

Chapter 2

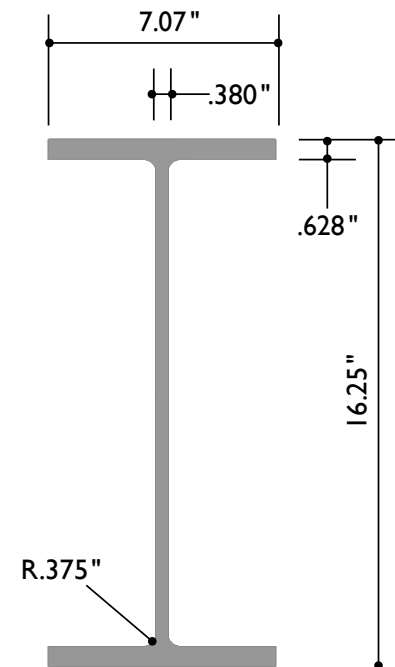
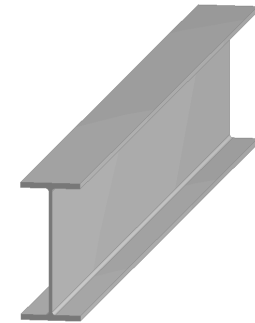
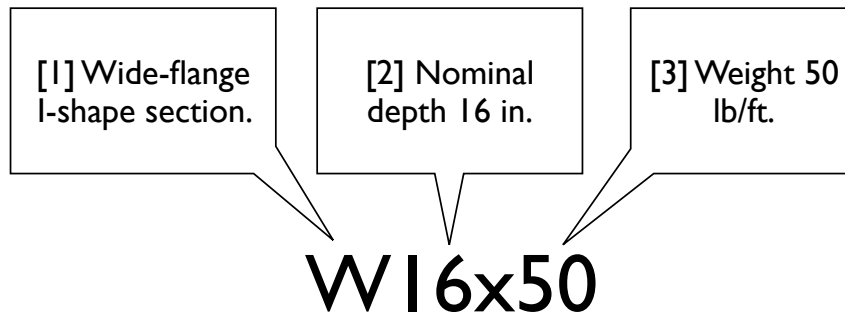
Sketching

- 2.1 W16x50 Beam
- 2.2 Triangular Plate
- 2.3 More Details
- 2.4 M20x2.5 Threaded Bolt
- 2.5 Spur Gears
- 2.6 Microgripper
- 2.7 Review

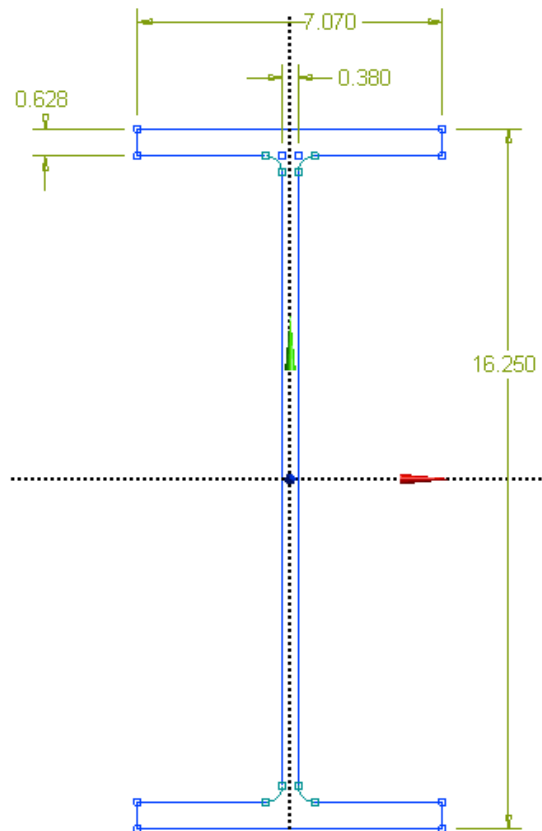
Section 2.1

W16x50 Beam

Problem Description

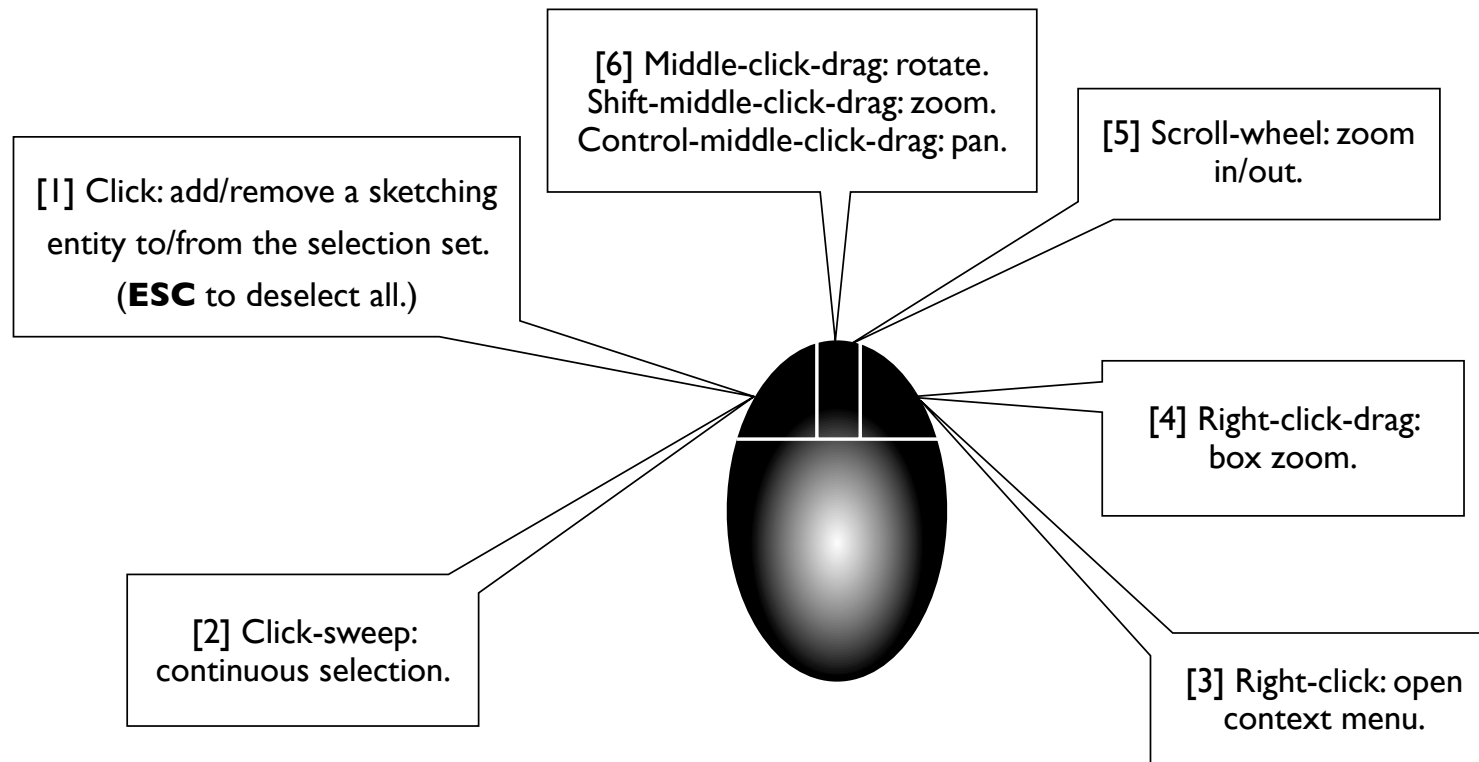


Techniques/Concepts



- Start up DesignModeler
- Sketching/Modeling modes
- Draw>Rectangle
- Draw>Polyline
- Dimensions>General
- Dimension>Horizontal
- Dimensions>Display
- Dimensions>Move
- Modify>Copy/Paste
- Modify>Trim
- Modify>Fillet
- Constraints>Symmetry
- Auto Constraints
- Constraint Status
- Extrude

