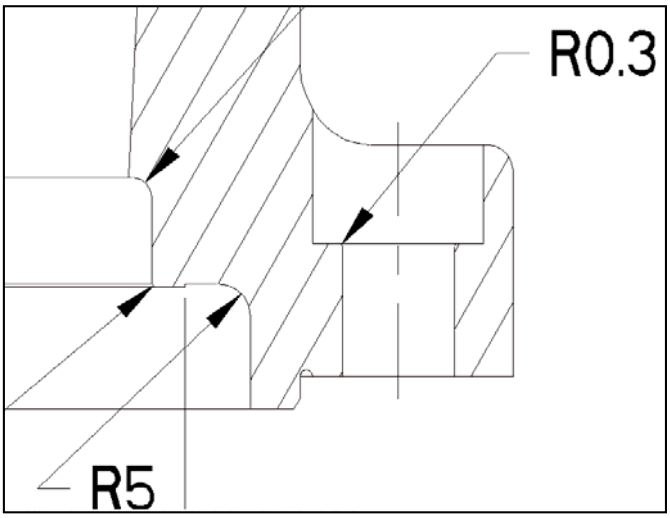


Figure 22.33 Rounds

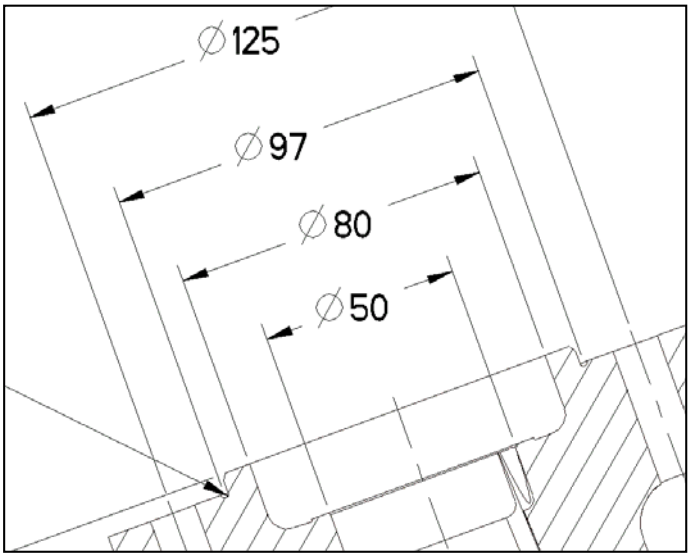


Figure 22.34 SECTION B-B, Mating Diameters

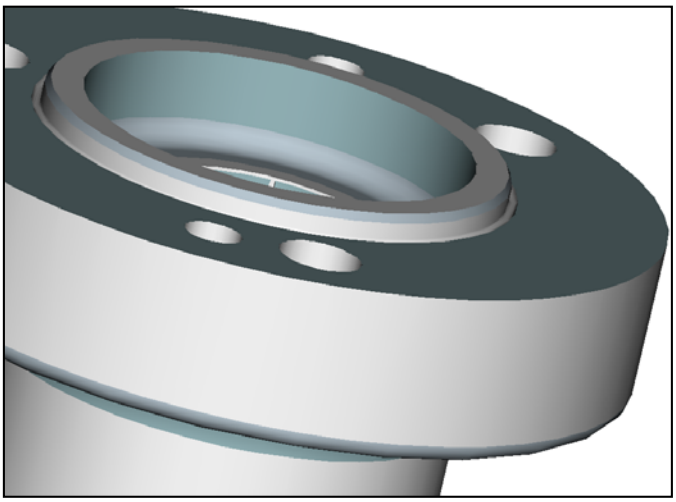


Figure 22.35 Mating Surface

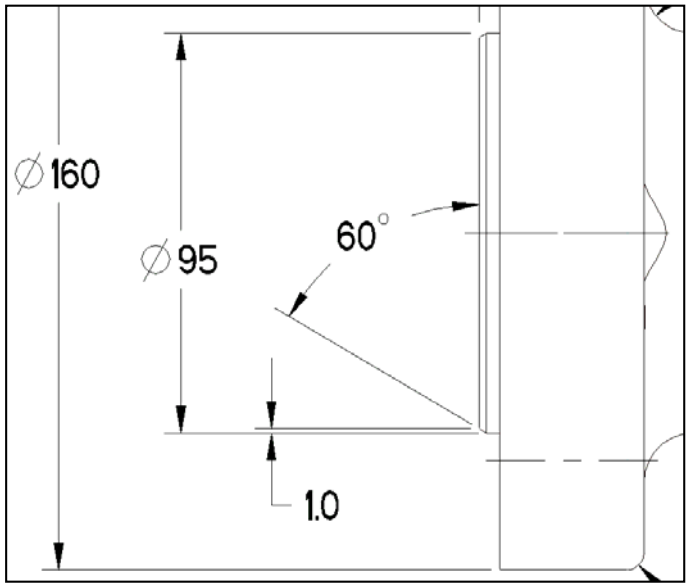


Figure 22.36 Side View, Close-up

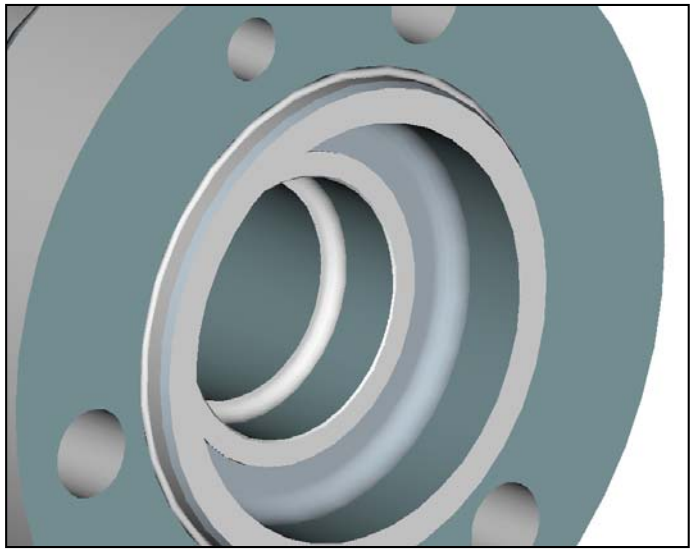


Figure 22.37 Internal View

Straight Coupling

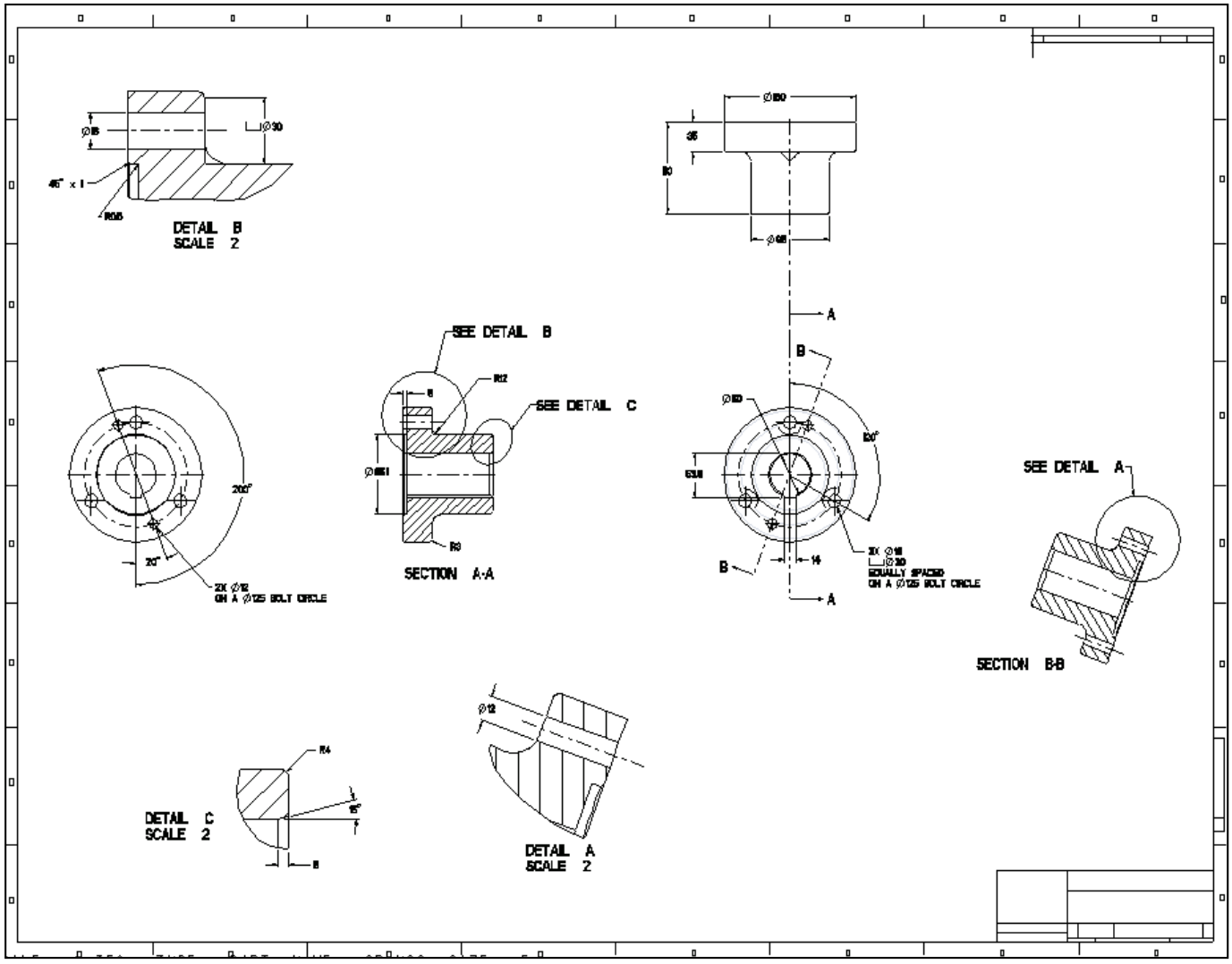


Figure 22.38 Straight Coupling Detail Drawing

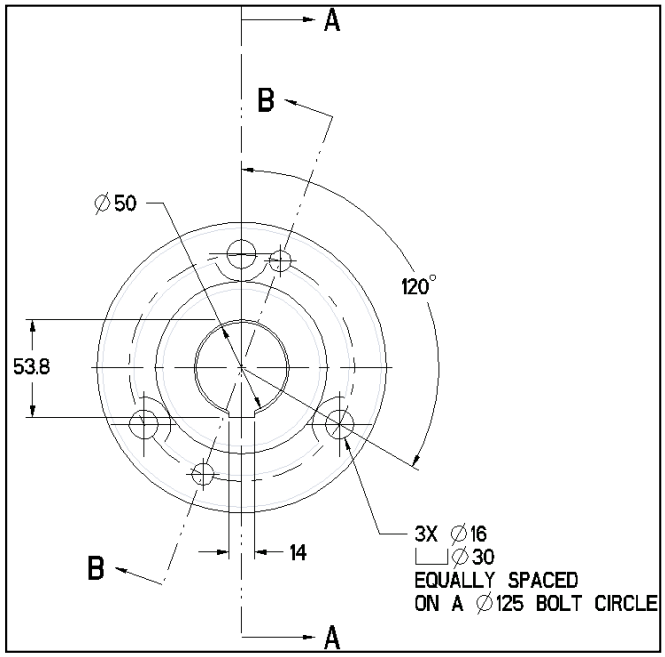


Figure 22.39 Straight Coupling Detail Drawing, Front View

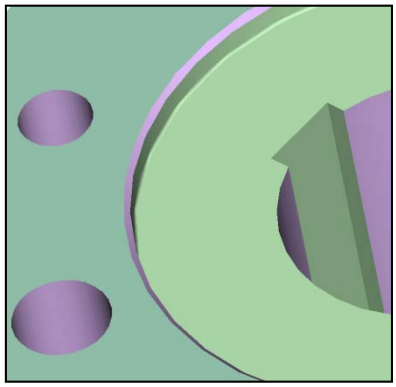


Figure 22.40 Holes

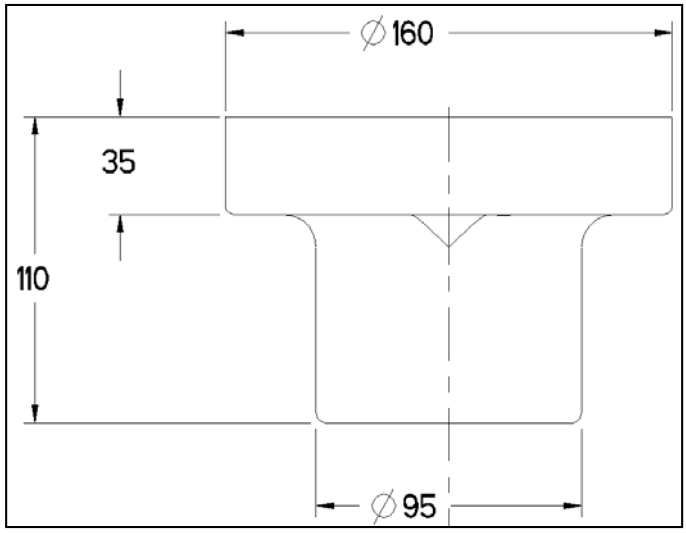


Figure 22.41 Straight Coupling, Top View

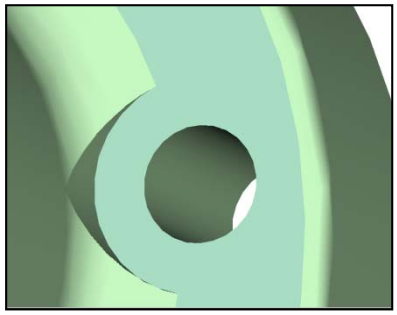


Figure 22.42 Hole Cutting Round

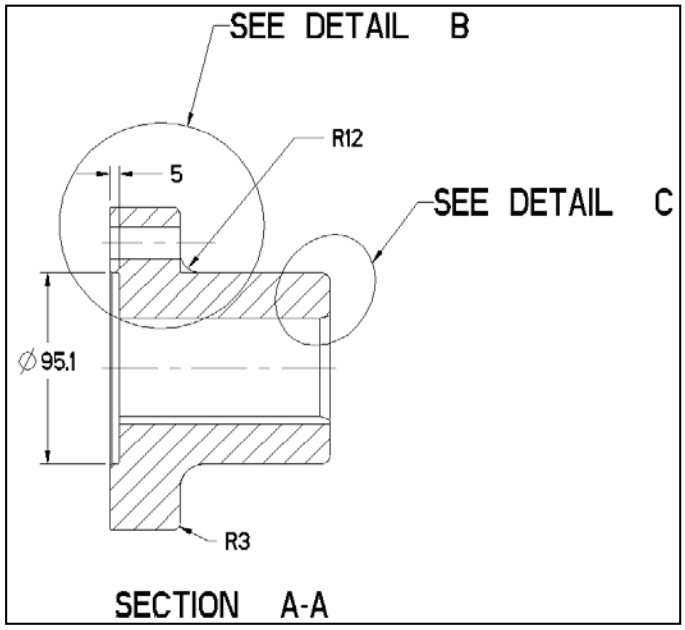


Figure 22.43 SECTION A-A

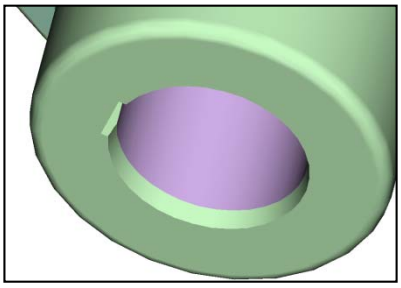


Figure 22.44 Tapered Hole

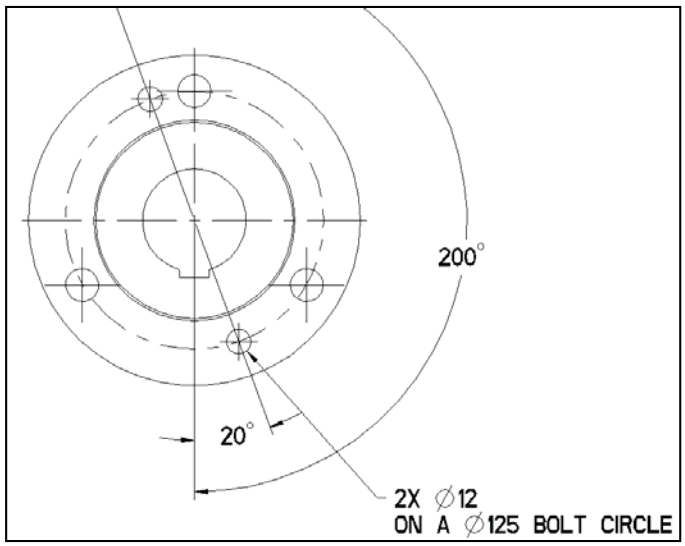


Figure 22.45 Detail, Back View

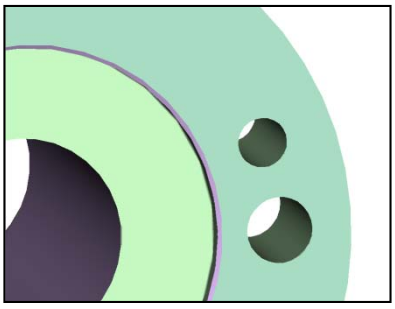


Figure 22.46 Holes from Bottom

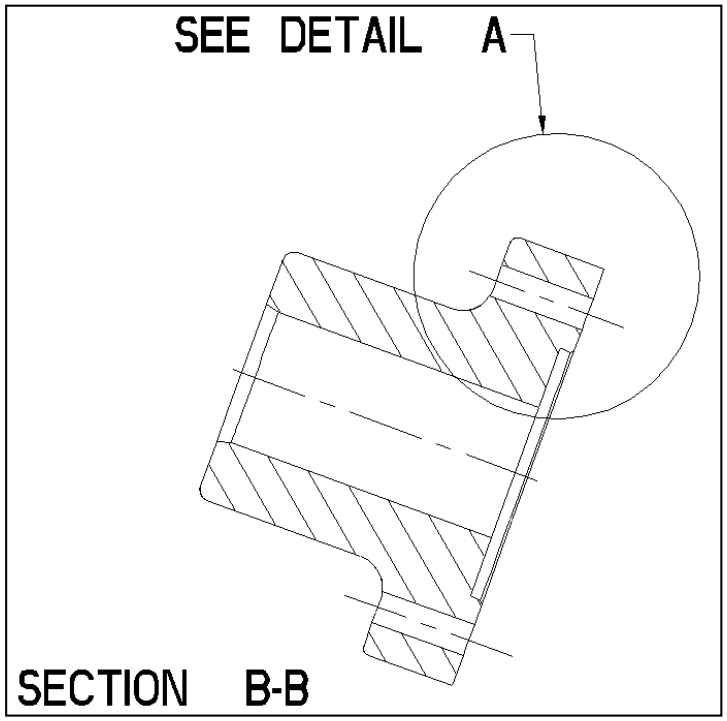


Figure 22.47 SECTION B-B

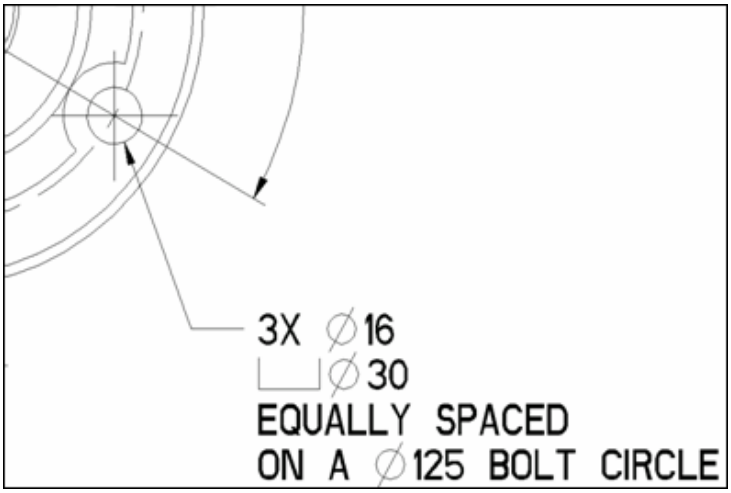


Figure 22.48 Hole Callout

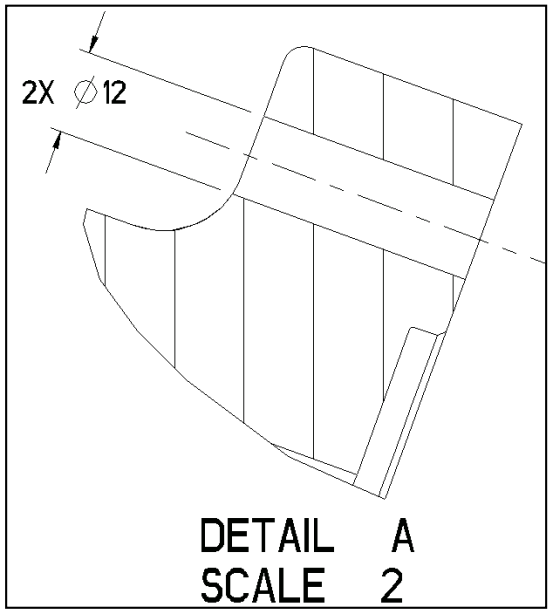


