



Name:
Group Name:
ID #:

**Department of Mechanical Engineering
ME EN 4000 - Engineering Design I**

Engineering Lab 4

Assigned: Thursday, September 21, 2006
Due: Wednesday, September 27, 2006, by 5pm (to the ME4000 basket in 2110 MEB)

Introduction

This lab teaches the creation of an assembly, the modeling of parts within an assembly, as well as provides a review of fits and tolerances and making drawings. The exercise introduces modeling according to assembly requirements and manufacturing constraints, and how to document these things on a drawing.

As seen in Lab 2, proper engineering drawings not only show all relevant views and dimensions, but also include tolerances that will ensure the part's functionality. In this exercise you will identify the fits and tolerances required for the internal hub geometry and the external spindle geometry (designed by you) Part files are available in ProE Wildfire, SolidWorks, and iges format, see http://mech.utah.edu/senior_design/06/index.php/Main/Lab4 .

Task

1. Download the part files of all components and create an assembly (cross-sectional on page 2).
2. **Create a solid model of a spindle** that assembles inside the hub shown on the next page. The complete assembly consists of the spindle, two deep-groove bearings (40x68x15 and 30x55x13), the hub, a pressure ring, and a spindle nut to capture the bearing between the shoulder of the spindle and this nut.
3. **Create an engineering drawing** of the spindle showing all details and dimensions that are relevant to the manufacturing of the part. Since you are advised to use metric units, you will need to modify the standard tolerance block appropriately. Use tolerance-block-level tolerances whenever possible. Control other tolerances to ensure the function of this part.
4. **Create an engineering drawing of the assembly** including an isometric and section view of the assembly. For this assignment, it is not necessary to put dimensions on this assembly drawing with the exception of specifying the dimension and fit of the hub/bearing interface. Note that this dimension would normally go on a part drawing rather than the assembly, but I didn't want to have you make another drawing in this assignment. After specifying the hub/bearing tolerances, all you will need to do is fill in the title block with the quantity, part name, description, material, zone (where part is called out in the assembly), and find number **AND** place find numbers with arrows to call out the parts on the isometric view.

CAD Tutorial

Please complete the CAD tutorial for your respective CAD package that is listed on the wiki and turn in required proof of completion (http://mech.utah.edu/senior_design/06/index.php/Main/Lab4).

Hints

- The smaller of the two bearings serves as the fixed bearing, the larger bearing is allowed to slide (i.e., both areas of the spindle need to assembly into the bearings, but only one slides during service).

- The pressure ring has a center bore with clearance for the spindle and presses against the fixed bearing using (4) M12 bolts.
- Corners are never perfectly sharp because the edge of every cutting tool has a radius.
- It is good practice to avoid sharp edges. Use chamfers to ease assembly and avoid injuries.

Assembled Hub Cross-section (shown with spindle)