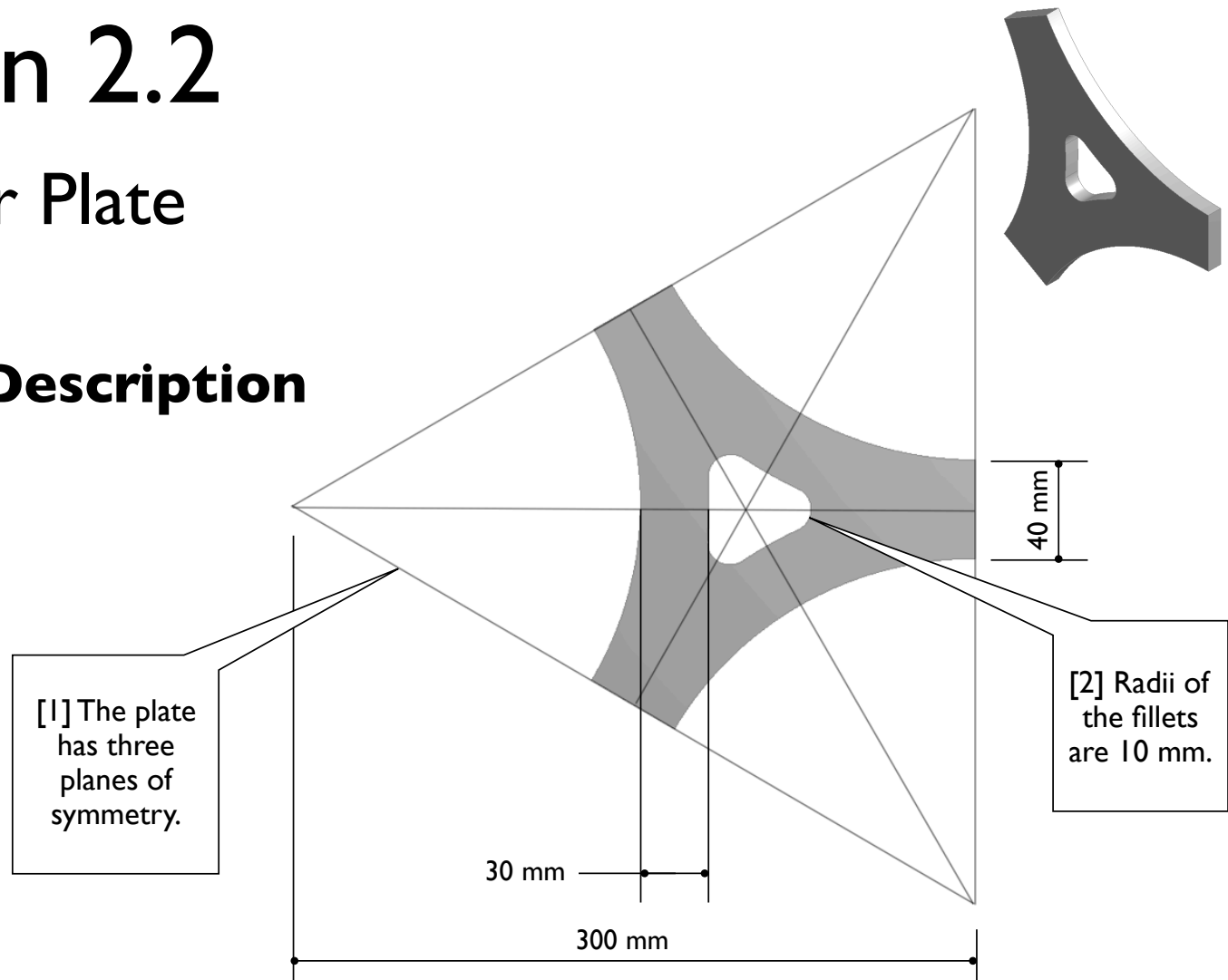
Basic Mouse Operations in Sketching Mode