Figure 22.49 DETAIL A

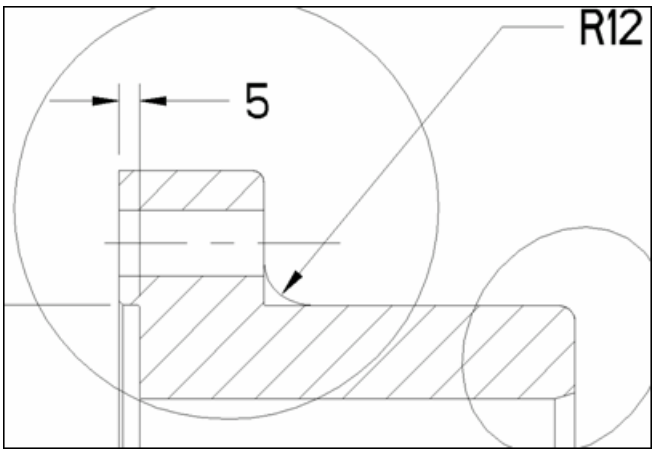


Figure 22.50 Round **R12**

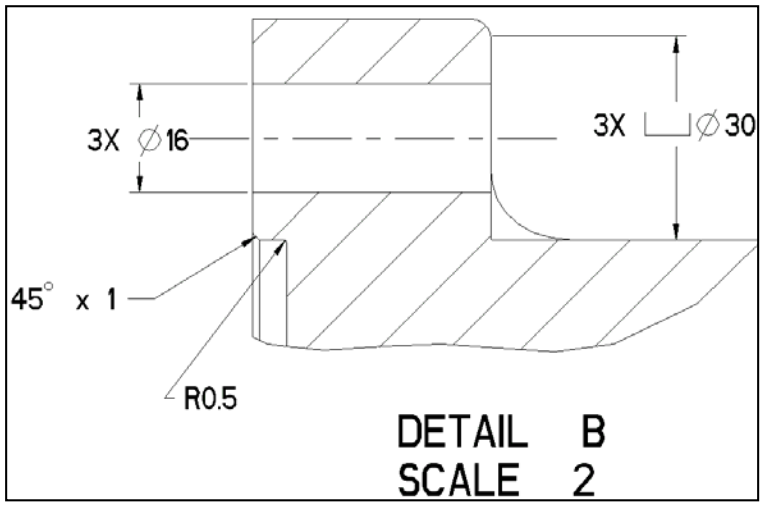


Figure 22.51 DETAIL B

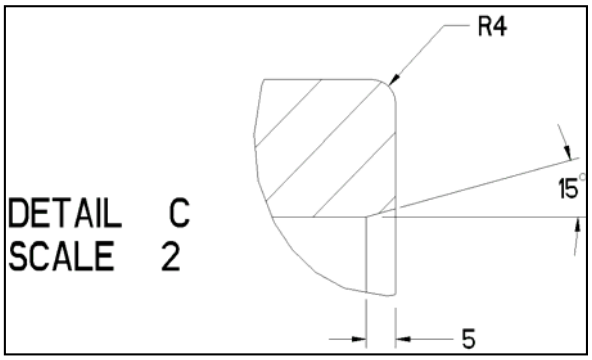


Figure 22.52 DETAIL C

Coupling Assembly

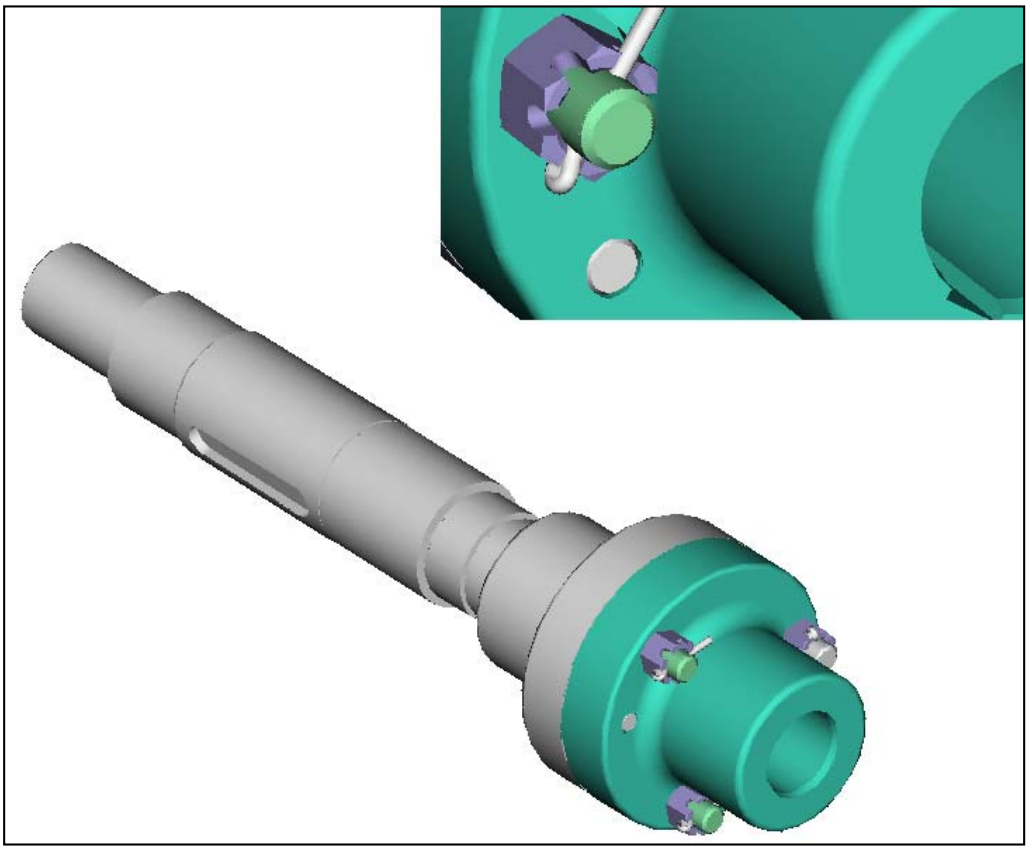


Figure 22.53 Coupling Assembly

Coupling Assembly

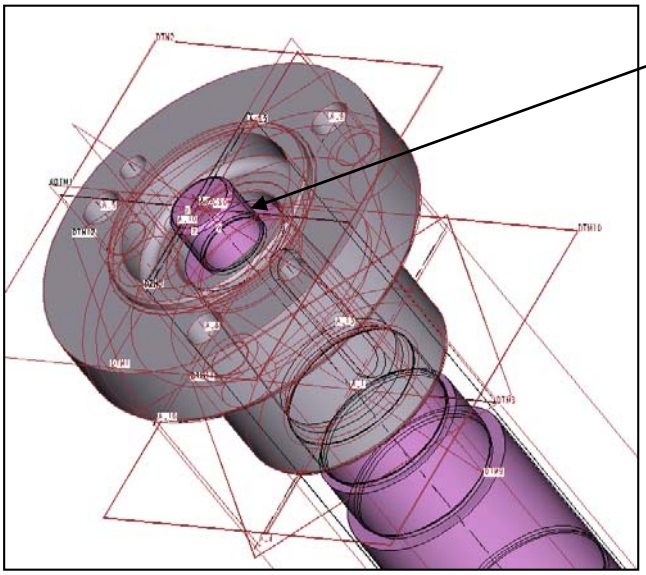
The Coupling Assembly requires commands similar to those for the Swing Clamp Assembly. Model the parts and create the assembly. Analyze the assembly and plan the steps required to assemble it. Plan the assembly component sequence and the parent-child relationships for the assembly. After completing the assembly, perform an Analysis using Global Interference. If there is interference between the shaft and the key, modify the key to the correct size.

The Coupling Shaft will be the first component assembled. The Taper Coupling is also used in the assembly. Model the Straight Coupling before you start the assembly. Depending on the library parts available on your system, you may need to model the Key, the Dowel, and the Washer components.

