Nut and Bolt Tutorial

Thread Representations

Parts to a Thread

Thread Dimensioning

- Major Diameter
- Thread Series (IE UNC, UNF, ACME, etc)
- Threads per Inch
- Class of Fit (1, 2, or 3)
- A = External
  B = Internal
Bolt- Simplified Threads

Overview

1. Create a cylinder that is the same diameter as the major diameter
2. Create bolt head. (Will use reference materials from the textbook to create). Bolt head is designed based upon the major diameter
3. Create cosmetic threads

Steps

1. Create a cylinder with a diameter of .50 (this is the major diameter) and length of 1.75. Circled view should be on the top datum
2. Bolt Head: Sizes can be found in the Drafting and Design Text book page 840
   a. Select Extrude > Right mouse button define internal sketch > select one of the flat ends of the cylinder > select sketch
   b. Select reference tool > select the edge of the cylinder (this will create a reference point for the center of the bolt head
   c. Select the circle tool > draw a circle from the center of the cylinder > set the diameter to .866 > right mouse button on the circle > select construction (this changes the circle to construction circle, which we will use as a reference to scribe a hexagon).
   d. Select the line tool > draw the following hexagon

   ![Diagram of hexagon]

   e. Select the equal lengths tool from the constraints menu > select each line (note you should only have to do this 3 times to full constrain the hexagon.
   L1 Should be next to 3 of the 6 edges. NOTE You may get an over constrained error
   Delete The angle or the linear dimension from the constraint list
   f. Green check the sketch
   g. Set the height of the hexagon to .302
h. Bolt Head Chamfer

i. Select the revolve tool > right mouse button define internal sketch > select the front datum (we need to select this one because the plane goes through the points and not the flats of the hexagon).

ii. Draw the following triangle; be sure to set a centerline

iii. Green check

iv. Select the subtract icon in the revolve info tab

v. Green Check

3. Cosmetic Thread
   a. Model Tab > Select the down arrow next to Engineering > select cosmetic thread
   b. Info Bar looks as follows

   Thread Size and Thread per inch:
   Major Diameter and Threads per inch

   c. Select Thread Icon
   d. Selection is the thread surface > select the cylinder
   e. Select the Thread Start Surface box > select the end of the thread that does not have the bolt head
   f. Thread Size and Thread per Inch = ½-13
   g. Enter thread distance = 1.25
   h. Green Check
4. **Thread end Chamfer**
   a. Model Tab > Select Chamfer Tool
   b. Select the end of the cylinder
   c. Set the D = .05 in the chamfer info bar.
   d. Green Check

   **Finished Part**
   Note Purple Lines represent the Minor Diameter of the thread

Nut-Simplified Threads

1. **Drawing the overall shape of the nut**
   a. Model Tab > Select Extrude > right mouse button > select top datum
   b. Draw a circle at the origin that is a diameter of .866 > right click on the circle and change it to construction
   c. Draw a hexagon > set each line as equal length (Note this is the same hexagon size as above)
2. **Nut Chamfers**
   a. Model Tab > select Revolve > right mouse button > select define internal sketch > select the front datum (this should be the datum that passes through the corners of the hexagon and not the flats).
   b. Draw the following triangles and set the centerline in the middle of the nut
   c. Green Check
   d. Select the subtract icon in the Revolve Tab
   e. Green Check

3. **Setting the Threaded Hole**
   a. Select the Hole Tool
   b. Select the top surface of the nut
   c. Place the locators on the Front and Right Datum
d. Set the values to 0.00 for both locators

e. Select the Thread Icon in the Hole Info Bar > Change the settings to the following

Set Major Diameter and Thread per inch to ½-13

f. Click on the Shape Tab > Select Thru Thread

g. Green Check
Finished Part