

SolidWorks Cosmetic Threads

(Draft 1 10/25/06)

Introduction

Most fasteners are standardized and can be identified by a catalog number, or standard code. Still, it is desirable to have some graphical indication of the presence of threads in a drawing and/or in the solid part. Thread representation is time consuming and not needed in detail because of standardization. Hand drafters developed a few simple and quick ways to represent threads. Displaying the actual multiple spiral thread surfaces in a solid is also time consuming, and resource consuming since they make the database much larger and significantly slow the display speed. Thus, solid modelers usually also employ a cosmetic thread display. Of course, when the internal or external thread is physically built all the details must be present. This is done by using the standard specification for the fastener as the computer numerical control (CNC) cutter file (CL) is output (exported) by the solid modeler, or common translator software. In the “as build drawing” (from the CNC code) the true thread surfaces are displayed. When non-standard threads are required they are usually build with a helix or spiral sweep construction.

Build a bolt

To illustrate the concept of a cosmetic thread a typical non-standard bolt shape is developed, in the Appendix, and is displayed in the left side of Figure 1. The shaft is 1.5 inches long with a diameter of 0.50 inches. The desired threads will be 1.0 inch long with a thread root, or minimum diameter of 0.408 inches, as shown as one cosmetic thread in the right of Figure 1. That corresponds to the “UNified series Fine” (UNF) standard thread diameters, but for graphical display you can use values reasonably close to the standard.

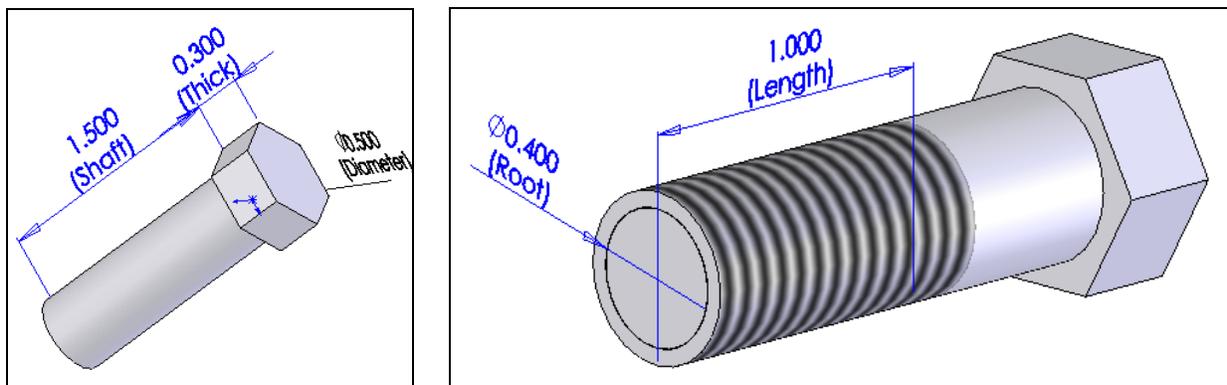


Figure 1 Typical bolt without and with cosmetic threads

The Unified Thread Standard (UTS) was established in 1949. It is still common in the United States but most of the world has converted to the metric International Organization for Standardization (ISO) standard. The UTS specifies the thread form, series, class, allowance, tolerance, and designation for unified screw threads. The UTS consists of Unified Coarse (UNC), Unified Fine (UNF), Unified Extra Fine (UNEF) and Unified Special (UNS). The ISO standard is based on metric rounded numbers and has been adopted world-wide and has displaced all former standards, including UTS. In the USA, where UTS is still prevalent, nearly half the fasteners are based on the ISO standard.

A true cosmetic thread is displayed in the part drawings in a standard symbolic way. That is the main advantage of formally creating them on a solid part. It is also possible to show the presence of threads in a quick way that does not produce a standard symbolism in the drawings, but conveys the same information through a note. That approach will be demonstrated first.