Because not all organizations purchase the libraries, details are provided for all the components required for the assembly, including the standard off-the-shelf parts available in Creo/Pro/E's library. Creo/Pro/LIBRARY commands to access the standard components are provided for those of you who have them loaded on your systems. The instance name is given for every standard component used in the assembly. The Slotted Hex Nut, Socket Head Cap Screw, Hex Jam Nut, and Cotter Pin are all standard parts from the library. The Cotter Pin is modeled in inch units, and the remaining items are metric.

For this lesson, do not assemble the library parts directly from the library. Save each library part in your own directory with a new name, and then use the new part names in the assembly.

Redesign the length of the Coupling Shaft threaded end to accommodate the washer and nut. You decide the new length based on the combined thickness of the two components.



Redesign the length of the Coupling Shaft threaded end to accommodate the washer and nut. *You* decide the new length based on the combined thickness of the two components.

Figure 22.54 Assemble the Taper Coupling

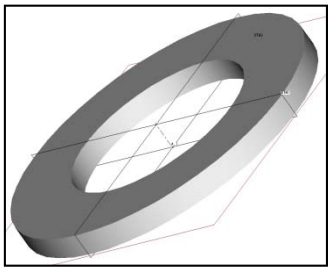


Figure 22.55 Washer

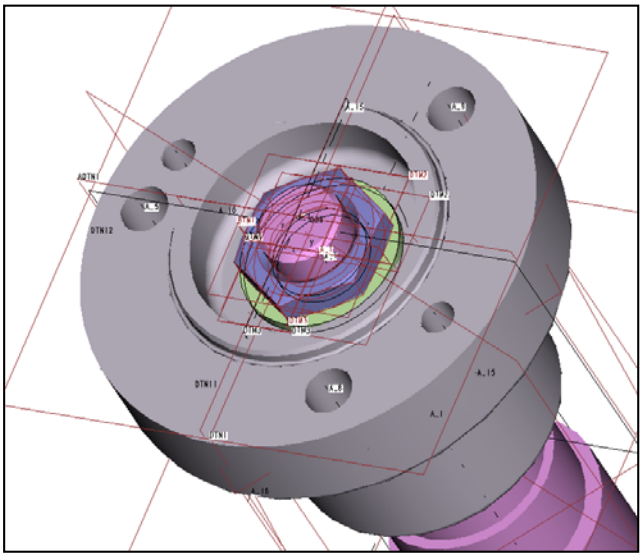


Figure 22.56 Hex Jam Nut and Washer

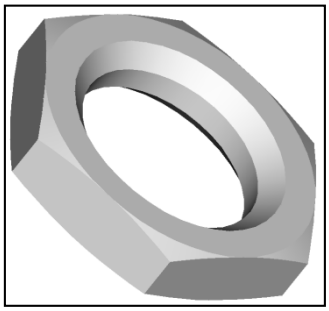
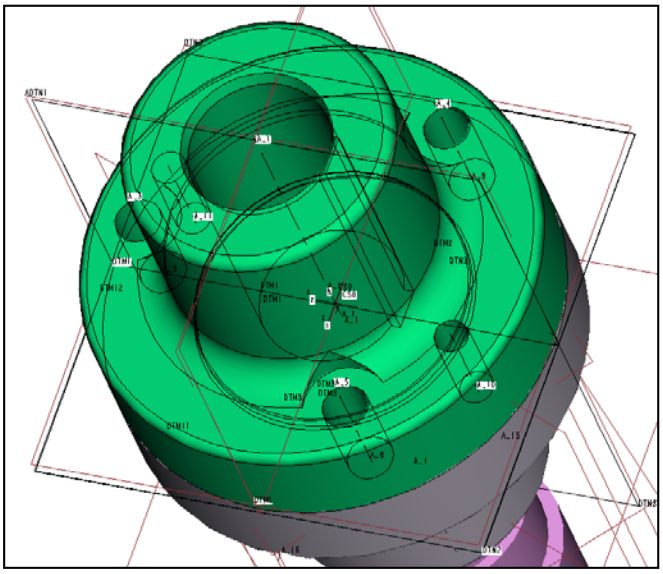


