MEEG 202 Manufacturing Project Guidelines

Materials:

- **For Mill Parts** – 16 square inches (4” X 4”, 2” X 8” etc.) of aluminum plate in stock thicknesses of .250”, .375” or .500”.
- **For Lathe Parts** – 6 linear inches of aluminum rod in stock diameters of .250”, .375” or .500”.

Required Design Features (choose one):

- **Press Fit or Interference Fit** - When the male cylindrical part is .001” or more larger than the female part. A mechanical or hydraulic press is required to force these two pieces together.

- **Slip or Locational fit** – When the male cylindrical part is .001” or more smaller than the female part. The round (lathe) part can turn or slide freely in the machined hole.

List of Optional Features (choose at least one for each part). Including but not limited to:

- **Threaded Holes** – Stick to these stock thread sizes: 6-32, 8-32, 10-32, ¼-20, 5/16-18, 3/8-16. These will be formed by using the appropriate tap drill and tap.

- **Clearance Holes** – Sized to allow bolts or screws to pass through freely.

- **Reamed Holes** – Formed by drilling undersize and then using a reamer to cut a very precisely sized round hole. Used for press or slip fits.

- **Countersinking or Counterboring** – To allow the head of a screw or fastener to be flush or below the surface of a part.

- **External threads** – Stick to these stock thread sizes: ¼-20, 5/16-18, or 3/8-16. These will be formed by turning the cylindrical part on the lathe to the appropriate diameter and by using a thread die to cut the threads on the part.

- **Shoulders on lathe parts** – These allow a cylindrical part to be inserted to a specific depth in a hole.

- **Grooves** – These can be on the outside of a cylindrical part or milled into a plate. Stick to nominal sizes like .125”, .250”, .375” or .500”. Depth of grooves should be equal to or less than the width.

- **Radiused Edges and Corners** – On the edges of cylinders or plates. These are cut using radius cutters in nominal radiuses of 1/16”, 1/8”, 3/16” and ¼”. Larger radiuses on the corners of plates can be formed by sawing and belt sanding.

- **Chamfers** – These can be formed on the edges of plates, holes or cylinders using a 45 degree cutter.

- **Knurling** – Embossing a non-slip diamond pattern on the outside of a cylindrical part of .375” diameter or larger.
Tips and Suggestions for Designing Your Project

Remember, for this project each person has only two hours to learn to use a machine (lathe or mill) and to make their part. When designing your part, save machining time by:

- Use the KISS design method (Keep It Simple …).
- Using the stock thicknesses and diameters of the provided materials whenever possible.
- Use stock hardware (nuts, bolts and screws) in the sizes mentioned above for fastening.
- Use rectilinear designs. Odd or multiple angles require extra set-up time.
- Avoid arcs, elipses and other features that cannot be formed accurately on a manually controlled (non-CNC) machine.
- Before turning in any sketch or drawing, show it to Dr. Keefe or Steve Beard for suggestions.

Additional Hardware Available for project:

- **Nuts, Bolts and Set Screws** – For fastening parts together. In all common English sizes.
- **Dowel Pins** – For press fits or locational fits. In various sizes. See Steve Beard for sizes.