Fake thread with a note

In this simplified approach you begin with the bare bolt on the left in Figure 1 then:

1. **Top→Insert Sketch, Standard View→Top.**
2. Insert a split line where the threads stop with **Sketch→Line** and **Smart Dimension**.
3. **Insert→Curve→Split Line** and select the full cylindrical surface, **OK**.
4. Right click on the thread surface side of the surface split, click **Appearance→Texture** to open the **Selection** panel, as shown in Figure 2.
5. Select **Threads**, vary the spacing and angle to illustrate right or left threads, the number of starting threads, etc. Rotate the thread texture to verify that the threads match up around the circumference.
6. Then describe the standard thread you want by adding a note to the texture surface, **Insert→Annotation→Note**. Give the diameter, number of threads per inch (or length if metric), the standard code, quality, and thread length (see Figure 3).

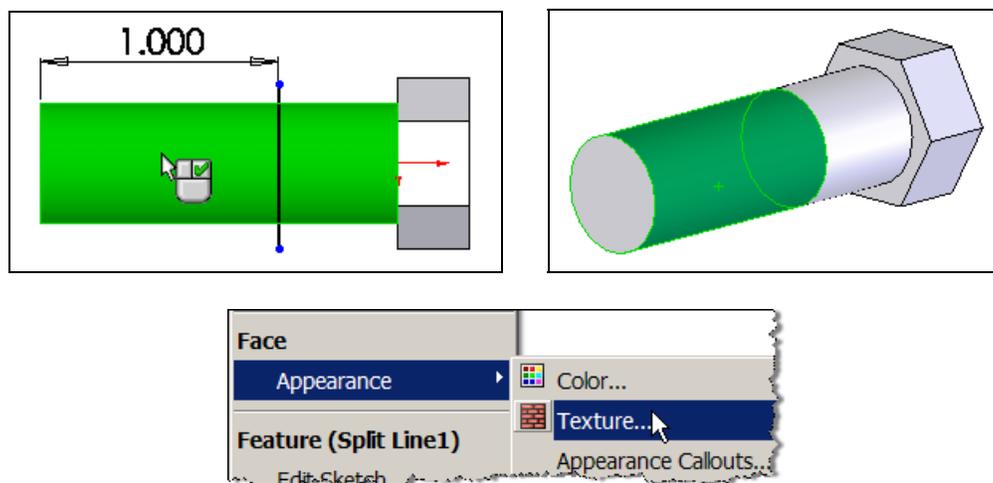


Figure 2 Selecting the surface to texture as a thread

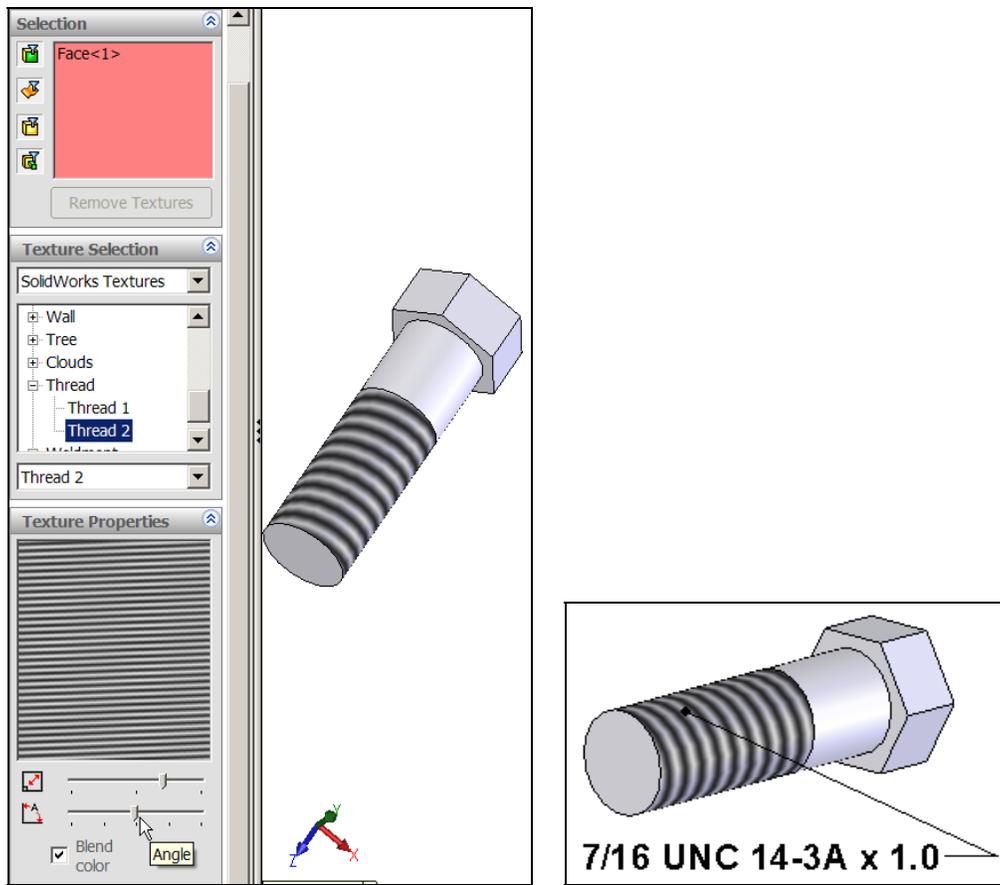


Figure 3 Selecting a "thread" texture and adding a descriptive note

Adding cosmetic thread

Here, the slower recommended process for creating thread displays that appear in the drawings. Having the part, with a cylindrical surface, open the display of a cosmetic thread is fairly simple:

1. **Insert**→**Annotations**→**Cosmetic Thread** will open the **Cosmetic Thread** panel (see
2. Figure 4).
3. If you did not pre-select a circular edge (of a cylindrical boss or hole) you will be prompted with a **Message** to select a starting circle.
4. In the **Cosmetic Thread** panel the edge name appears in the **Thread Setting**.
5. There also select a **Blind** thread extrusion, give its **length**, **D = 1.0**, and **diameter**, **0.4**, as seen in
6. Figure 5.