Figure 22.57 Hex Jam Nut



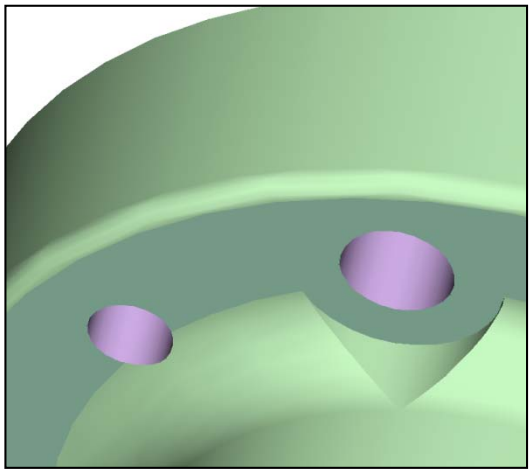


Figure 22.58 Straight Coupling

Figure 22.59 Bearing Surface

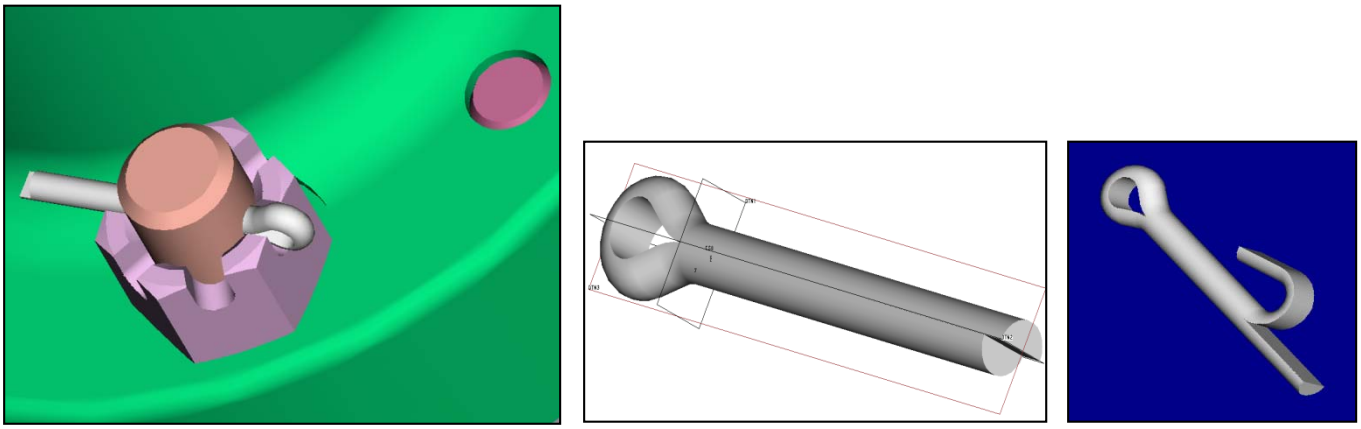


Figure 22.60 Dowel, Slotted Hex Nut, and Cotter Pin. After constraining the cotter pin, try redefining (the trajectory) it to bend one or both of its prongs.

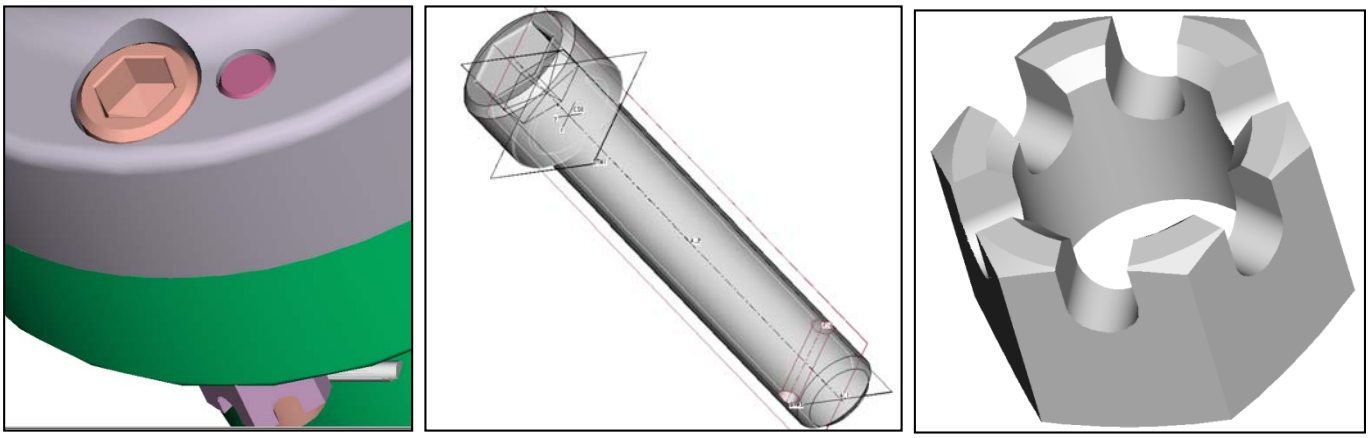


Figure 22.61 Socket Head Cap Screw and Slotted Hex Nut

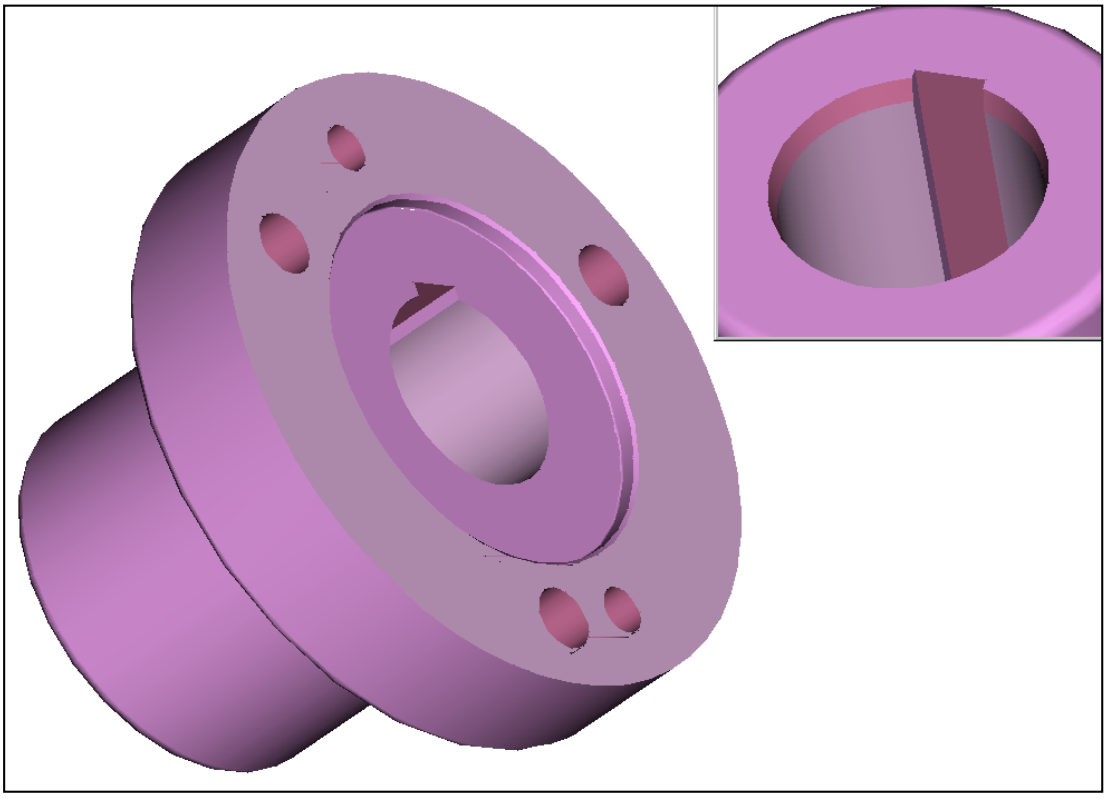


Figure 22.62 Straight Coupling, Part Model

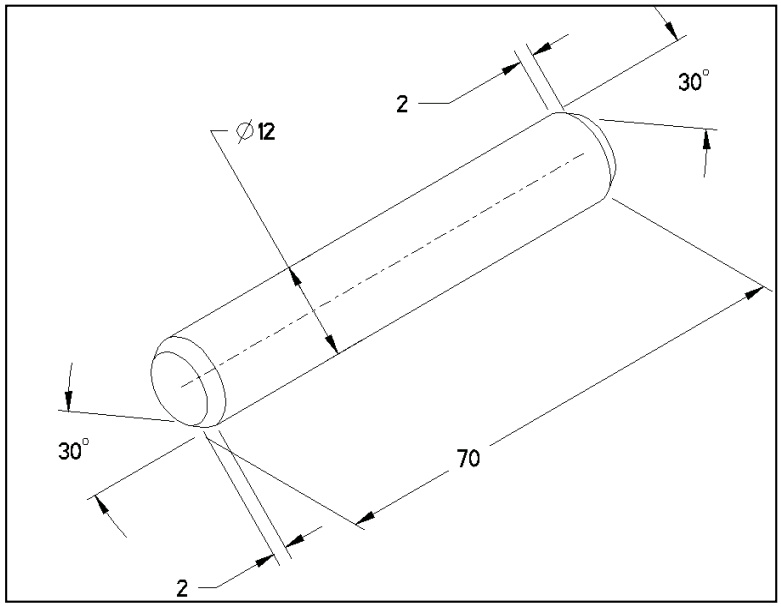


Figure 22.63 Dowel (model this component)