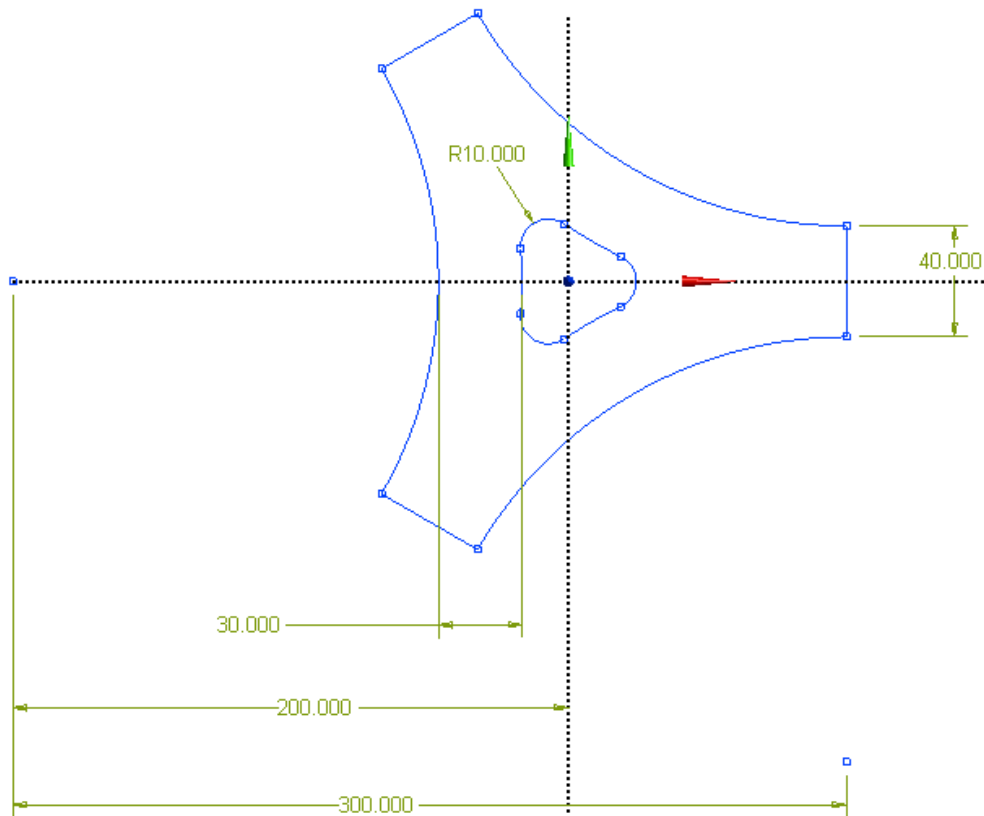
Section 2.2

Triangular Plate

Problem Description

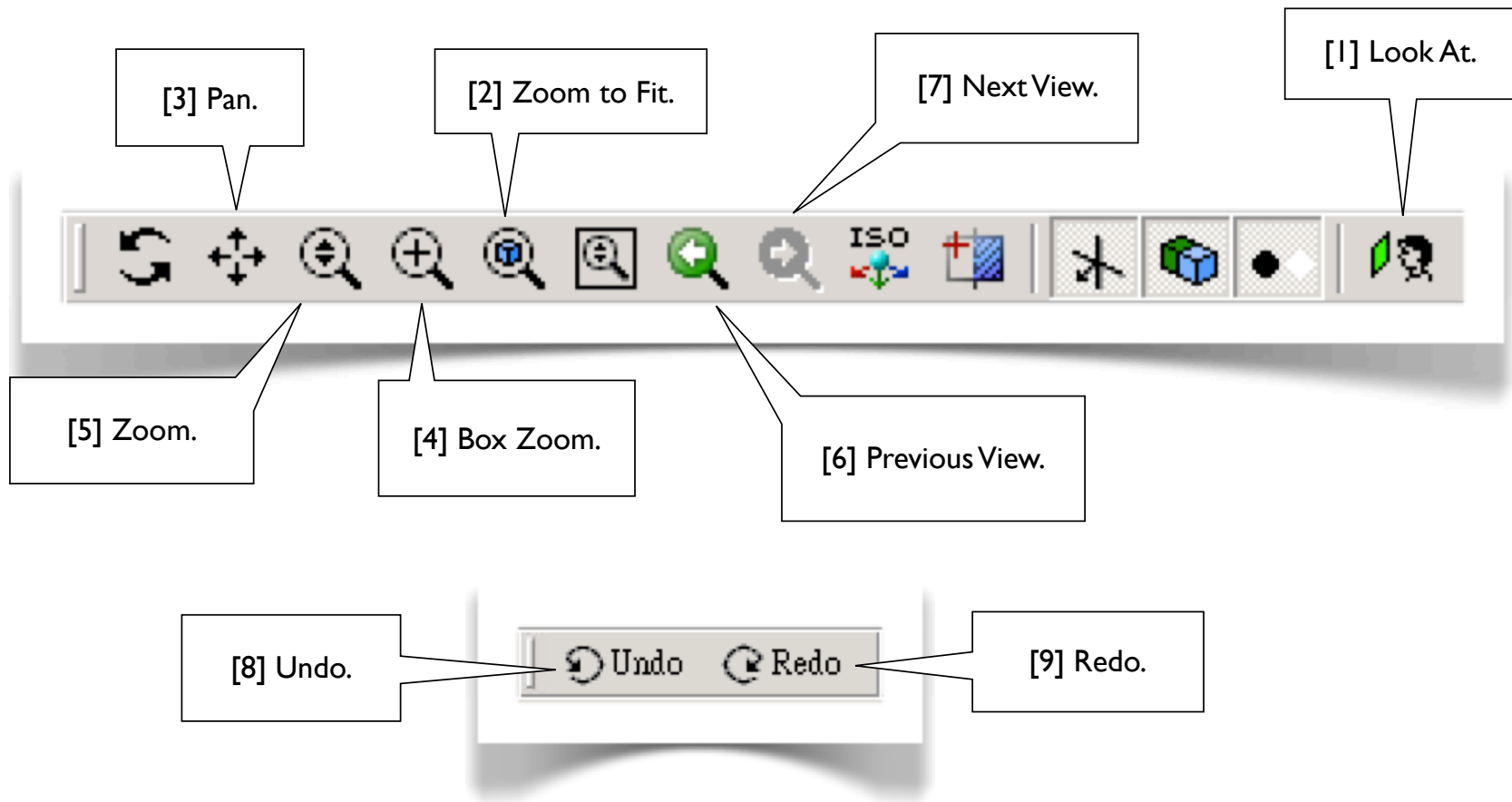


Techniques/Concepts



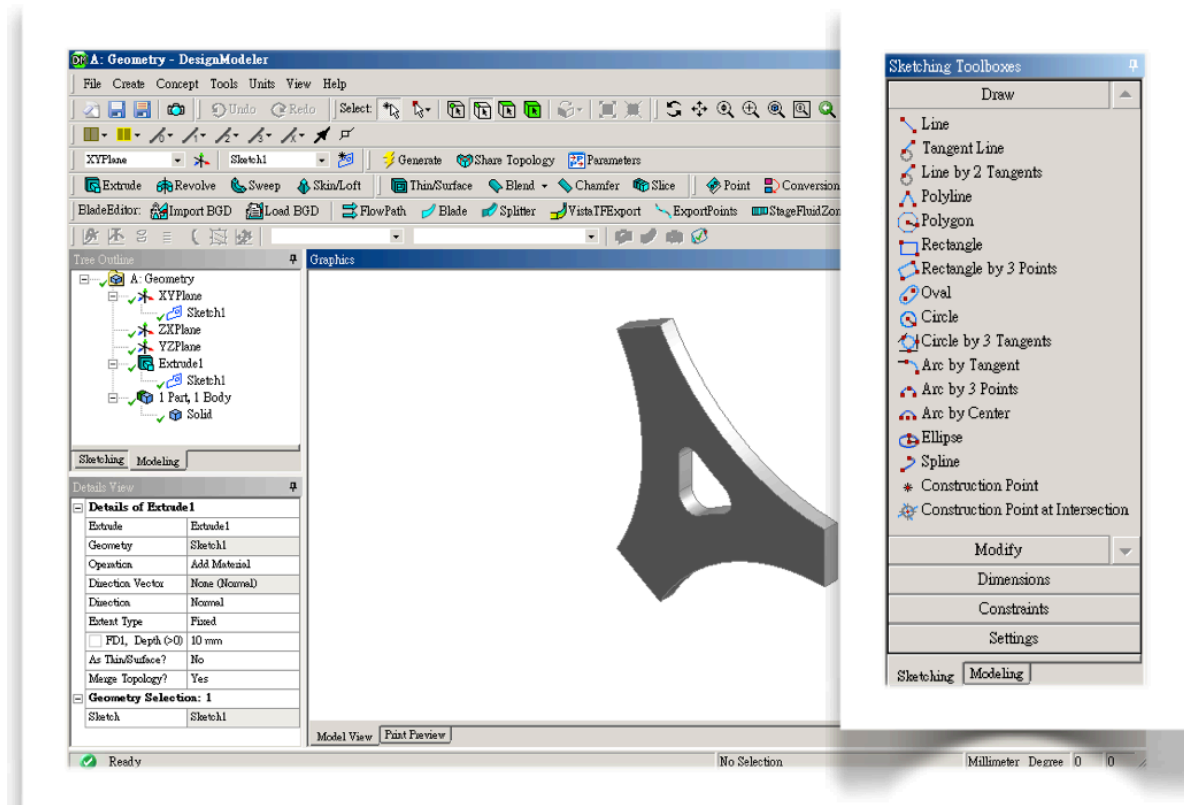
- Draw>Arc by Center
- Dimensions> Radius
- Modify>Replicate
- Modify>Offset
- Constraints>Equal Length
- Selection Filter
- Single/Box Selection

