MEASUREMENT LABORATORY II

Purpose: to be familiar with surface roughness, hardness and coordinate measurements

Equipment and materials:

1. Taylor Hobson Surtronic 3+ surface profilometer
2. Brown & Sharp coordinate measuring machine
3. Mitutoyo Rockwell hardness tester
4. Aluminum specimens (turned and milled) for surface roughness measurement
5. Parts for CMM
6. Steel and aluminum specimens for hardness testing

The items to be included in the report:

1. Measured data and plots (roughness vs. feed)
2. AutoCAD drawings of the CMM results.
3. Straightness of surfaces A, B, C and D, out of roundness of holes E and F, parallelism. between A and B, and G and H, and perpendicularity between A and G (these have to be shown on the AutoCAD drawings).
4. Description on bearing area curve.
5. Hardness values in comparison with tensile strength data (available in handbooks)
6. Discussions and conclusions.

[AME #1] Surface Roughness Measurement

Procedure for surface roughness measurements:

1. Learn how to use the profilometer from the lab instructor.
2. Measure surface roughness of turned parts using cutoff lengths of 0.8 mm and 0.25 mm.
3. Rotate the part by 90^0 and repeat the measurement.
4. Generate Ra, Rq and bearing area curve.
6. Repeat 2 through 4 with a milled piece at three different locations: at the center of tool path (perpendicular to lay, position A), at the mid-point (approximately 45 degree to lay, position B) and at the outer point (approximately 60 degrees to lay, position C). See Figure 1.

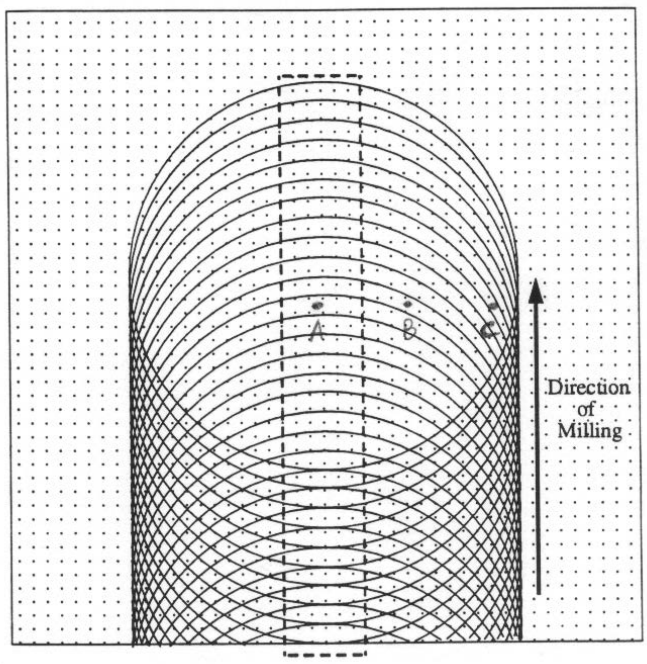

Figure 1 Measurement positions for the milled part.

[AME #2] Coordinate Measurement

Procedure for coordinate measurements

1. Position the tough trigger probe at the specified vertical location.
2. Perform the measurements on the specified points (see Figure 2)
3. Move the touch trigger probe in -z direction to the next specified vertical position.
4. Repeat 2.
5. Print out the measured data.
6. Calculate the center of the circles, parallelism of two surfaces of the slot, and the perpendicularity of the slot to the outside plane.
7. Generate AutoCAD drawings of the cross sectional views at three depths in z direction.

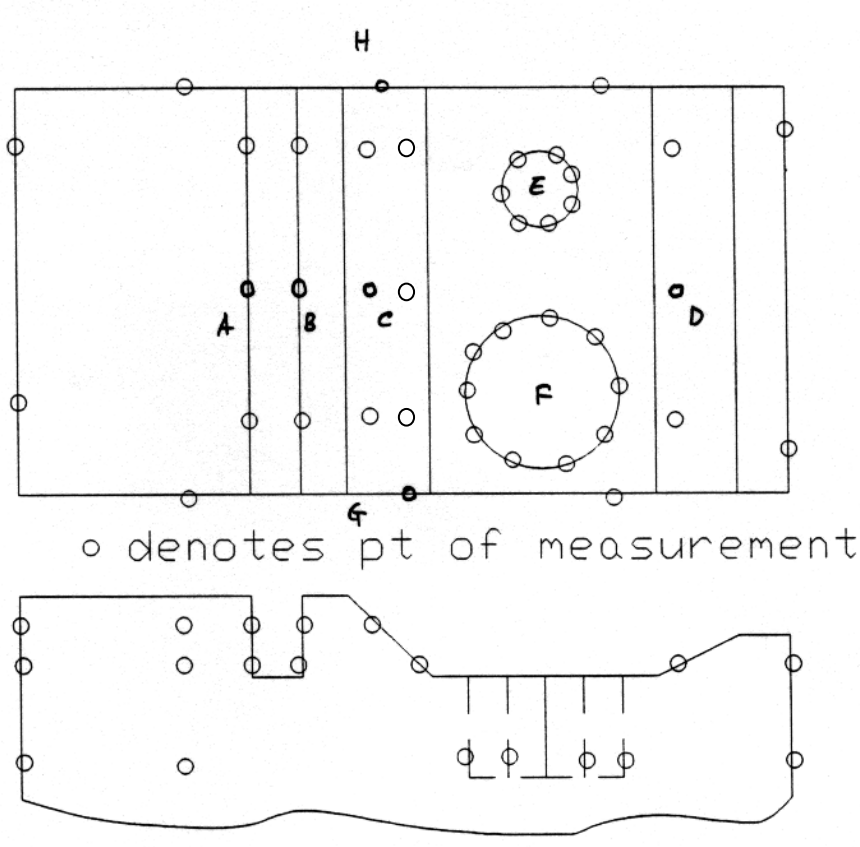

Figure 2: Measurement positions for the coordinate measurements.

[AME #3] Hardness Measurement

Procedure for hardness measurements

1. Learn how to use the hardness tester from the lab instructor.
2. Set the measurement scale to B for the aluminum and steel specimens.
3. After placing the specimen on the tester, ensure the minor load is set for the “R” scale.
4. Apply the major load of 100 kg for the aluminum specimen.
5. Record the hardness value.
6. Repeat steps 3 and 4 for the steel specimen with the major load of 100 kg.