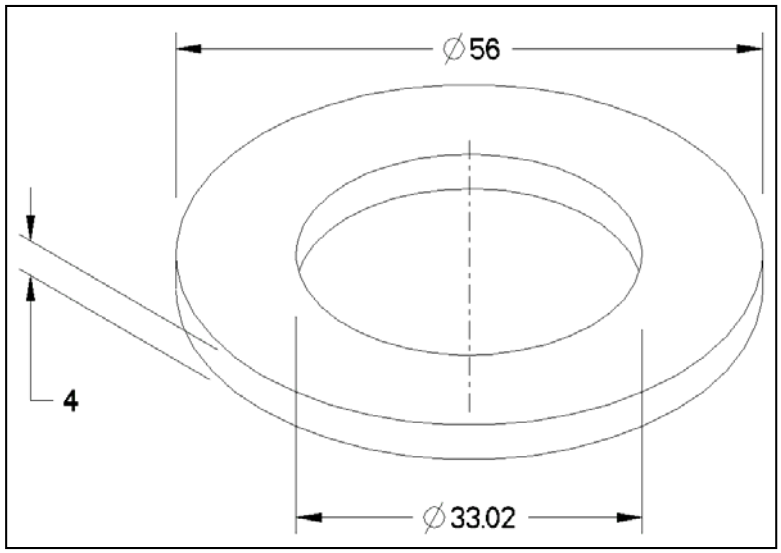


Figure 22.64 Washer (model this component)

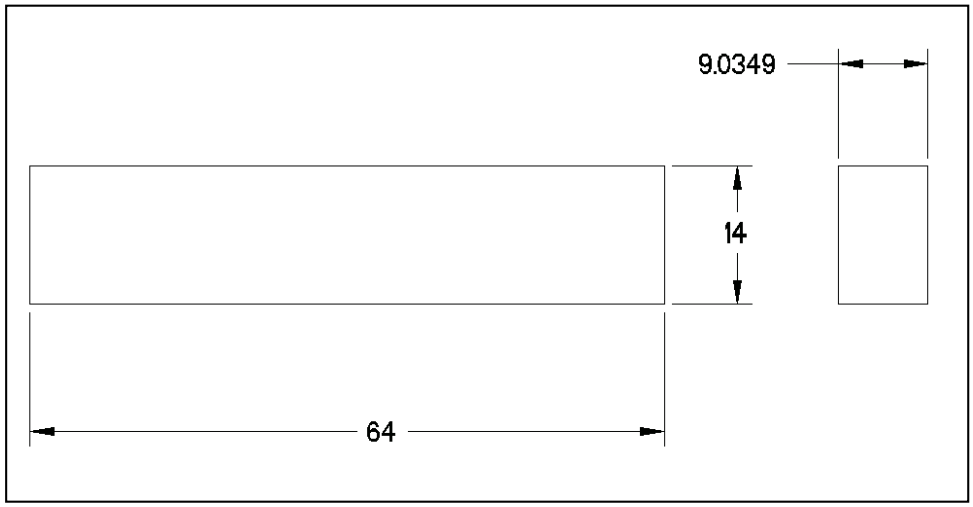


Figure 22.65 Key (model this component)

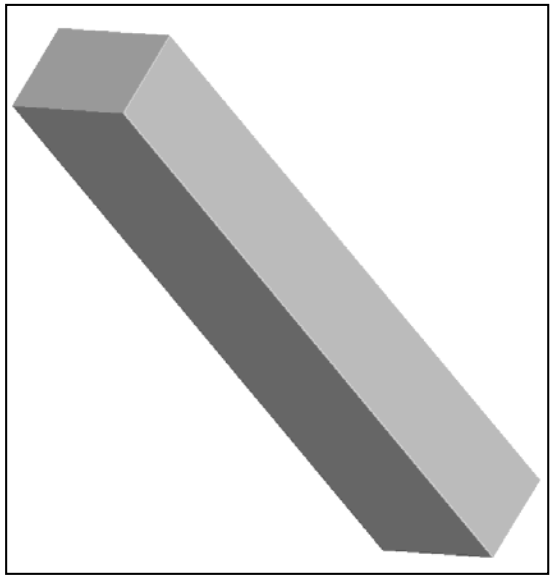


Figure 22.66 Key

Note: your directory structure may be slightly different. Consult your instructor or system administrator for the proper library path.

HEX JAM NUT

File > Open > prolibrary > objlib > metriclib > hex_nuts > mhjn.prt > By Parameter > NOMINAL_DIA_THR_PITCH > M30X3.5 > INSTANCE = MHJN10

Modify the thickness of the nut to 10 mm

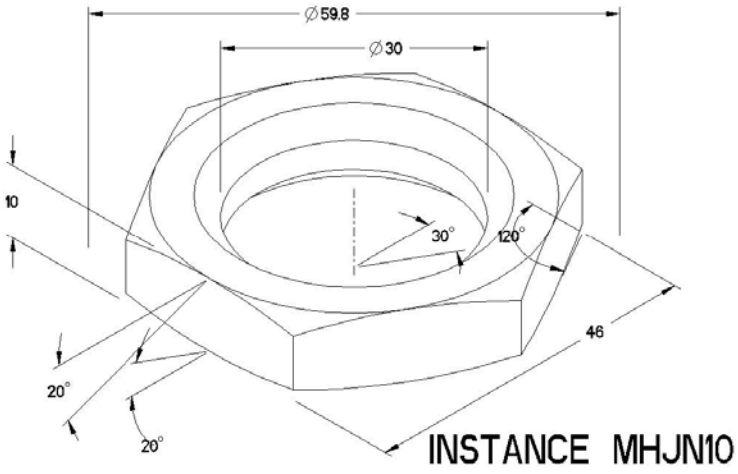


Figure 22.67 Hex Jam Nut

SOCKET HEAD CAP SCREW

File > Open > prolibrary > objlib > metriclib > sock_hd_scr > mscs.prt > By Parameter > NOMINAL_SIZE_THR_PITCH > M16X2 > Open By Parameter > d5,length > 80.000 > INSTANCE = MSCS1210

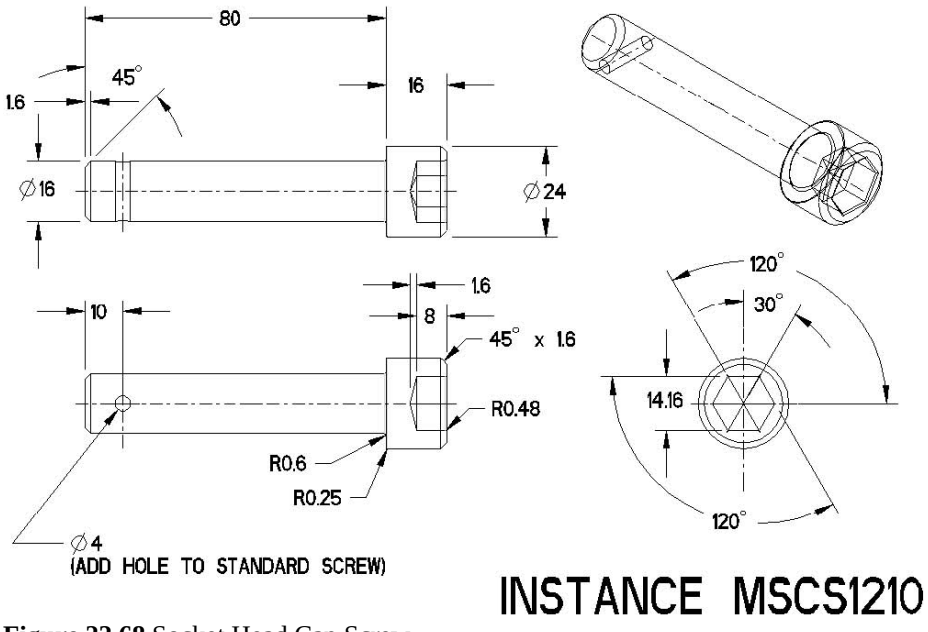


Figure 22.68 Socket Head Cap Screw

SLOTTED HEX NUT

File > Open > prolibrary > objlib > metriclib > hex_nuts > mshn.prt > By Parameter > NOMINAL_DIA_THR_PITCH > M16X2 > INSTANCE = MSHN07

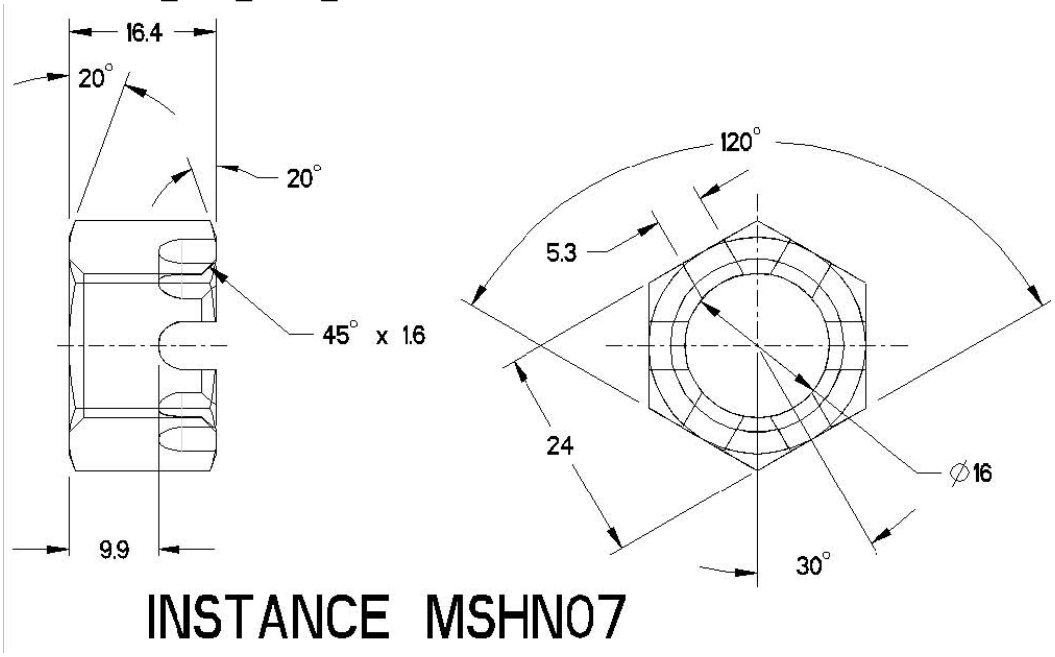


Figure 22.69 Slotted Hex Nut

COTTER PIN

File > Open > prolibrary > objlib > eng_part_lib > cot_clvs_pin > Pina.prt > By Parameter > NOM_SIZE > .1562 > Open By Parameter > d13,1 > 1.250 ⇒INSTANCE = PNA09L05