2D Graphics Controls



Section 2.3 More Details

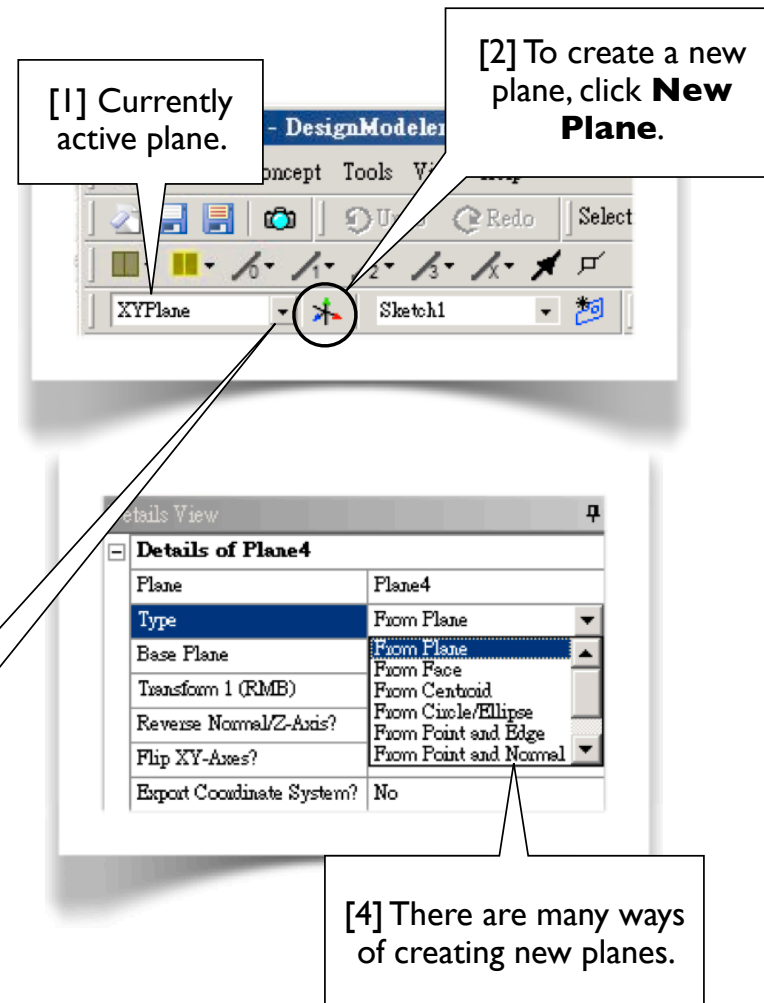
- Pull-down Menus and Toolbars
- Mode Tabs
- Tree Outline
- Sketching Toolboxes
- Graphics area
- Details View
- Status Bar
- Separators



Sketching Planes

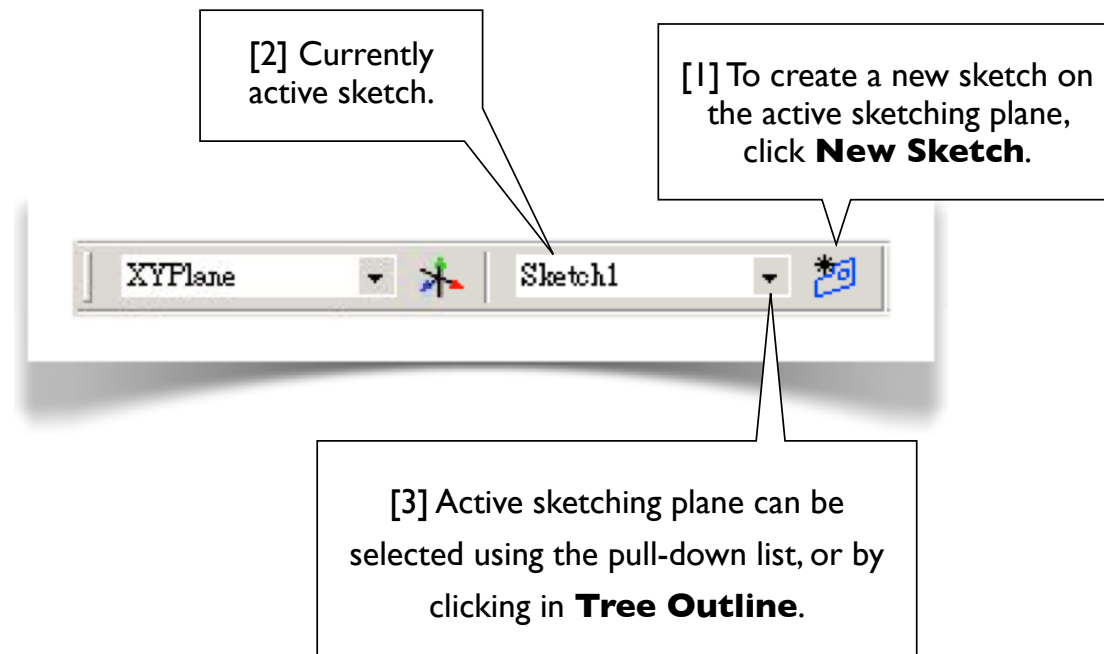
- A sketch must be created on a *sketching plane*; each plane may contain multiple sketches.
- In the beginning of a DesignModeler session, three planes are automatically created: XYPlane, YZPlane, and ZXPlane.

[3] Active sketch can be switched using the pull-down list, or by clicking in **Tree Outline**.



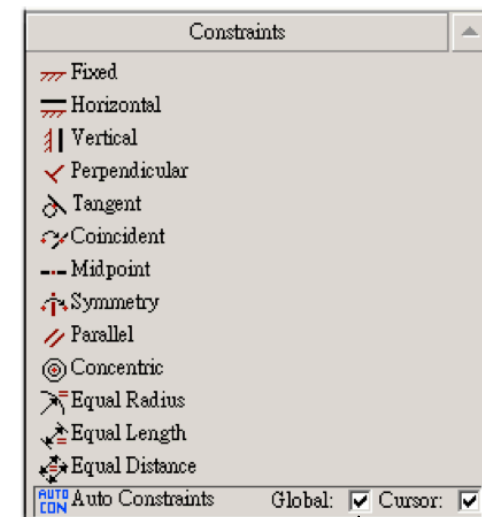
Sketches

- A sketch consists of *points* and *edges*; edges may be straight lines or curves.
- Multiple sketches may be created on a plane.