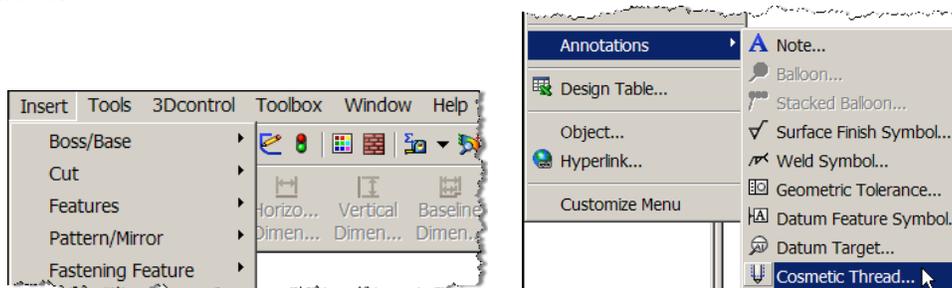


Figure 4 Selecting a cosmetic thread annotation type

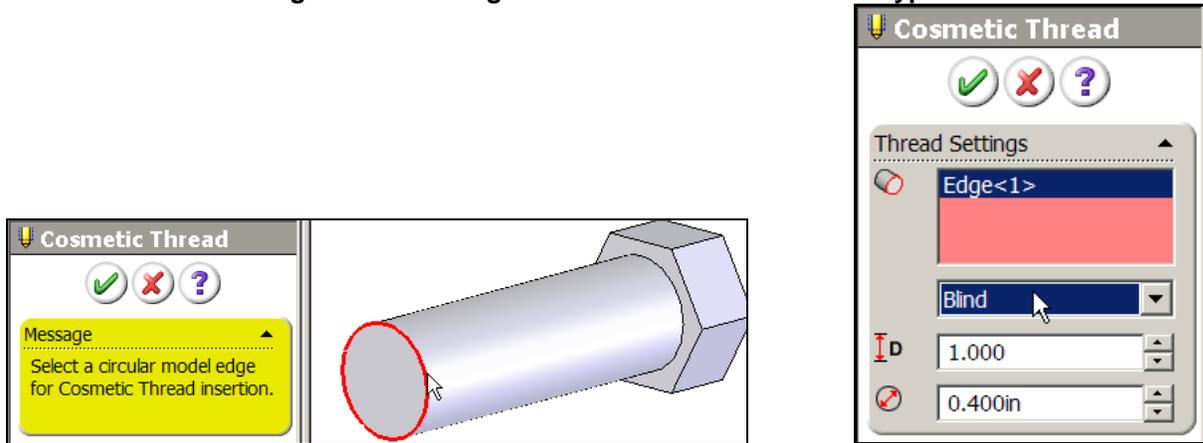


Figure 5 Picking the beginning circle edge and thread sizes

A circle of the given diameter will appear concentric with the starting edge to show that the cosmetic thread has been accepted. The default display mode is a simple line drawing in wireframe mode which is illustrated in Figure 6. To see the shaded circular form then:

1. **Tools**→**Options**→**Document Properties**→**Annotation Display**.
2. In the **Display filter** check **Shaded cosmetic threads**, as well as **Cosmetic threads** (as illustrated in Figure 7). The final result is seen in Figure 8.