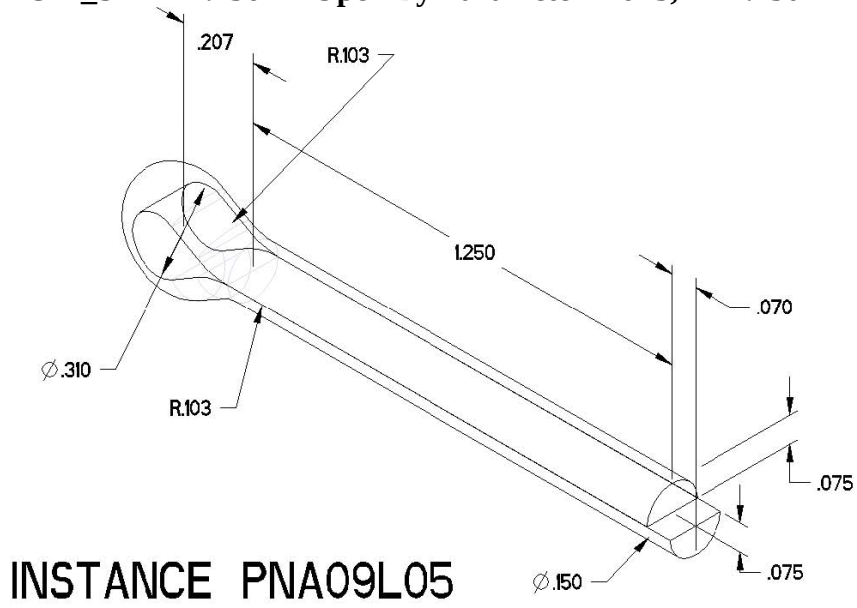


Figure 22.70 Cotter Pin

Coupling Assembly (Exploded)

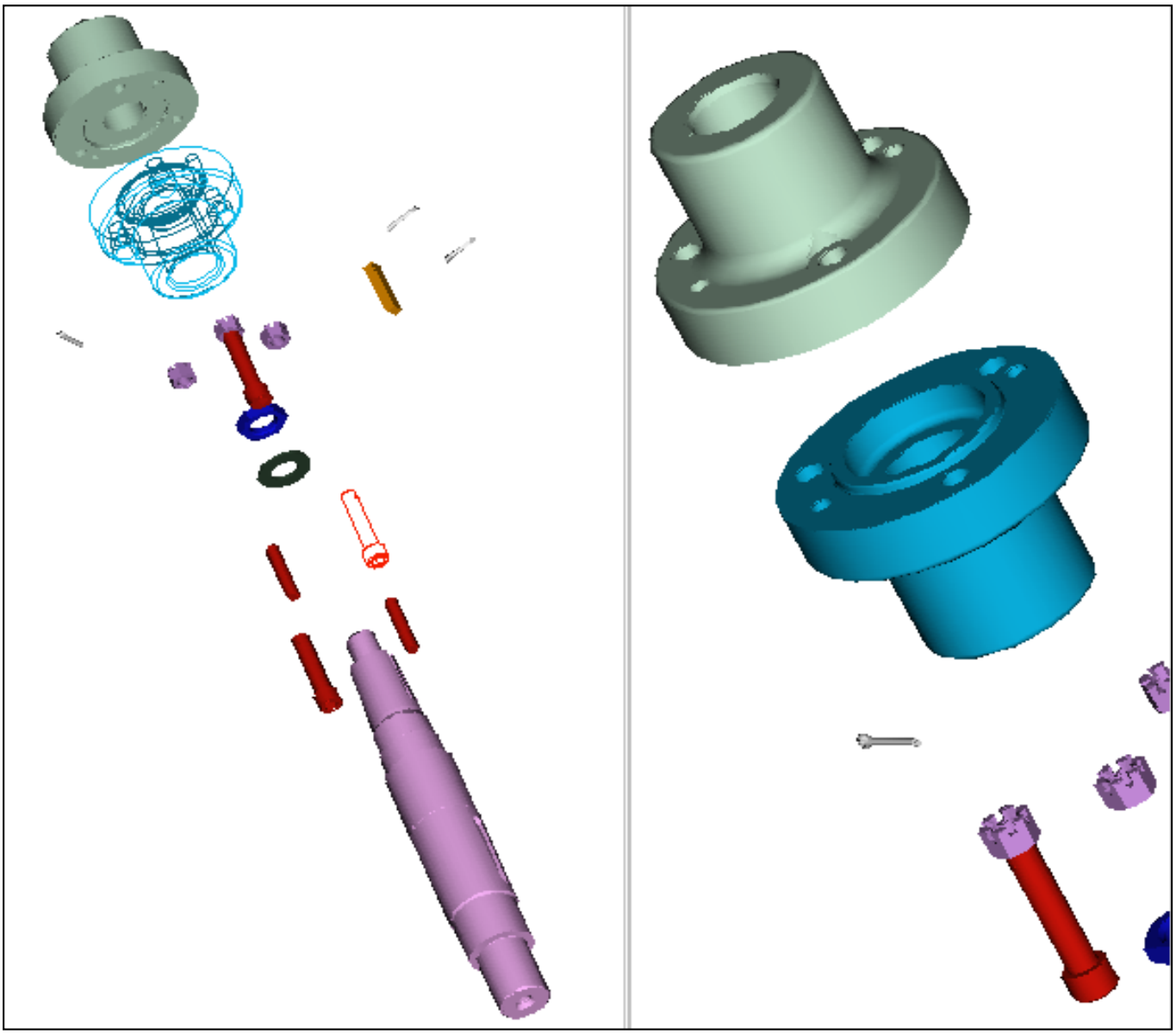


Figure 22.71 Exploded Coupling Assembly

An exploded view needs to be created. Varieties of other views are suggested, including a section of the assembly, a perspective view, and an exploded view with a different component (display) style variation. Each component should have its own color. If you did not color the components during the part creation, bring up each part in Part mode, define, and apply a color. Create three or four View States. You do not need to match the examples shown.

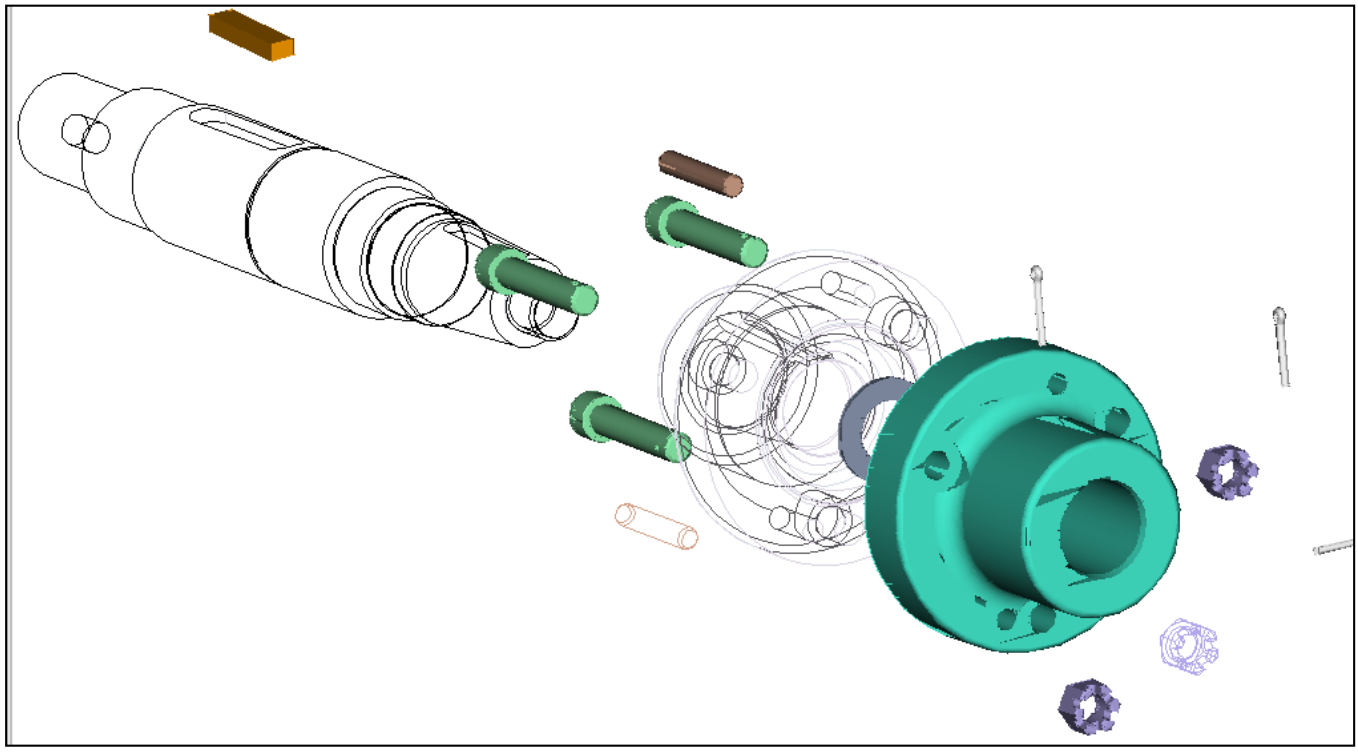


Figure 22.72 Perspective View of Exploded Coupling Assembly with a Style State showing various Component Display Styles