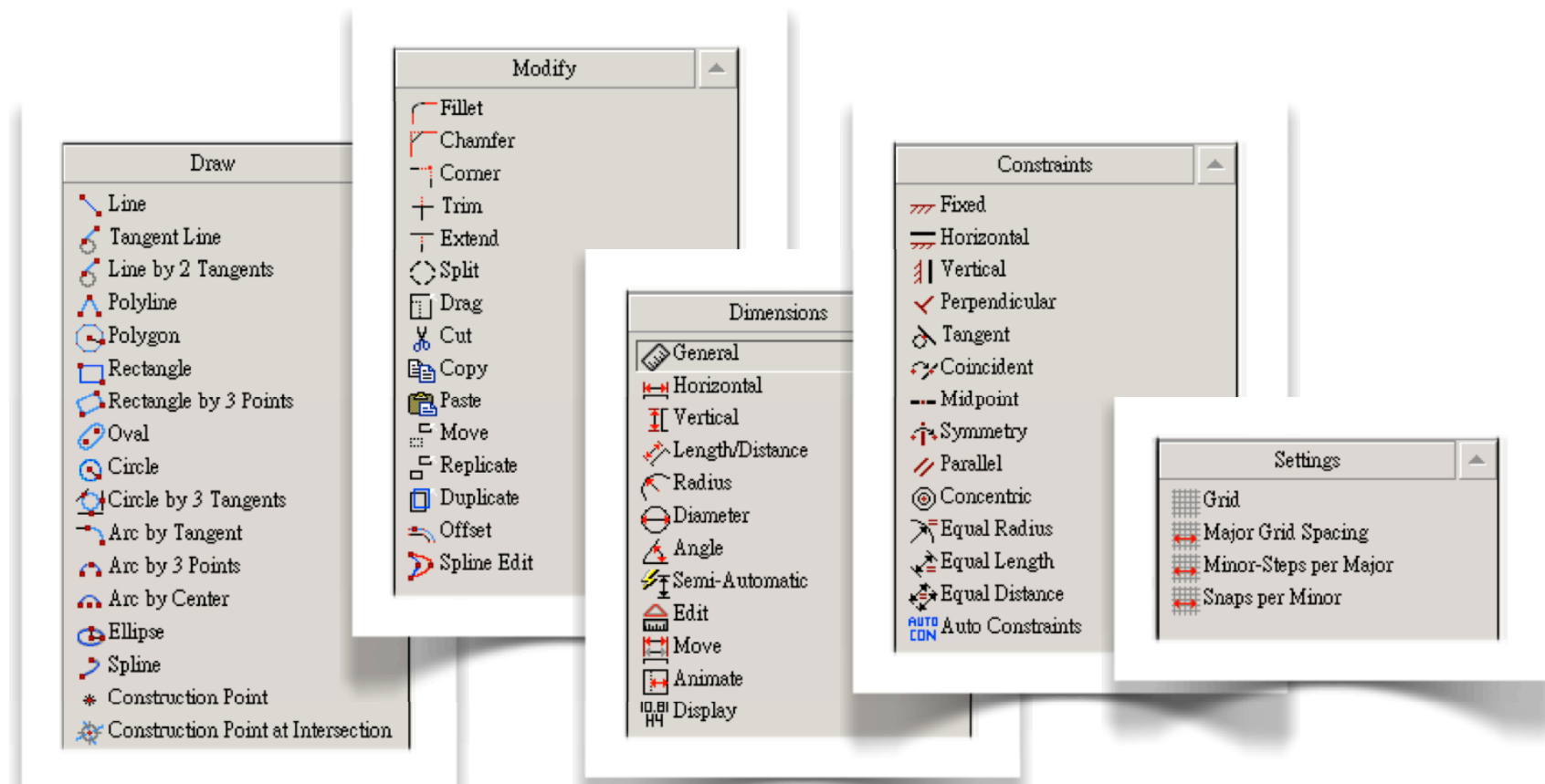
Auto Constraints

- C - The cursor is coincident with a line.
- P - The cursor is coincident with another point.
- T - The cursor is a tangent point.
- $\perp$ - The cursor is a perpendicular foot.
- H - The line is horizontal.
- V - The line is vertical.
- // - The line is parallel to another line.
- R - The radius is equal to another radius.



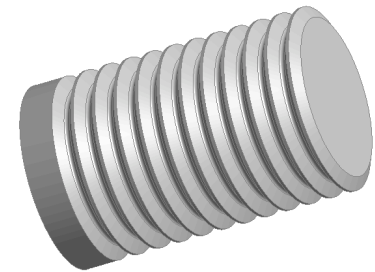
You can turn on/off **Auto Constraints**.

