

MIT OpenCourseWare
<http://ocw.mit.edu>

2.007 Design and Manufacturing I
Spring 2009

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.



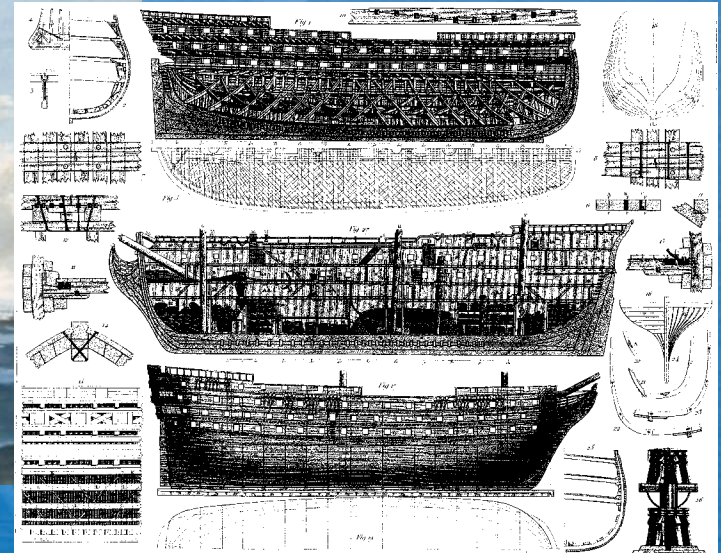
Introduction to CAD

- Basic parts 1 -

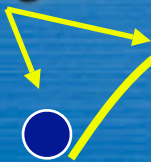
2.007 Spring 2009

Prof. David Gossard

On Splines (a tangent...)



Weights



Thin strip



On Splines (a tangent...)

- Flexure

$$M = EI \frac{dy^2}{dx^2}$$

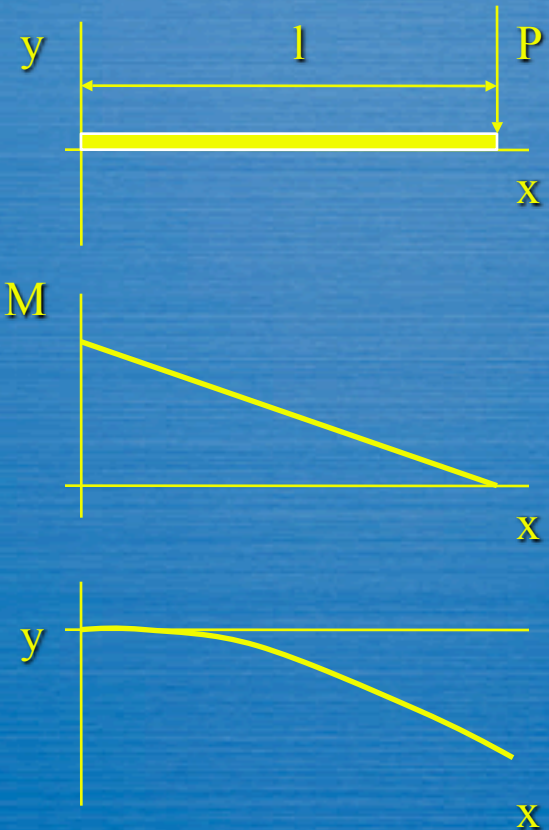
- Moment

$$M(x) = P(l - x)$$

- Displacement

$$y(x) = \frac{P}{EI} \left(\frac{l}{2} x^2 - \frac{1}{6} x^3 \right)$$

Cubic polynomial in x !



On Splines (a tangent...)

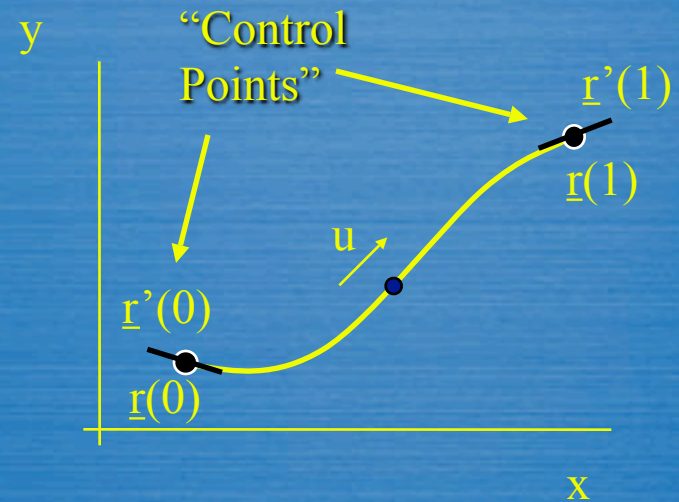
■ Cubic splines

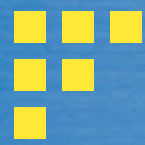
$$\underline{r}(u) = [1 \quad u \quad u^2 \quad u^3] \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -3 & 3 & -2 & -1 \\ 2 & -2 & 1 & 1 \end{bmatrix} \begin{bmatrix} \underline{r}(0) \\ \underline{r}(1) \\ \underline{r}'(0) \\ \underline{r}'(1) \end{bmatrix}$$

