

COMPUTER INTEGRATED MANUFACTURING

(電腦整合製造)

Instructor: 曾柏昌教授

ME Building Rm416

Class Meeting: Friday 2:10 ~ 5:00 pm

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The competitiveness of Taiwan's industry in the international market - and, in particular, in the field of high technology - depends to a large extent on its ability to develop and integrate new and advanced methods into the production process. These modern methods are based upon the emerging technologies of computer-integrated manufacturing (CIM) and flexible manufacturing (FMS). They allow for faster development of new and improved products of high quality, shorter development and production cycles, faster delivery times, reduced production costs, and the ability to compete with the ever-changing demands of the international markets.

In order to be able to incorporate advanced techniques into the production line, our Engineering graduates must be familiar with computer-aided design and manufacturing (CAD/CAM), numerically controlled machine tools (CNC), computer controlled material handling (AGV), automatic storage systems (AS/RS), robots, and sophisticated sensory systems such as computerized vision. The student must be able to design, install, implement, and operate such systems, together with other engineers and technicians involved in operating the "factory of the future".

TEXTBOOK:

1. Class Notes (Download on <http://wwwme.nchu.edu.tw/~CIM/> website)
2. "Computer-Integrated Design and Manufacturing", James A. Rehg and Henry W. Kraebber, 3rd Edition , Prentice Hall 2005, 高立圖書公司(04)22950808

REFERENCES:

1. Mikell P. Groover, "Automation, Production system, and Computer Integrated Manufacturing", 1987.
2. Ulrich Rembold et al., "Computer Integrated Manufacturing Technology and System", 1985.
3. Ten-Chen Chang et al., "Computer-Aided-Manufacturing", 1991.
4. Lbrahim Zeid, "CAD/CAM Theory and Practice", 1991.
5. Luggen William, "Flexible Manufacturing Cells and System", 1991.
6. C.H. Chang et al., "NC Machine Programming and Software Design", 1989
7. Vollmann, "Manufacturing Planning & Control Systems", 3/e, 1992
8. Olsson, "Computer for Automation & control", 1992
9. Editors Hamid R. Parsaei and Mohammad Jamahidi, "Design and Implementation of Intelligent Manufacturing Systems" , Prentice Hall, 1995.
10. "Systems Approach to Computer-Integrated Design and Manufacturing", Nanua Singh, John Wiley & Sins, Inc.,1996

COURSE OBJECTIVE:

The course serves as an introduction to the modern methods of manufacturing . Its objectives are (i) to expose the student to the different types of manufacturing available today such as the Special manufacturing System, the Manufacturing Cell, and the Flexible Manufacturing System (FMS). (ii) to learn the fundamentals of computer assisted numerical control programming and programming languages, (iii) to learn the concepts of Computer Integrated Manufacturing and Management System and automated flow lines, (iv) to learn the guidelines and criteria for implementing CAD/CAM Systems and associated software for design, Manufacturing, and a common CAD/CAM data base organized to serve both design and manufacturing, and (v) to discuss current research trends and possible future development.

COURSE OUTLINES:

1. Introduction to CIM

- Type of Manufacturing System
- Elements of CIM
- Automation and CAD/CAM
- 2. Concurrent Engineering
- 3. Manufacturing System
 - Group Technology (GT)
 - Process Planning
 - Production Planning and Control
- 4. Fundamental of CAM
 - Numerical Control (NC)
 - Control Systems of the NC Machine Tool
 - Adaptive Control
 - Sensors for Computer-Controlled Machine Tool
 - NC Part Programming
- 5. Material Handling and Storage
 - Automated Material Handling
 - Analysis for Material Handling System
 - Automated Guided Vehicle System
 - Automated Storage System
 - Automated Storage/Retrieval System
 - Applications
- 6. Flexible Manufacturing Systems
 - FMS Workstation
 - Material Handling and Storage System
 - Computer Control System
 - Planning the FMS
 - Analysis Methods for FMS
 - Applications
- 7. Numeric Control and Robots
 - Numerical Control
 - Industrial Robotics
 - Programmable Logic Controllers
- 8. Material Requirements Planning (MRP)
 - Objectives of MRP
 - Basic Concepts and Inputs to MRP
 - Bill of Material (BOM)
 - How MRP works?
- 9. Shop Floor Control (SFC)
 - Functions of SFC System
 - Operation Scheduling
 - Priority Rules for Job Sequencing
- 10. Just-In-Time (JIT)
 - Introduction
 - Prerequisites for JIT
 - Elements of JIT
 - Toward Eliminating Inventories in JIT System
- 11. Implementation of CIM

GRADING SYSTEM:

1. 3 Papers review 20%, (2 papers will be provided on website download, 1 paper is on you own research. Due on 3/27, 5/8, 6/8, Presentation will be held on the due day)
2. 2 Exams (Mid-30%, 4/24, Final-30%,6/19)
3. 2 Homework (20%)