Sketching Toolboxes

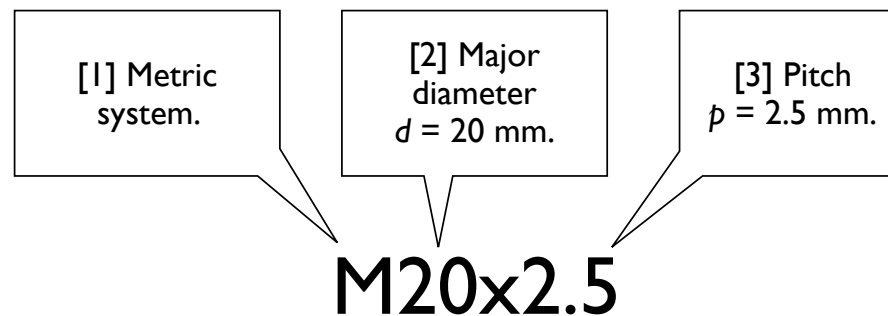


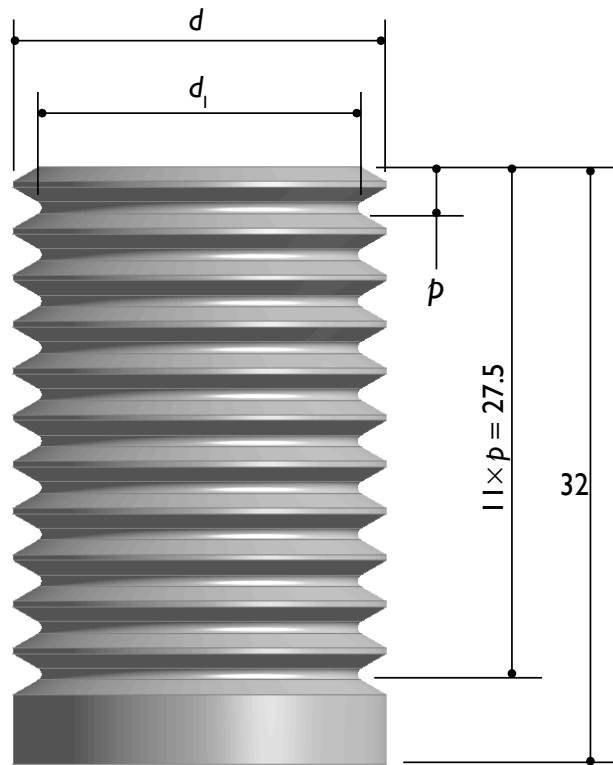
Section 2.4

M20x2.5 Threaded Bolt



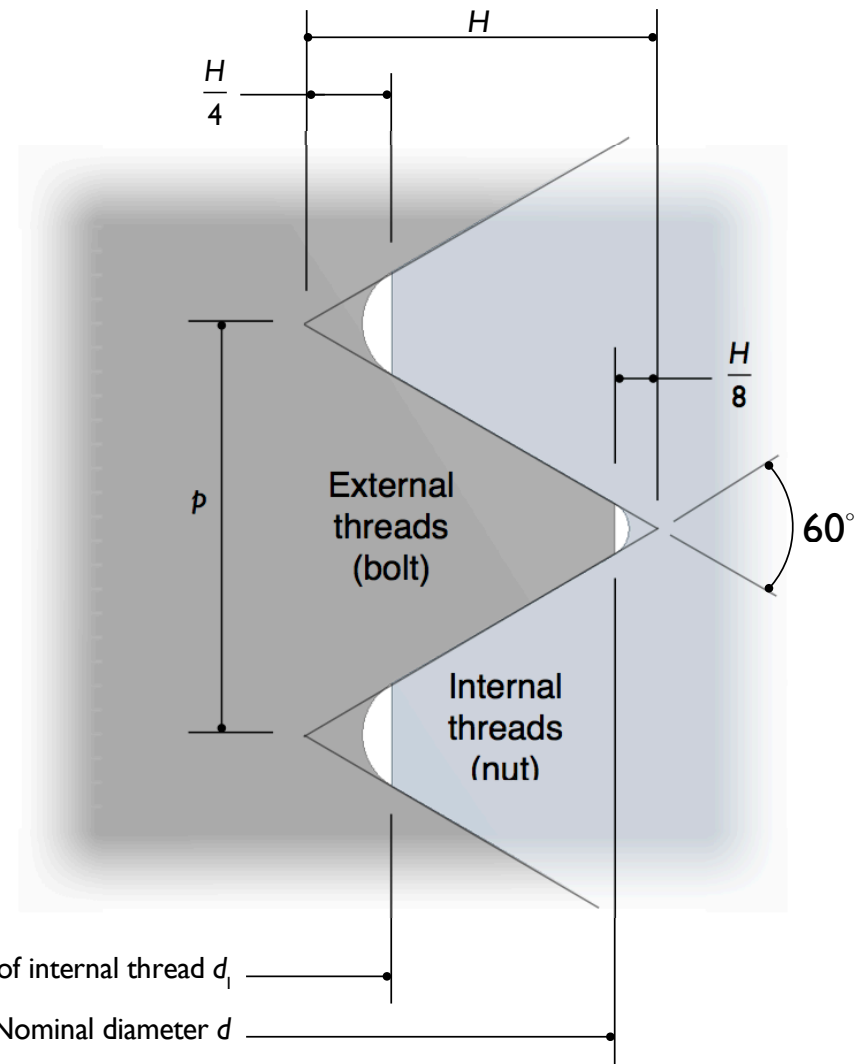
Problem Description





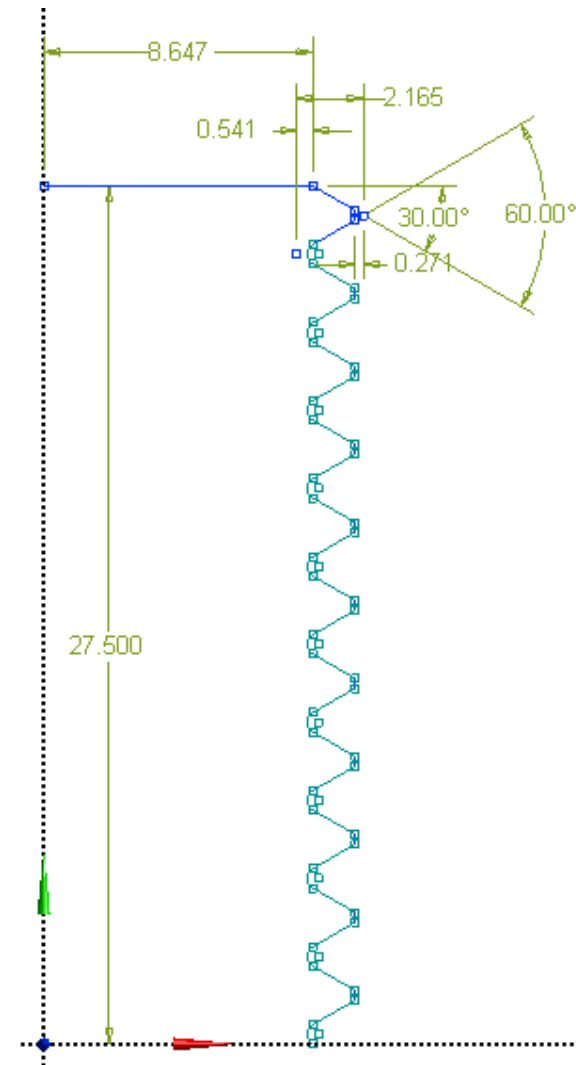
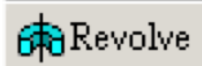
$$H = (\sqrt{3}/2)p = 2.165 \text{ mm}$$

$$d_i = d - (5/8)H \times 2 = 17.294 \text{ mm}$$



Techniques/Concepts

- Dimensions>Angle
- Modify>Replicate
- Revolve

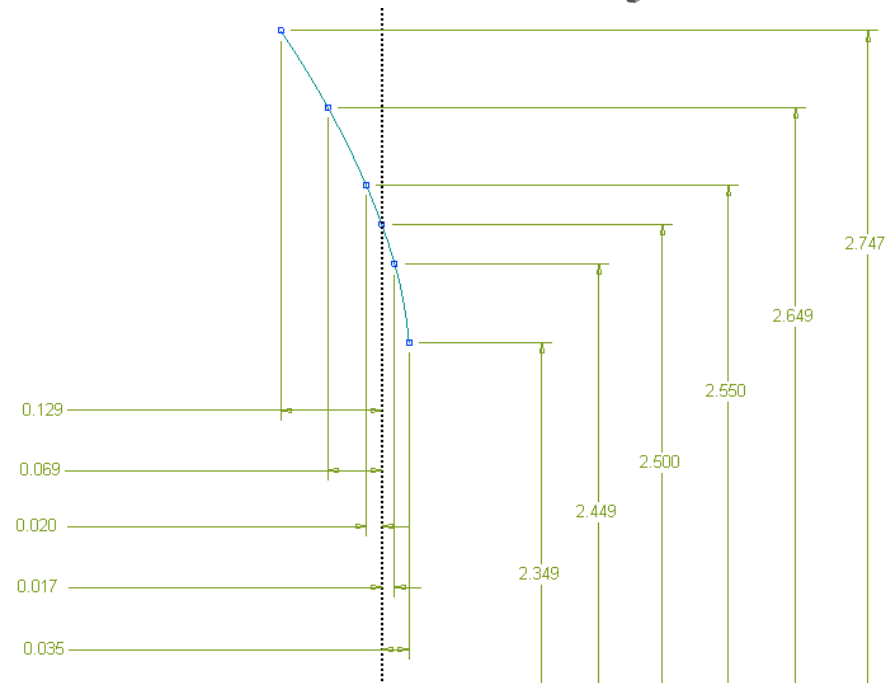
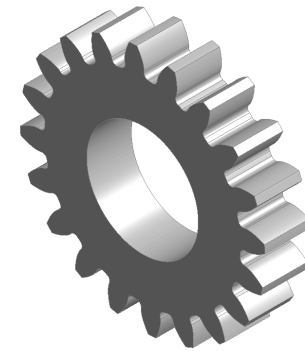