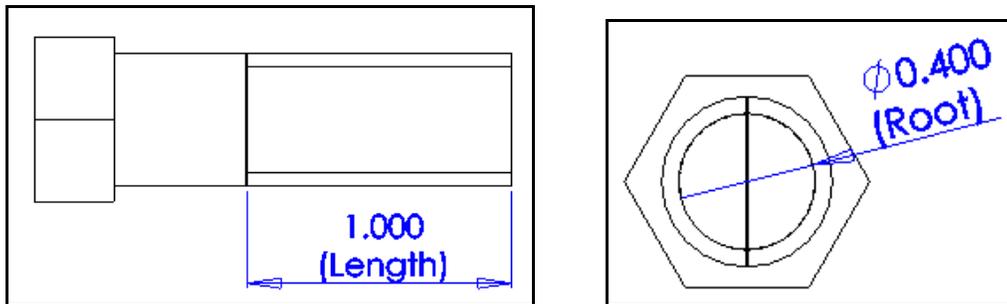


Figure 6 A wireframe view of cosmetic threads

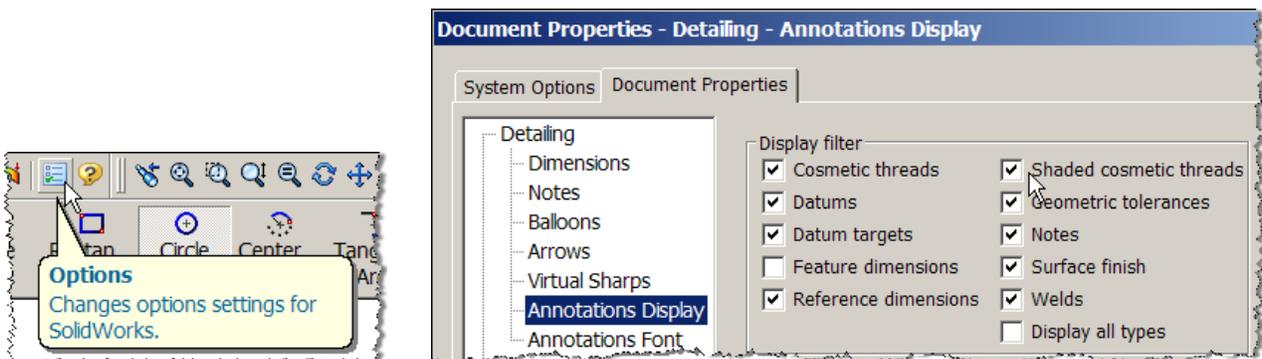


Figure 7 Changing the thread annotation display option

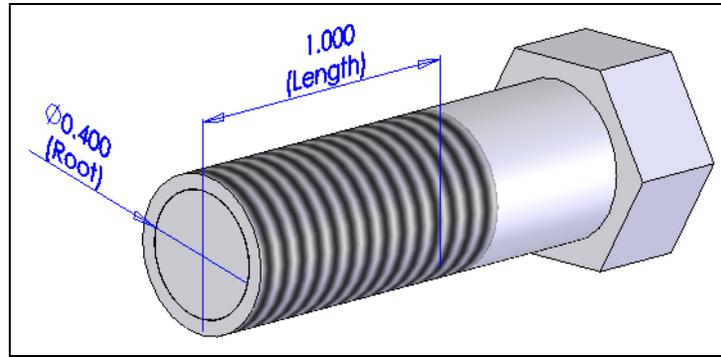


Figure 8 Resulting “threads”

References

1. W.E. Howard, J.C. Musto, *Introduction to Solid Modeling Using SolidWorks*, McGraw Hill, 2006.
2. SolidWorks online help feature for cosmetic threads