■ Refinements:

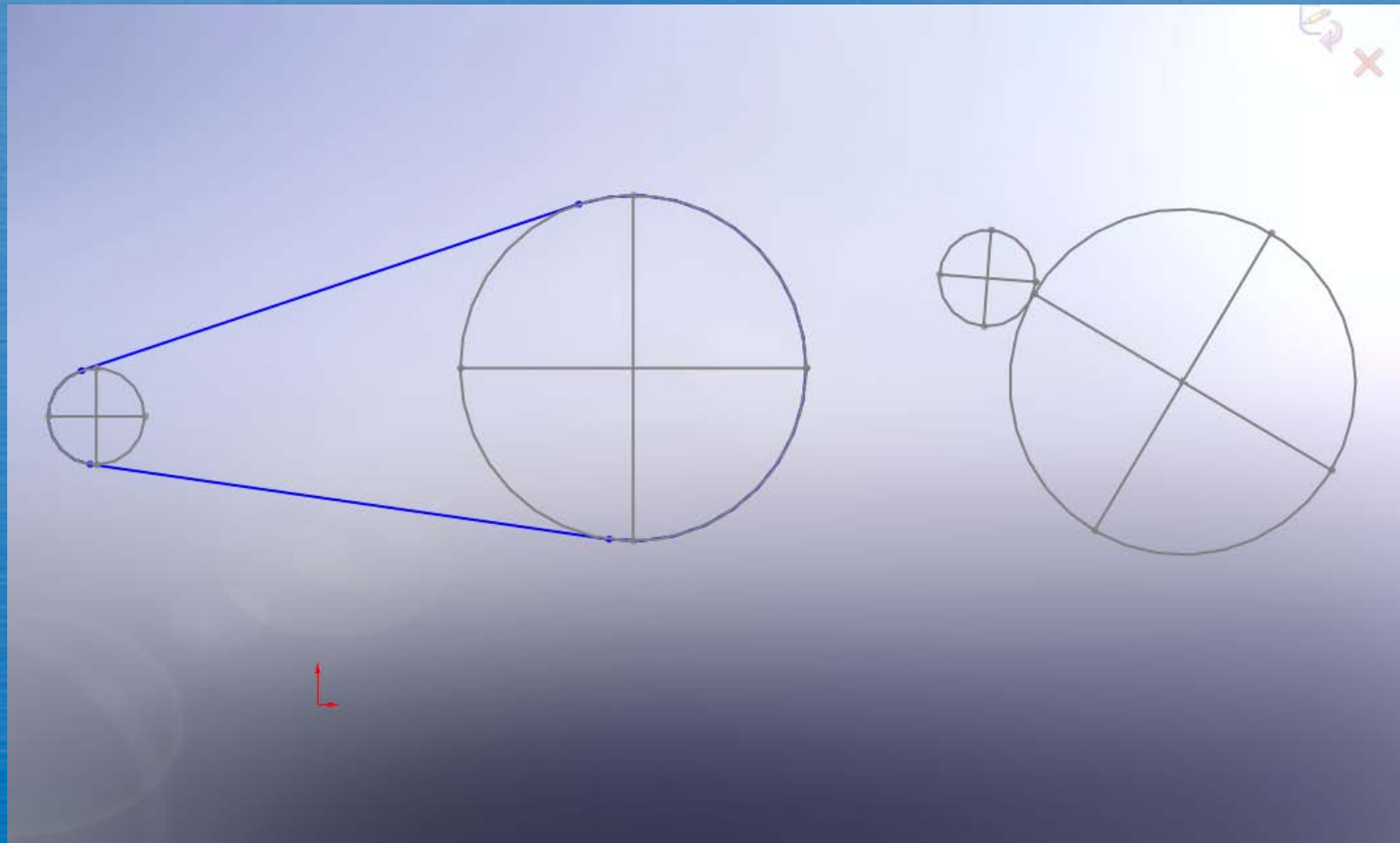
- B-splines
- Non-Uniform Rational B-splines (NURBS)

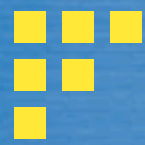
■ Curves and Surfaces !