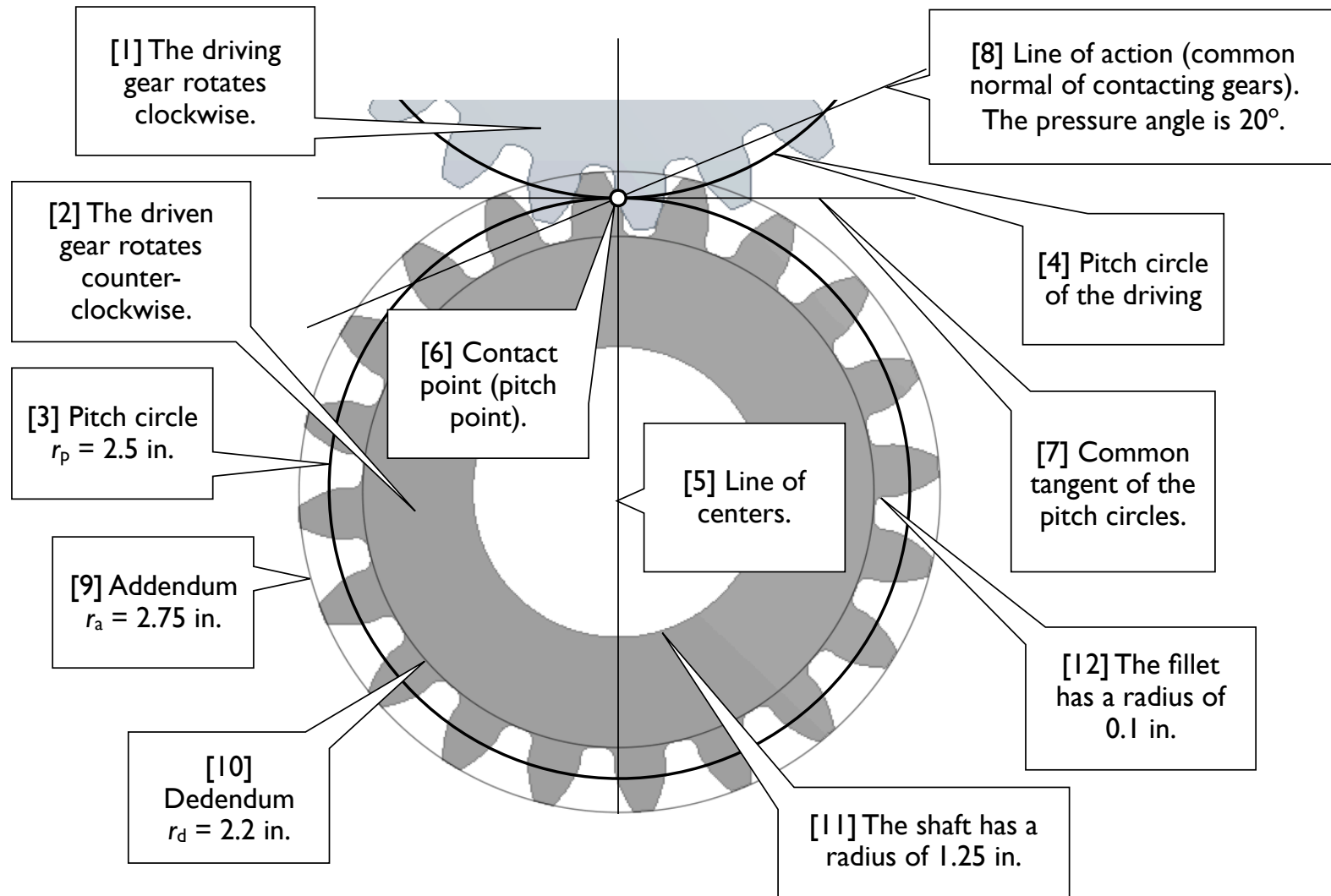
Section 2.5

Spur Gears

Problem Description

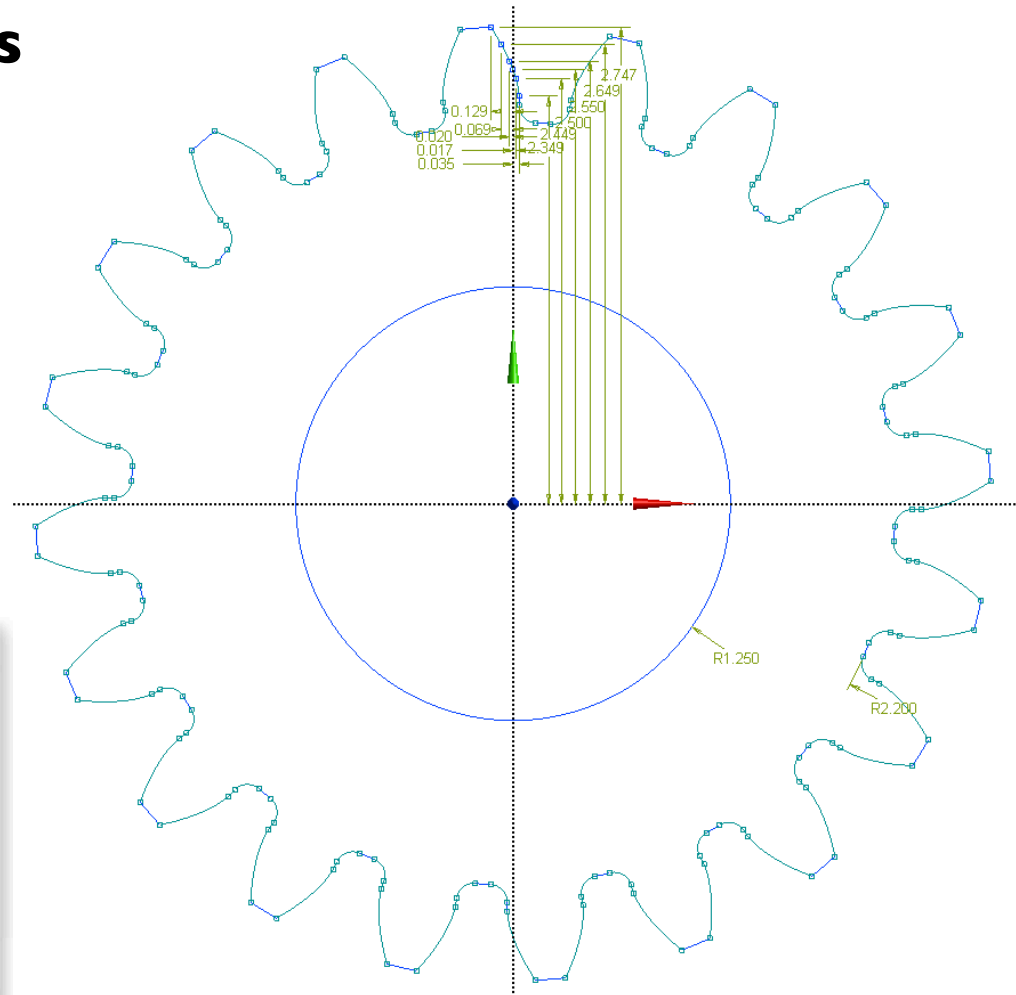
- To satisfy the fundamental law of gearing, the gear profiles are cut to an *involute curve*.