Appendix: Part construction steps

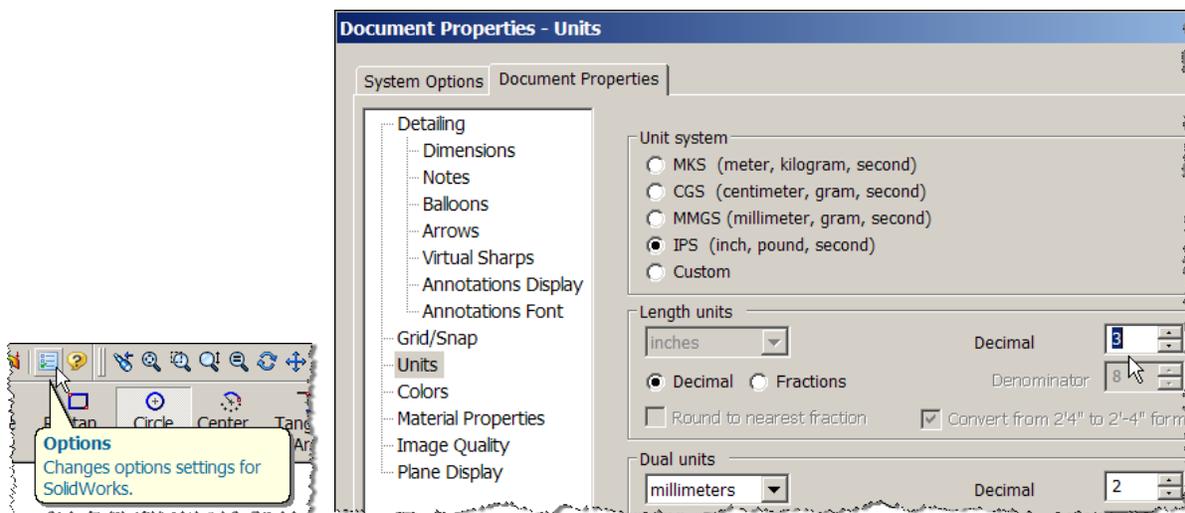


Figure 9

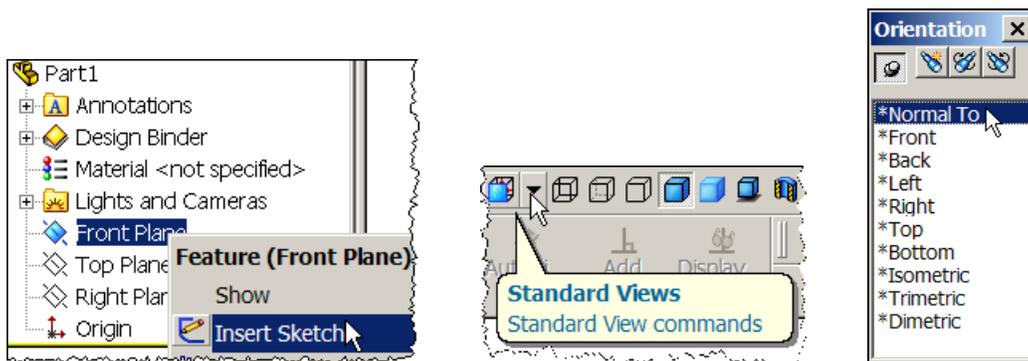