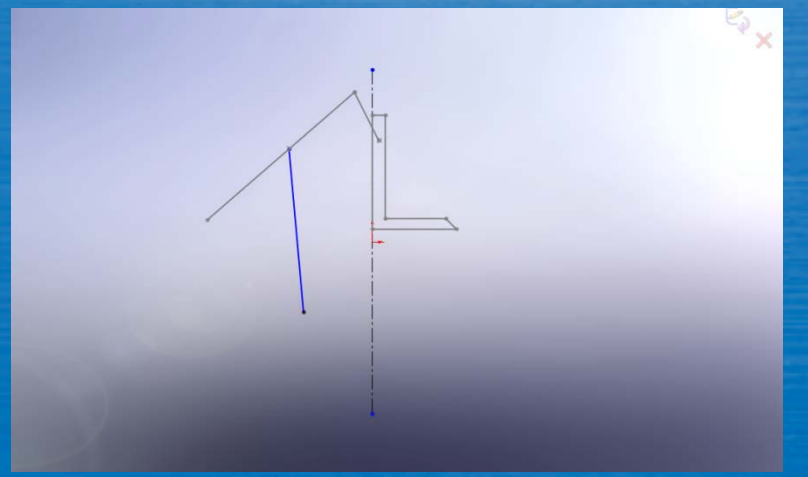
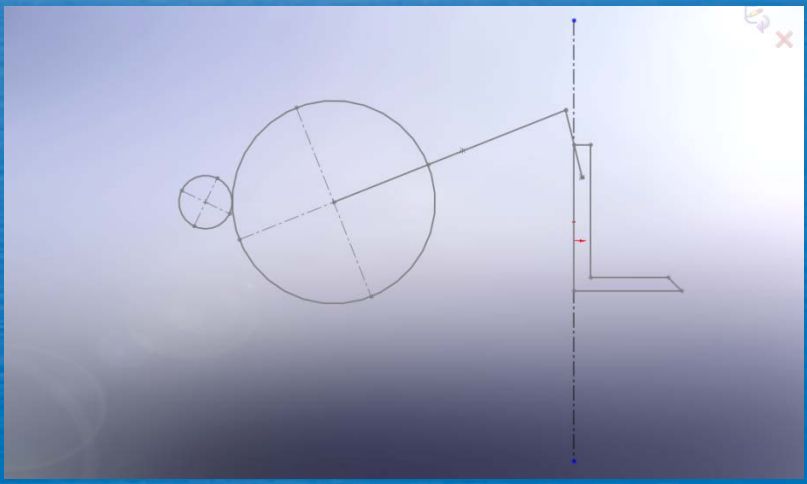
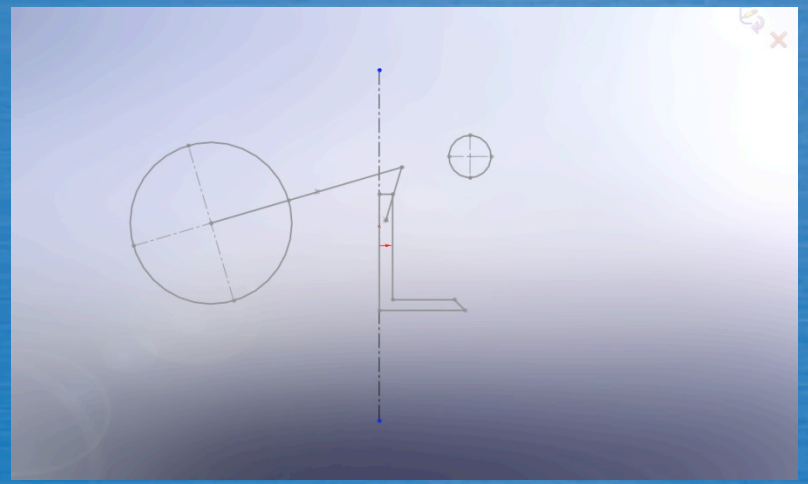
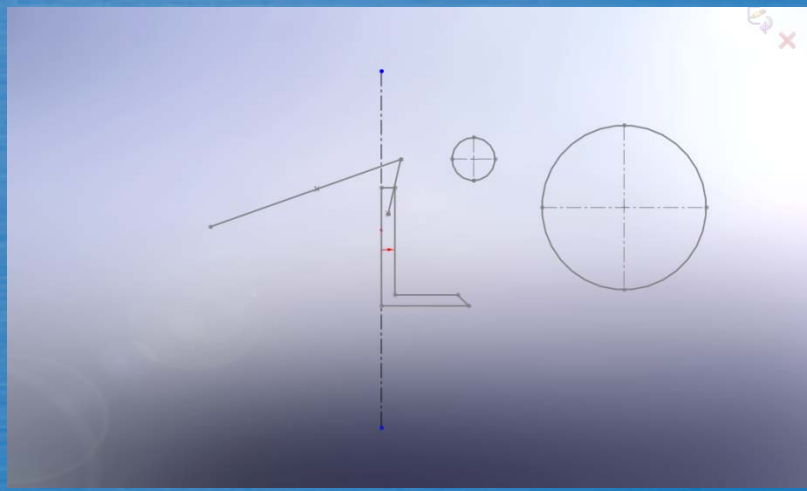