Techniques/Concepts

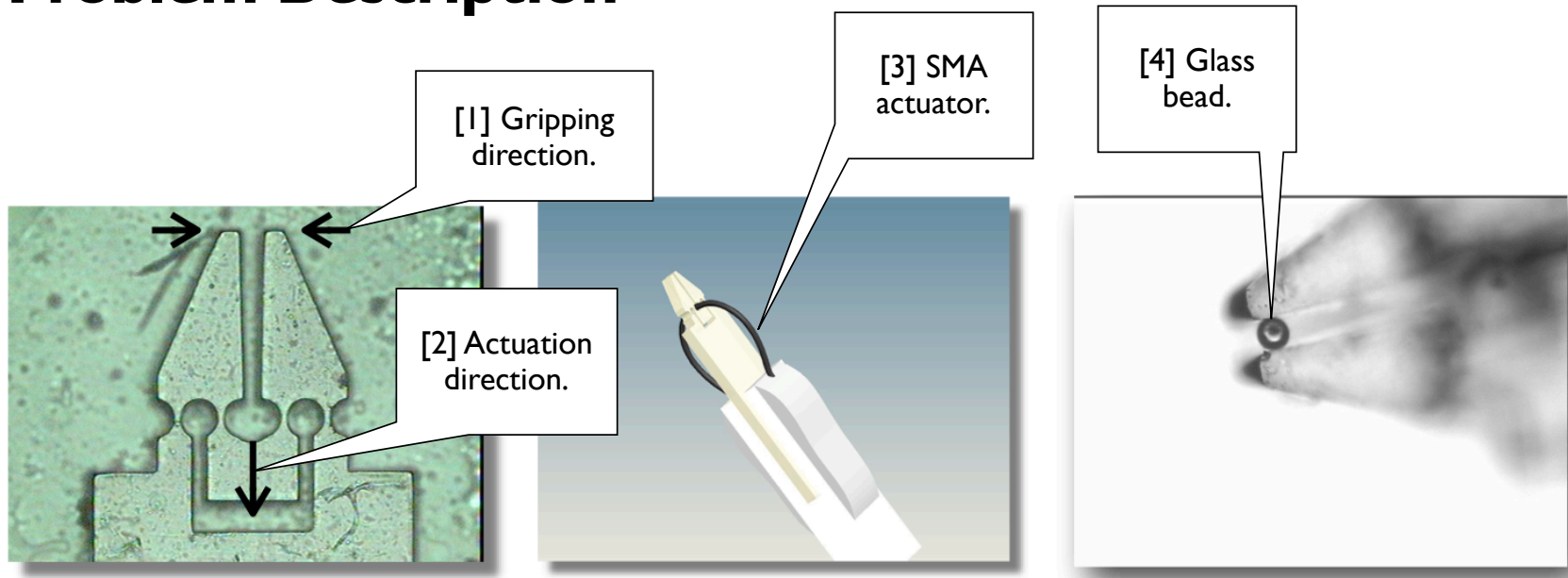
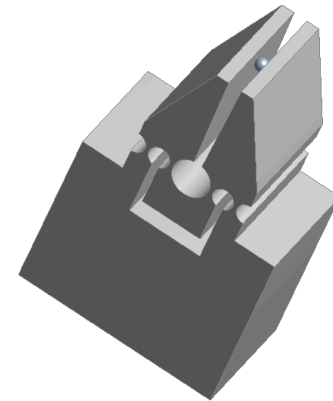
- Draw>Construction Point
- Draw>Spline
- Modify>Replicate
- Constraints>Perpendicular

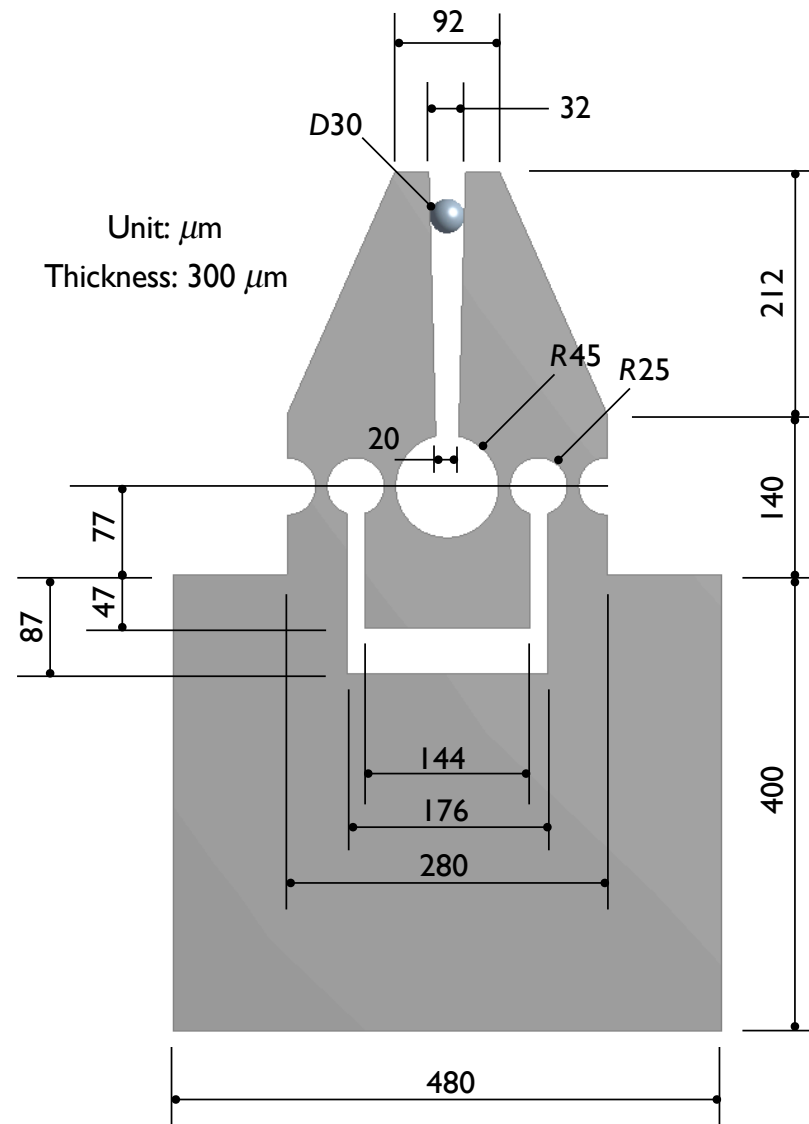


Section 2.6

Microgripper

Problem Description





Techniques/Concepts

- Constraints>Equal Radius
- Copy bodies (Mirror)
- Create new sketch
- Constraints>Tangent
- Multiple parts

