

Precision Machining

Syllabus Number

1F204

Basic Major Subjects

Elective Requisites 2
credit

ONO, Takenori

1. Course Description

Main topics are as follows:

- Definition and significance of the precision machining
- Classification of the precision machining
- Principle of the cutting process
- Typical precision cutting methods (Lathe, Milling, Drilling, etc.)
- Principle of the abrasive process
- Typical precision abrasive processes (Grinding, Polishing, ELID, etc.)
- Machine tools and their elements
- Micro machining and Ultra precision machining
- Environmental issues and measures
- Recent topics about the precision machining
- etc.

It is required that students have knowledge about typical material properties and fundamentals of the mechanics of materials, before lesson starts.

2. Course Objectives

An introduction of the principle of the precision cutting and abrasive processes. Topics include machine equipments, measurement systems, environmental issues and recent progresses of this field.

3. Grading Policy

Final grade will be calculated according to following, presentation of the group discussion (50%) and final examination (50%). To pass, students must earn at least 60 points out of 100.

4. Textbook and Reference

Textbook

Original handouts for the lecture

Reference

S. TANAKA, H. TSUWA, N. IGAWA 精密工作法 (Precision Machining, in Japanese), First volume
Kyoritsu shuppan

Other references will be introduced in the class.

5. Requirements (Assignments)

This course will be taught in Japanese.

6. Note

7. Schedule

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|------|---|
| [1] | Guidance, Purpose, classification and ability of the precision machining |
| [2] | Principal of the cutting process, Chip flow mechanism |
| [3] | Cutting force |
| [4] | Cutting temperature, Mechanism of the surface generation |
| [5] | Cutting tools and their wear |
| [6] | Vibration in the cutting process, Lubrication |
| [7] | Structure and elements of the machine tool |
| [8] | Machine tools for normal or precision cuttings |
| [9] | Abrasives, Grinding stones |
| [10] | Grinding force and temperature |
| [11] | Wear on the grinding stone and surface finish of the material |
| [12] | Polishing, and typical abrasive or grinding processes and their machine tools |
| [13] | Group work #1: Group discussion |
| [14] | Group work #2: Presentation |
| [15] | Summarize, Final test |