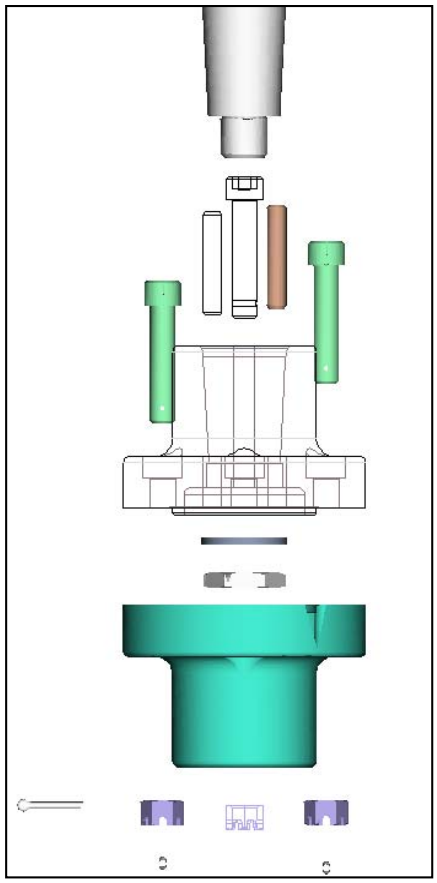


Figure 22.73 Front View

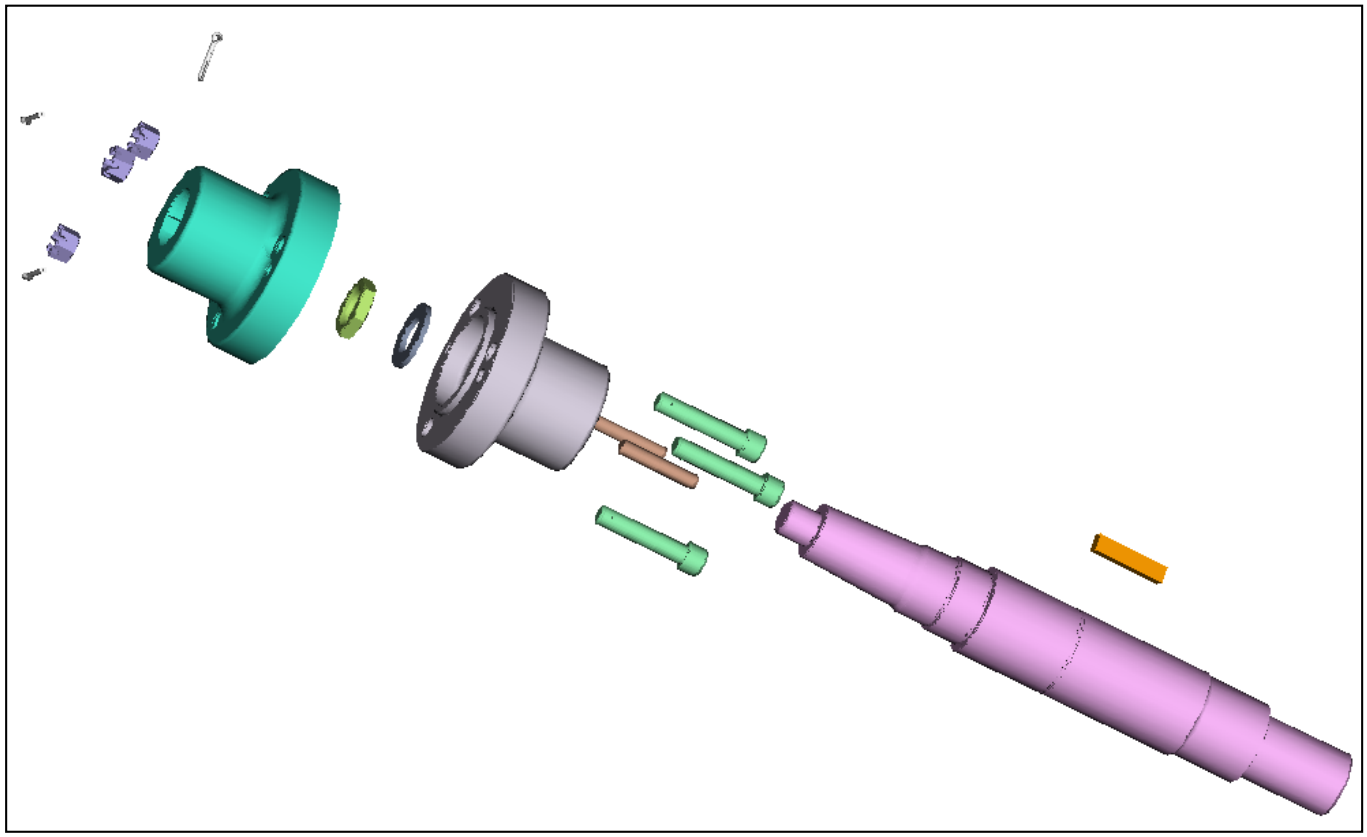


Figure 22.74 Shaded Exploded Coupling Assembly

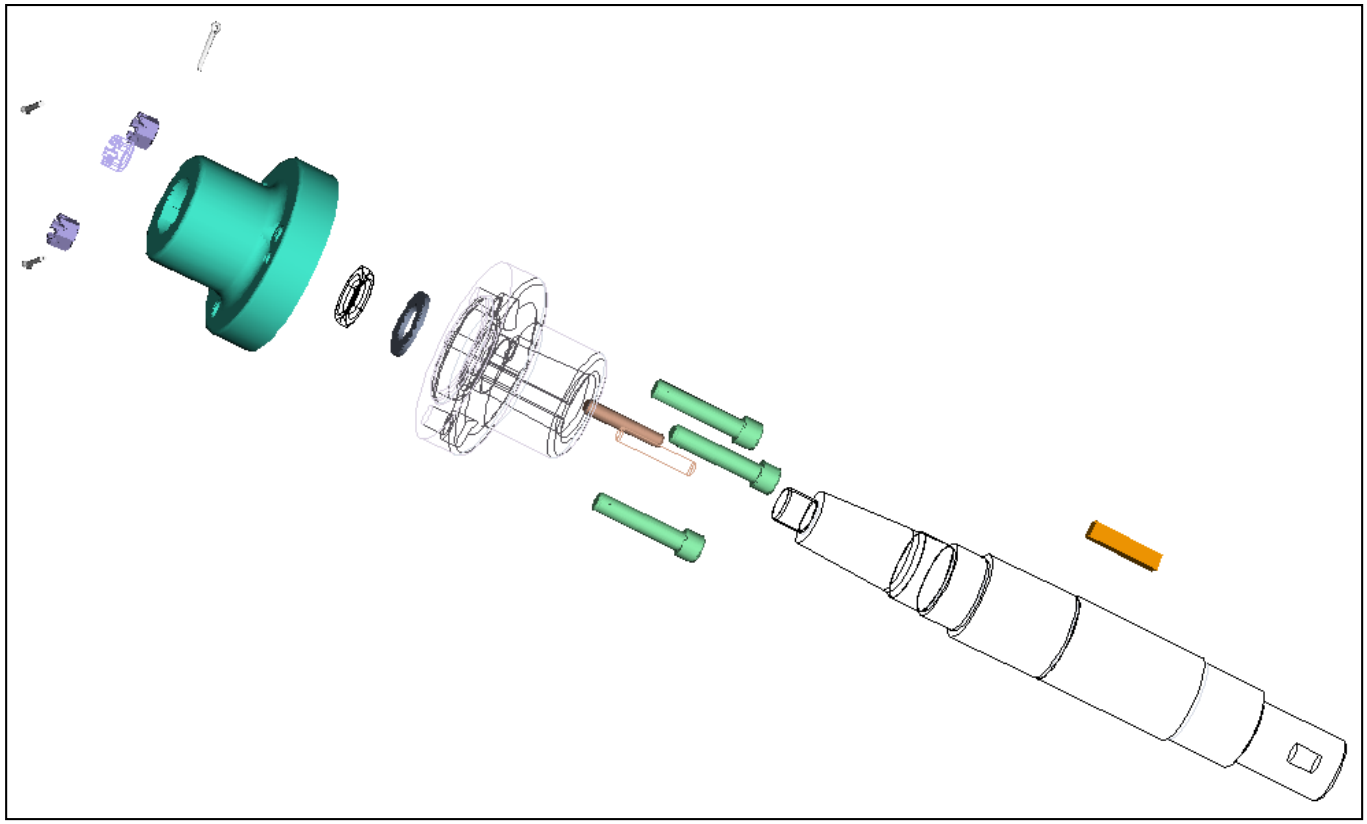


Figure 22.75 Exploded Coupling Assembly with a Different Component Style State

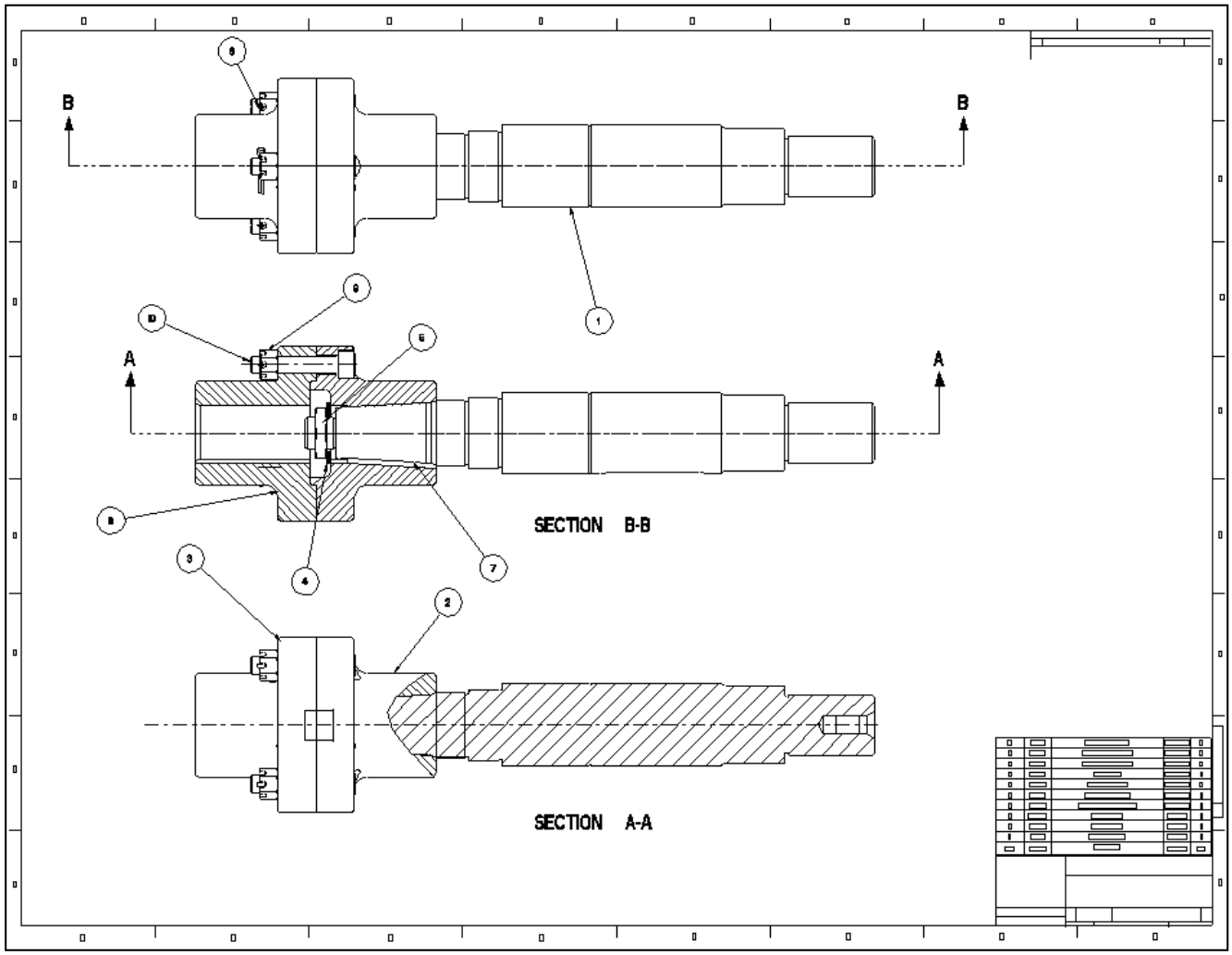


Figure 22.76 Coupling Assembly Drawing

Create a complete documentation package for the Coupling Assembly. The ballooned assembly drawing will have three views and a parts list (BOM). Assign parameters to the parts in the assembly so that they can be displayed on a parts list in the assembly drawing. Some of the items listed here have been created in other lessons. Create or extract existing models and drawings, and plot/print the following:

- *Part Models for all coupling assembly components*
- *Detail Drawings for each nonstandard component, for example, the Coupling Shaft*
- *Assembly Drawing and Parts List (BOM) using standard orthographic ballooned views*
- *Exploded Assembly Drawing of the ballooned assembly*