Figure 10

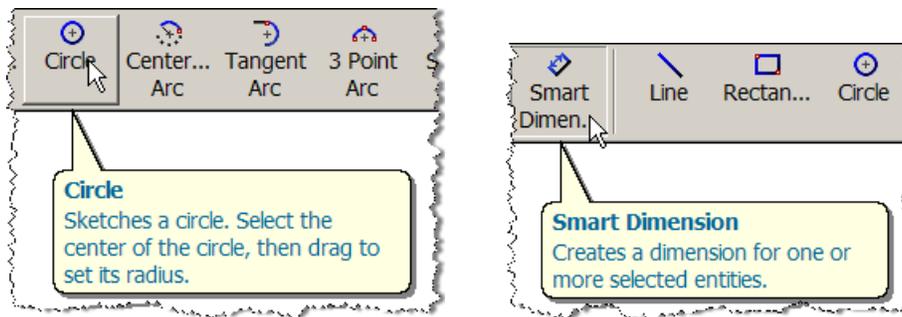


Figure 11

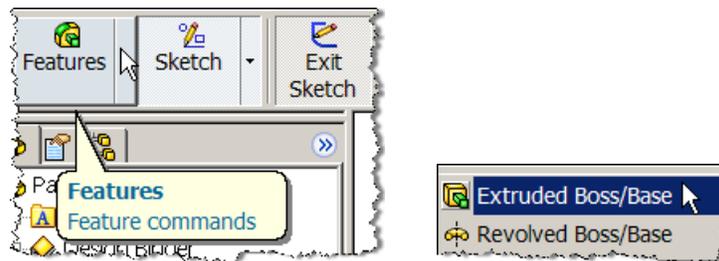


Figure 12