Belts & Gears

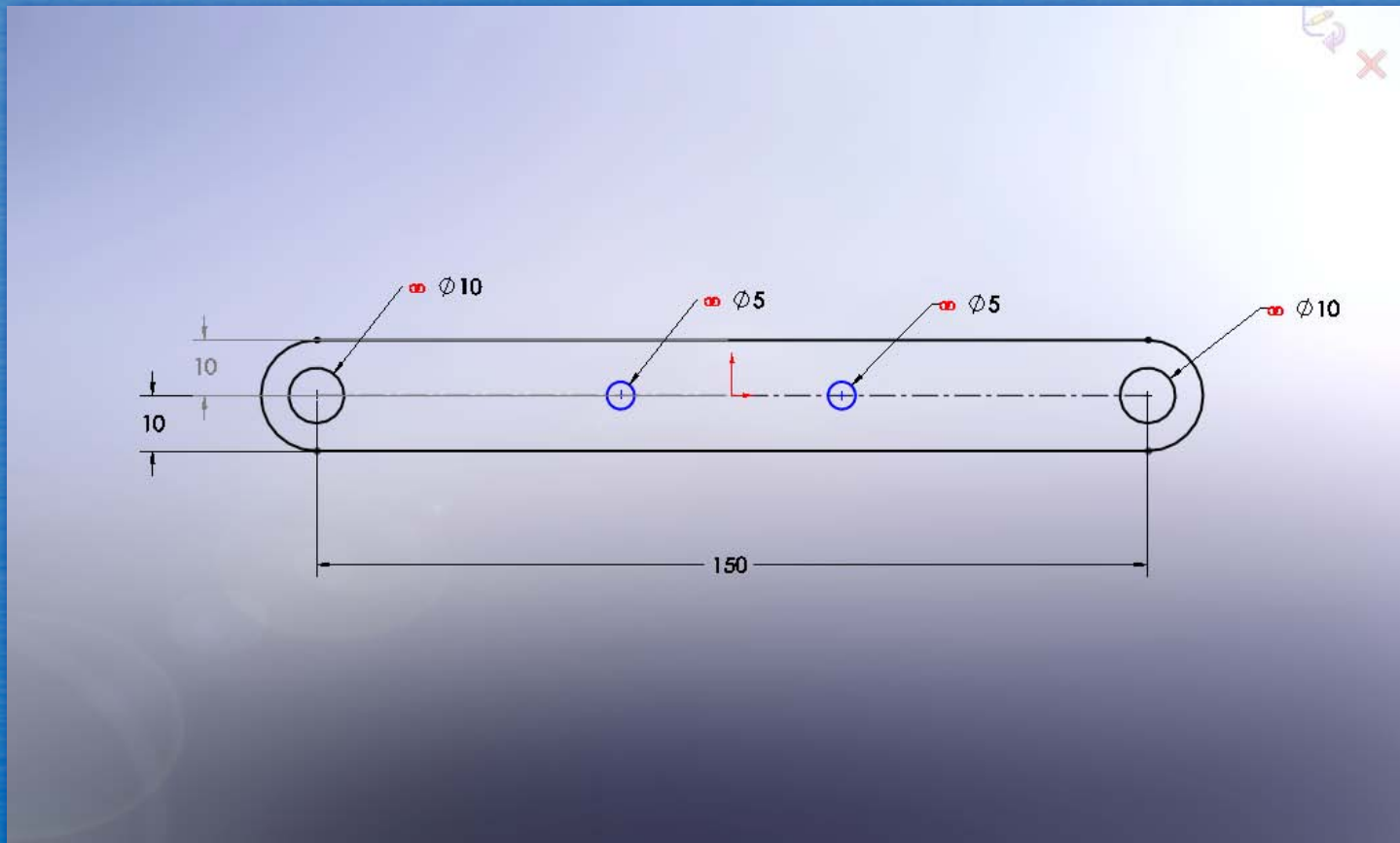


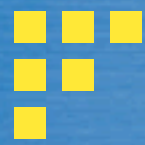


Case Study – Fork Lift

