

Practice of the precision machining

Syllabus Number

1F302

Special Subjects

Elective 2 credit

ONO, Takenori

1. Course Description

The Practical operations of NC (Numerical Controlled) machine tool (such as, Machining Center and NC lathe machine: Turning Center) and Ultra Precision Lathe (UPL) are exercised.

Mainly topics are follows:

1. Principal of the NC machine tools, Structure and its machine elements.
2. Practical operations of the Machining Center (MC)
3. Practical operations of the NC lathe machine
4. Practical operations of the Ultra Precision Lathe (UPL)
5. Basic of the measuring manner of the machining

2. Course Objectives

An introduction of the operations manner of the precision machining with NC machine tools. Topics, also include the CAM (Computer Aided Manufacturing), measurement systems, tooling system and cutting tools.

3. Grading Policy

Final grade will be calculated according to following, reports for 4 topics (about MC, NC lathe, UPL and Measuring: 100%). To pass, students must earn at least 60 points out of 100.

4. Textbook and Reference

5. Requirements(Assignments)

This course will be taught in Japanese.

The (original) text book for this course will be announced on the LMS site.

6. Note

7. Schedule

- [1] Guidance, Basic of the Machine tool and its Numerical control
- [2] Machining Center 1 : Coding NC programs with the CAM system (Gibbs)
- [3] Machining Center 2 : Checking the NC programs, setup the tooling and workpiece
- [4] Machining Center 3 : Machining with the MC, and simple "on-site" measuring on the machined features.
- [5] NC lathe (Turning Center) 1 : Coding NC programs with the CAM system (Gibbs)
- [6] NC lathe (Turning Center) 2: Checking the NC programs, setup the tooling and workpiece
- [7] NC lathe (Turning Center) 3 : Machining with the MC, and simple "on-site" measuring on the machined features.
- [8] Shape measuring: measuring on the machined features by MC and NC lathe by 3D measuring machine
- [9] Measuring the surface finishing: measuring the surface finish by the surface profiler
- [10] Ultra Precision Lathe machine (UPL) 1 : Principal of the UPL and its operation (Lecture)
- [11] Ultra Precision Lathe machine (UPL) 2 : Mirror finishing of the aluminum disc plate with the UPL (exercise)
- [12] Measuring the machining process 1 : Cutting force (on the UPL, Lecture and exercise)
- [13] Measuring the machining process 2 : Measuring the surface finishing by optical inspections (Lecture and exercise)
- [14] Measuring the machining process 3 : Hardness testing (Lecture and exercise)
- [15] Measuring the machining process 4 : Observation on the surface finish by the SEM (Scanning Electron Microscope: Lecture and exercise)