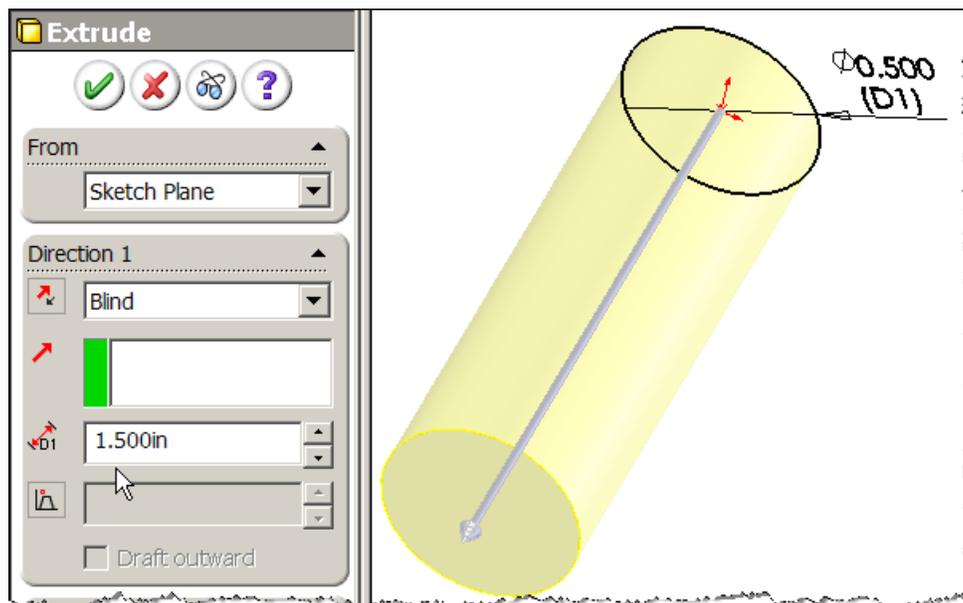


Figure 13

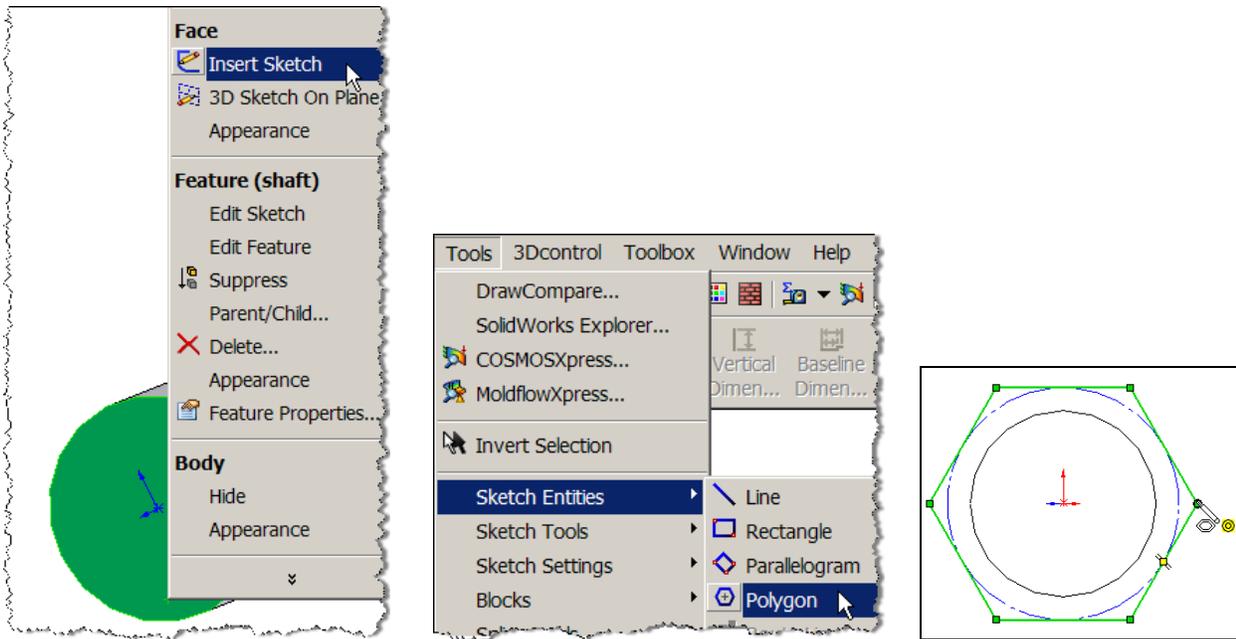


Figure 14

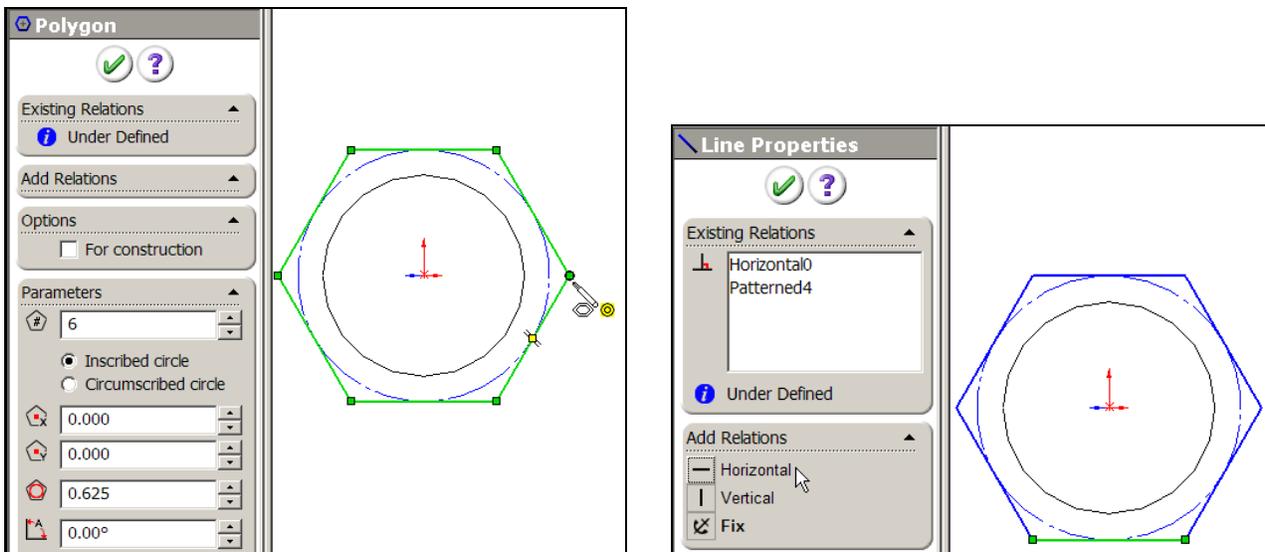