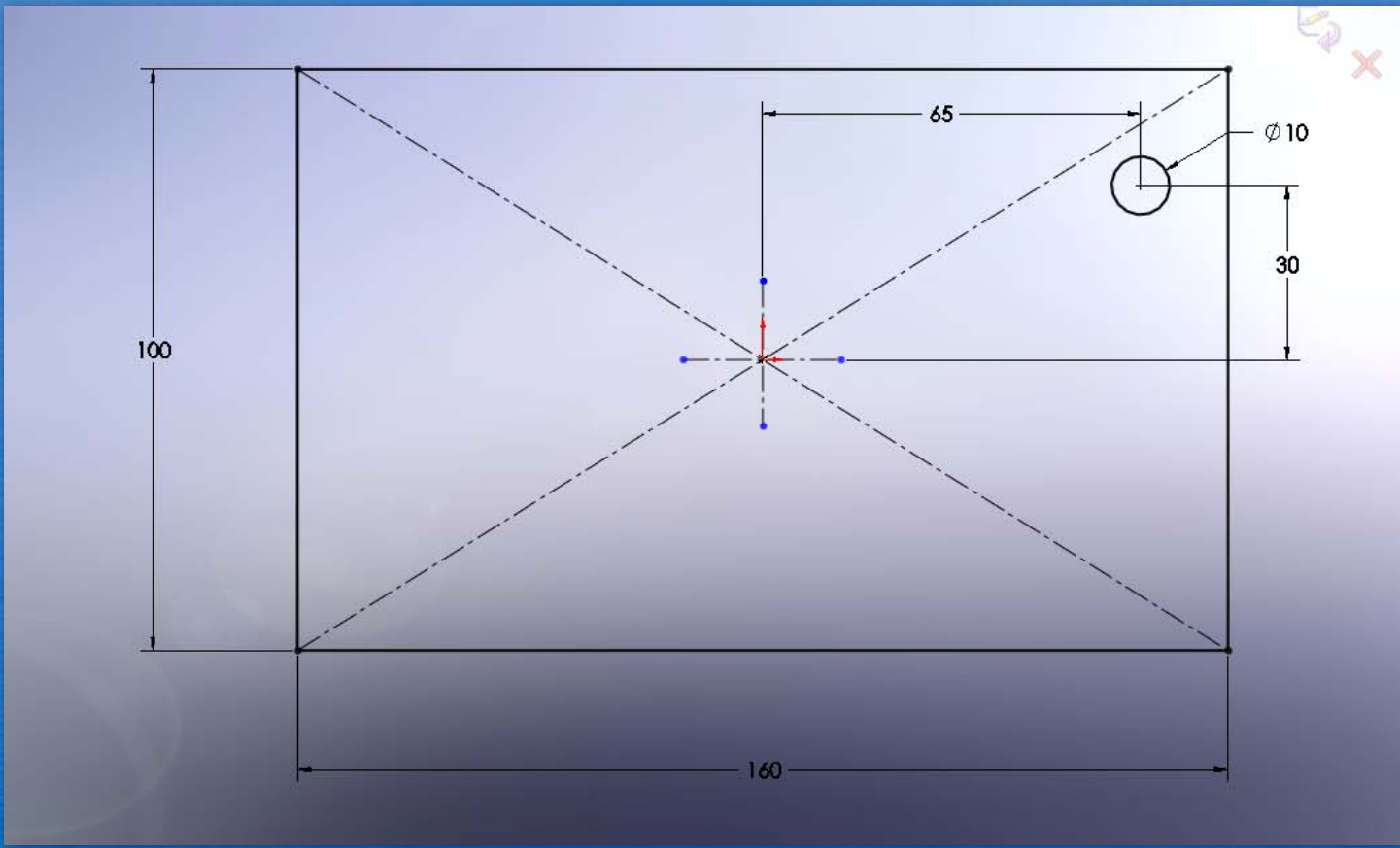


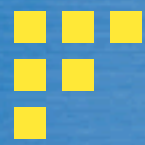
Offset Entities, Link Value



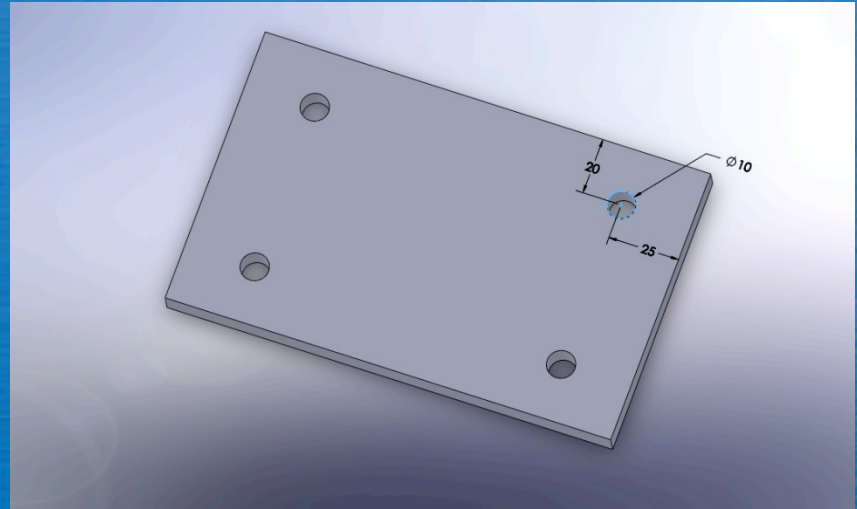