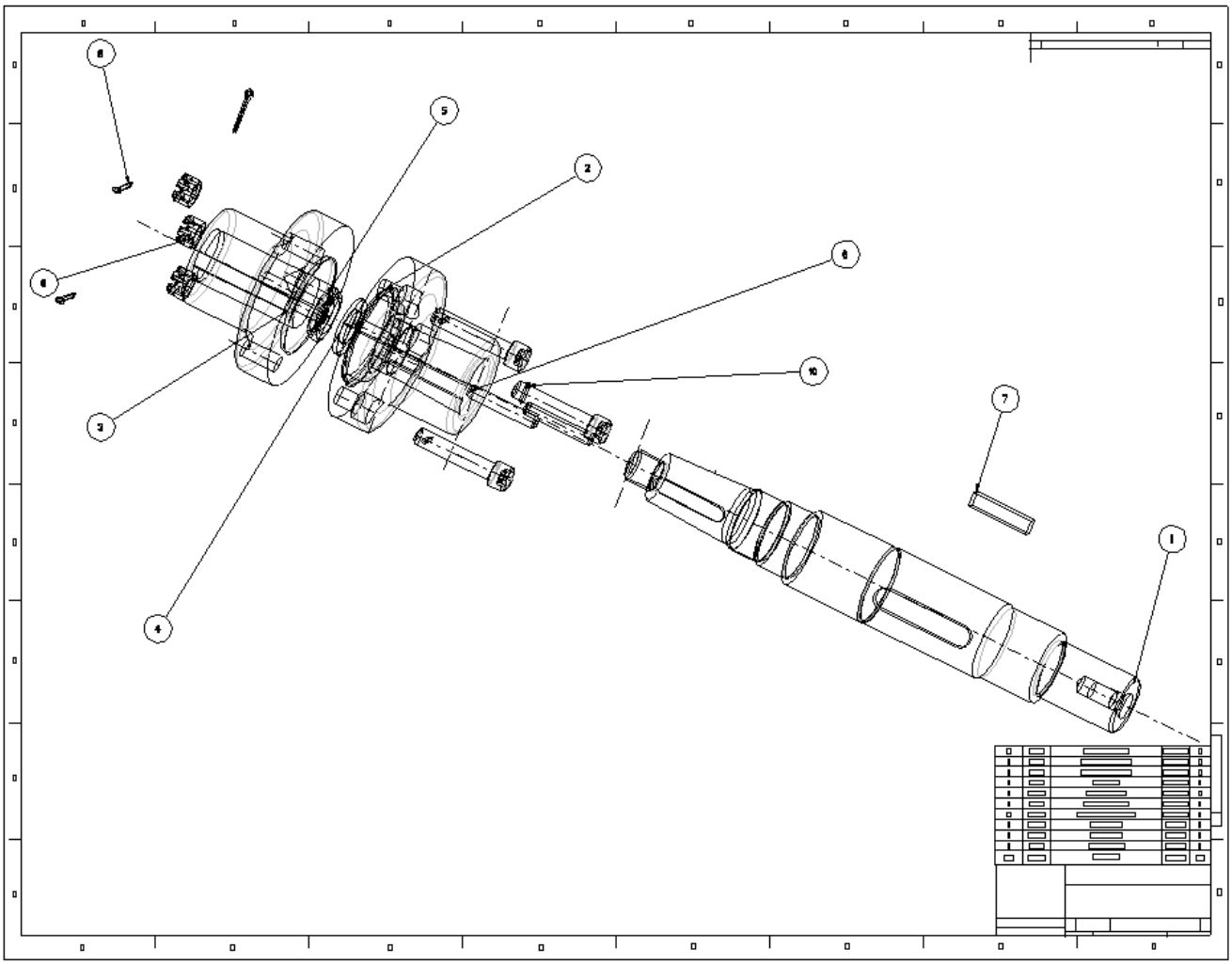


Figure 22.77 Exploded Coupling Assembly Drawing

ITEM	PT NUM	DESCRIPTION	MATERIAL	QTY
10	110-2CS	SOC HD CAP SCREW	PURCHASED	3
9	109-2SN	HEX SLOT NUT 16 X 2	PURCHASED	3
8	108-2CP	COTTER PIN .150 X 1.25	PURCHASED	3
7	107-2KY	KEY 14 X 61	PURCHASED	1
6	106-2DW	DOWEL 12OD X 70	PURCHASED	2
5	105-2HN	HEX NUT M30 X 3.5	PURCHASED	1
4	104-2WA	WASHER 33ID X 50OD X 4	PURCHASED	1
3	103-2CP2	COUPLING TWO	1040 CRS	1
2	102-2CP1	COUPLING ONE	1040 CRS	1
1	101-2SH	COUPLING SHAFT	1020 CRS	1

Figure 22.78 BOM

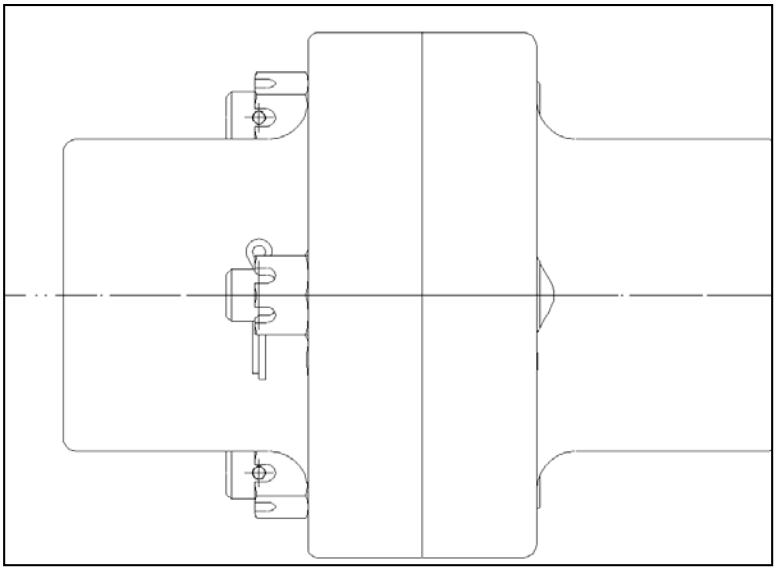


Figure 22.79 Drawing, Slotted Hex Nut

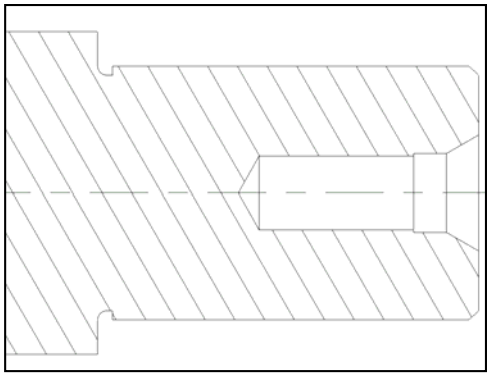


Figure 22.80 Tapped Hole

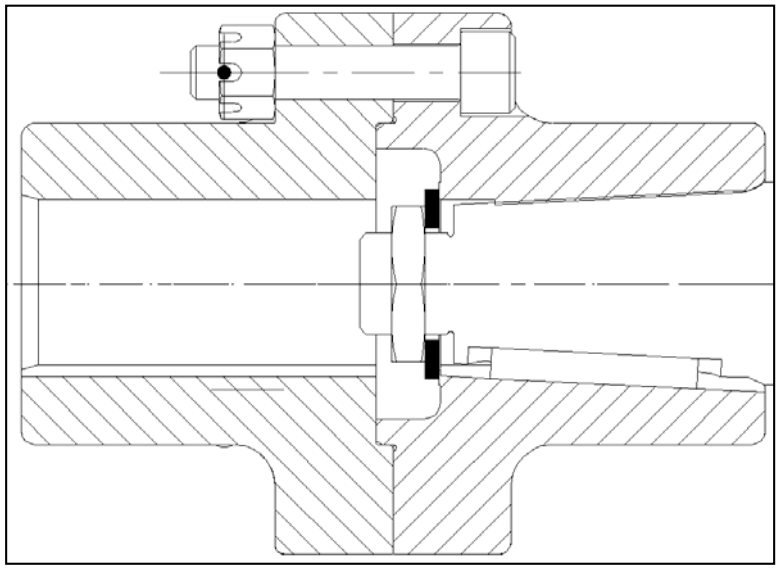


Figure 22.81 Drawing, Section Close-up

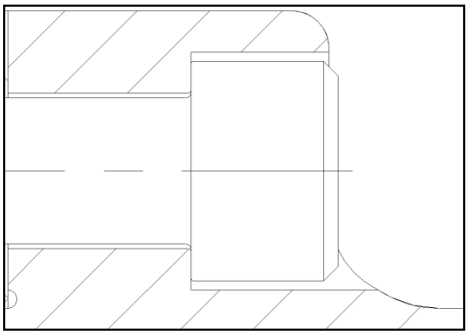


Figure 22.82 SHCS

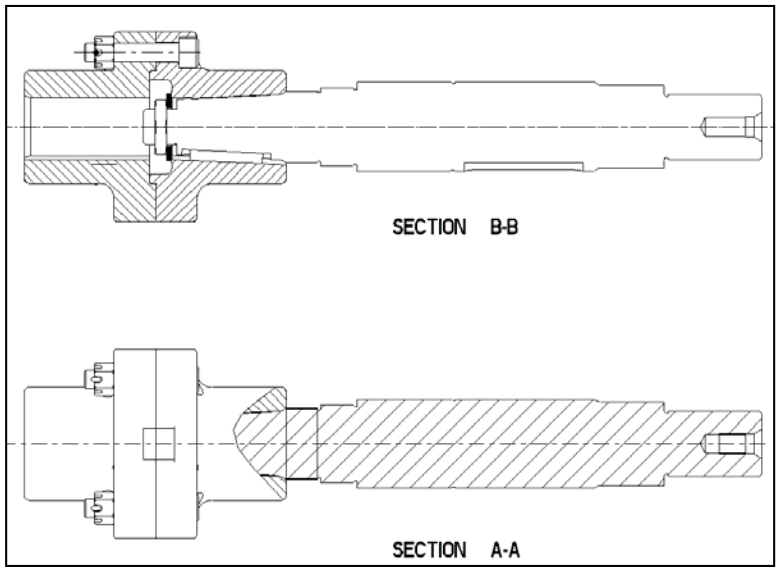


Figure 22.83 Drawing, Sections A-A and B-B

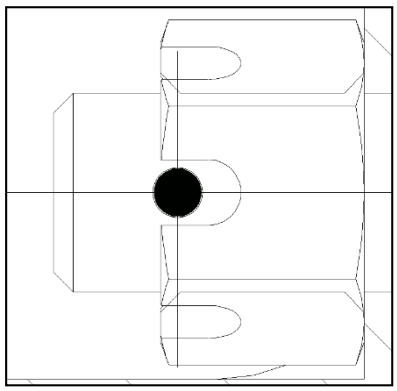


Figure 22.84 Nut