Figure 15

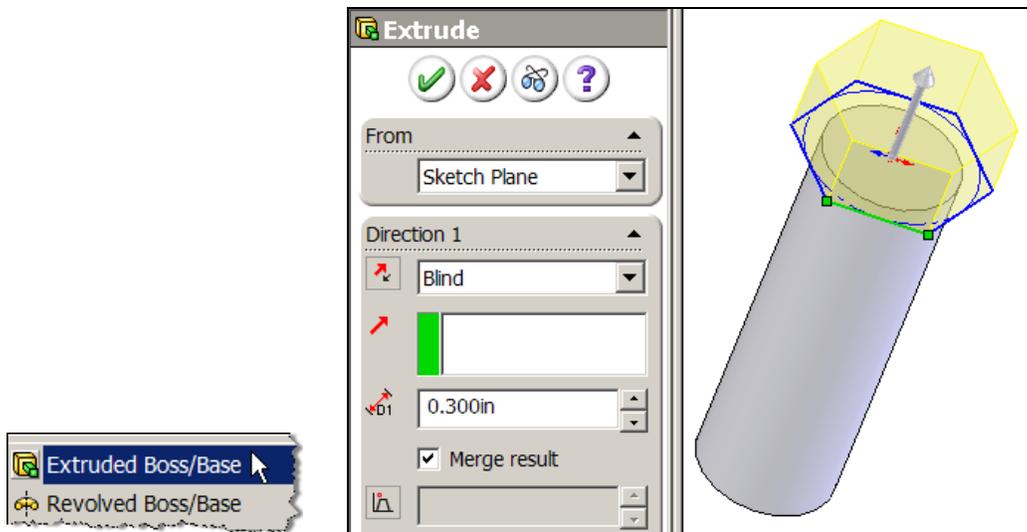


Figure 16

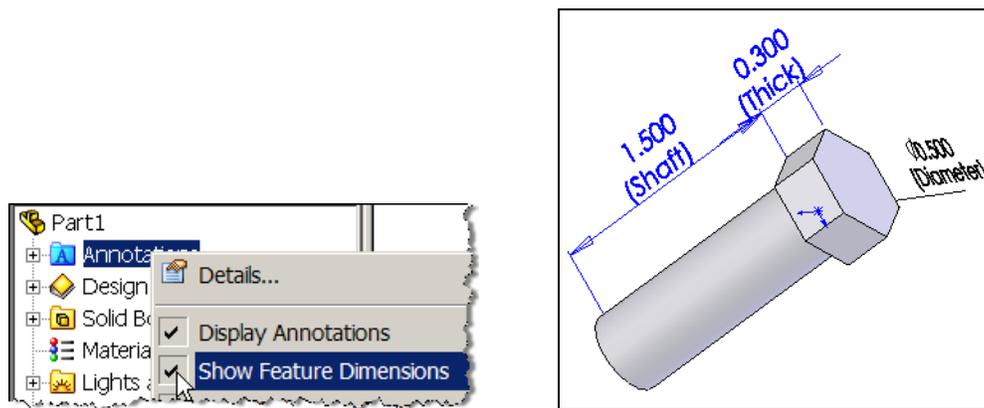


Figure 17