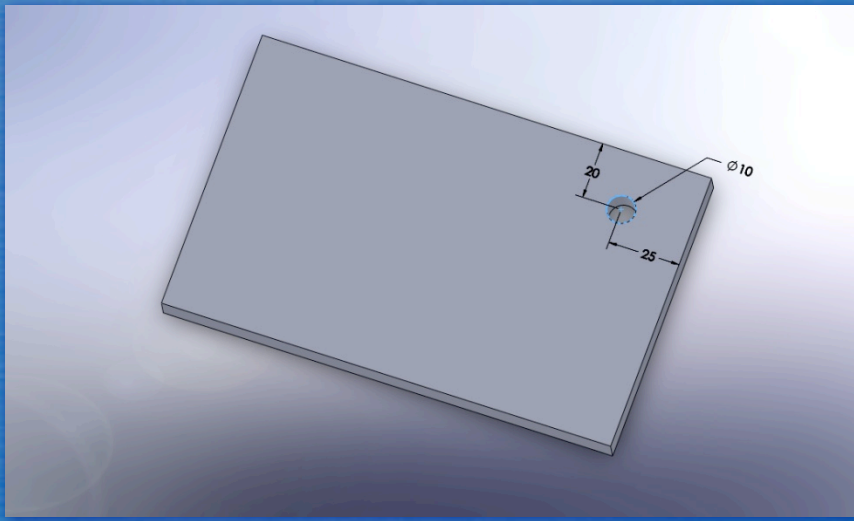


Mirror Entities

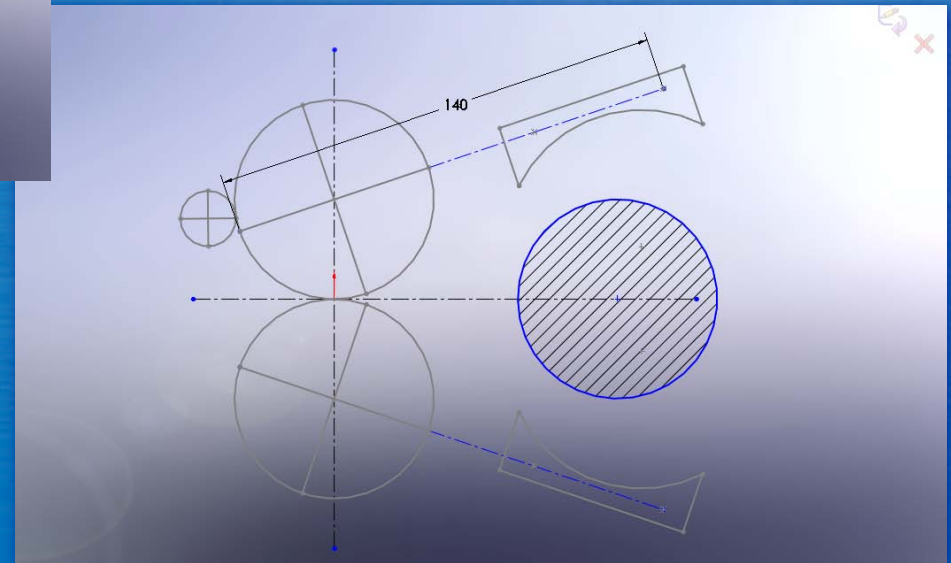
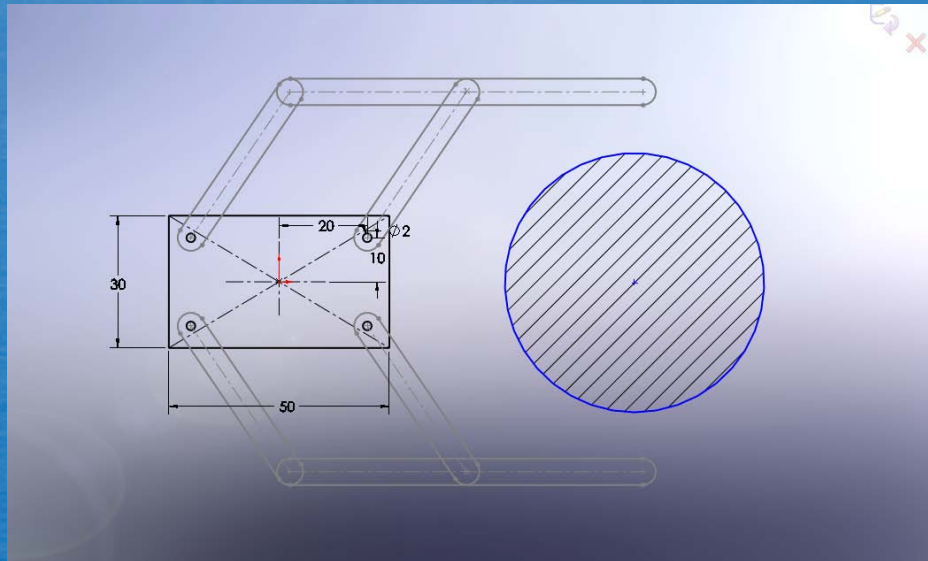


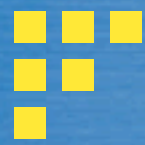


Mirror Features

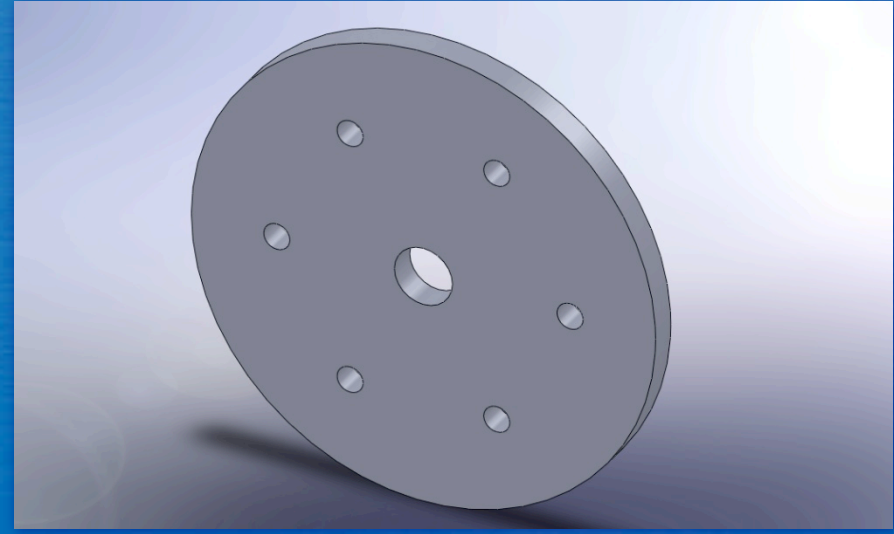
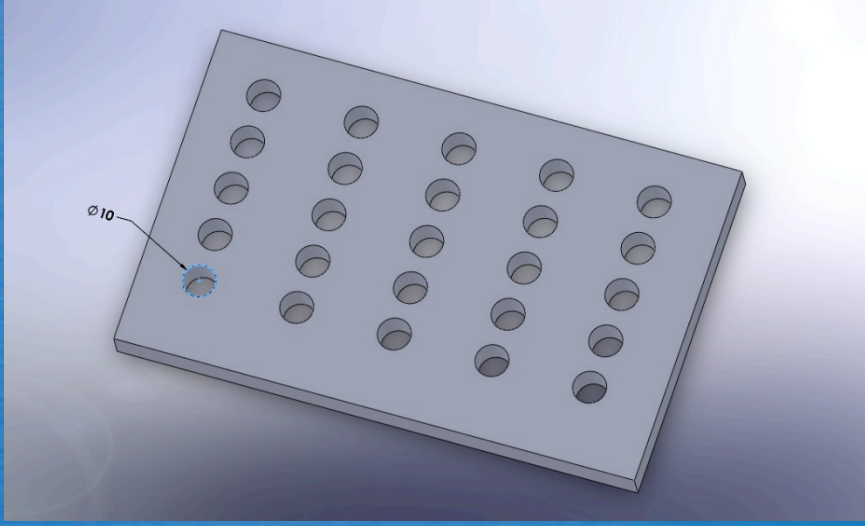


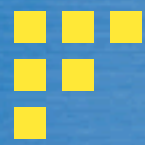
Case Study - Grippers



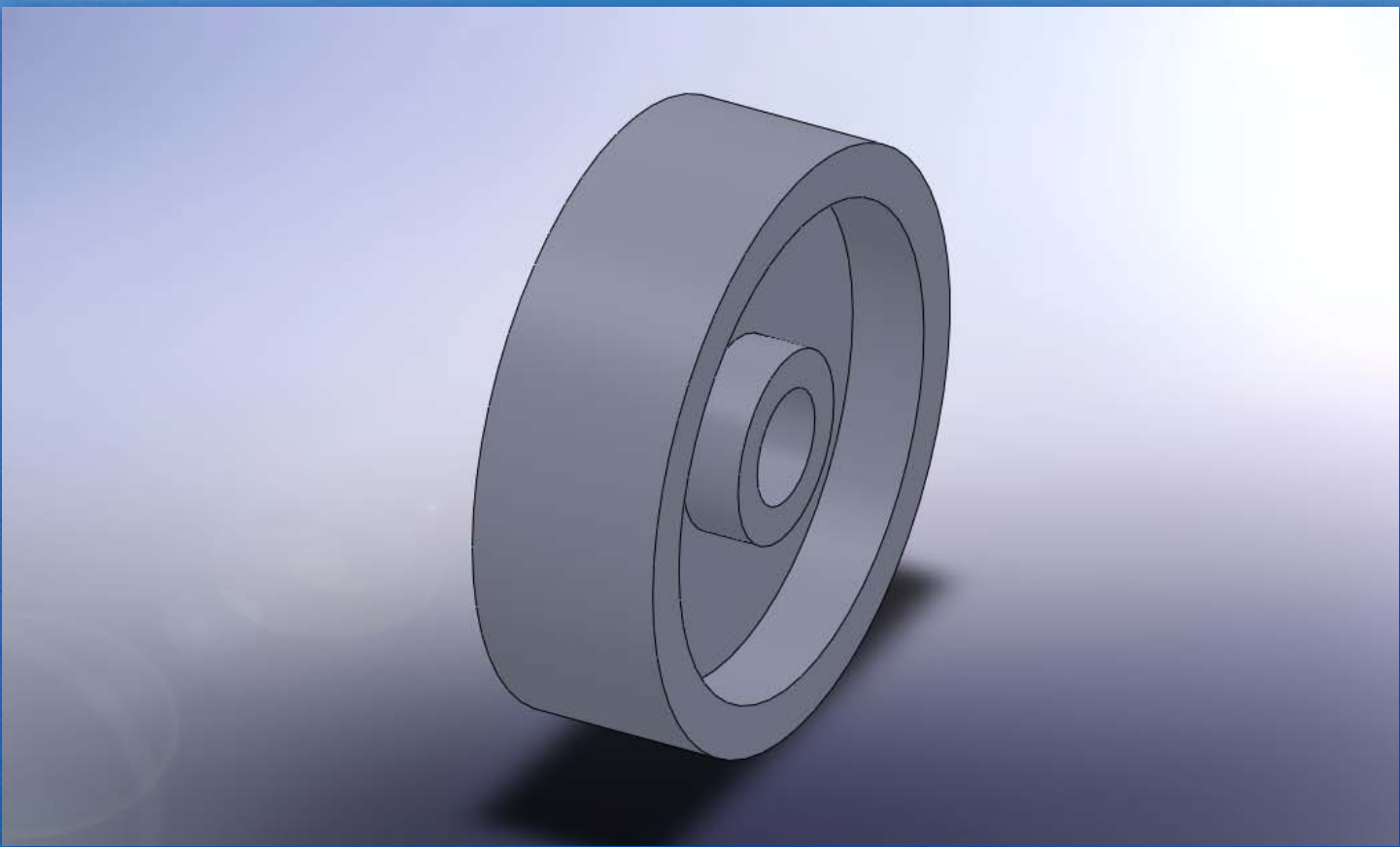


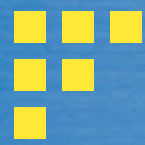
Linear & Circular Patterns





Revolved Feature





END