Automation (21-541)

Advanced Manufacturing Laboratory
Department of Industrial Engineering
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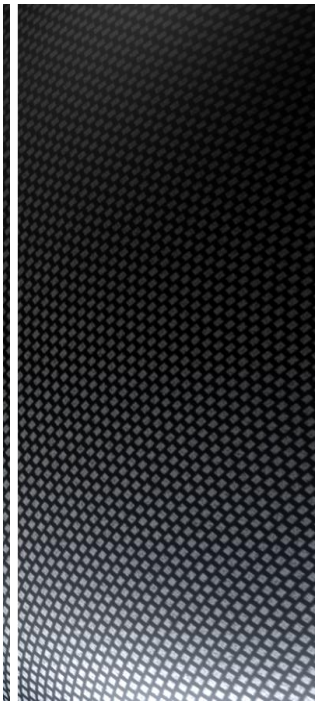
Session # 4



Session Schedule

- *CIM hardware and software considerations*
  - *A brief case study for CIM database design*

Introduction to manufacturing automation and CIM (Computer Integrated Manufacturing)

- *Automation:*
  - *set of all measures aiming at replacing human work through machines (e.g. automation is applied science)*
  - *the technology used for this purpose (e.g. this company has an automation department)*
- *Automation:*
  - *replacement of human work through machines (e.g. the automatisation of the textile factory caused uproar of the workers)*
  - *replacement of conscious activity by reflexes (e.g. drill of the sailors allows the automatisation of ship handling)*
- *Automation:*
  - *The use of computers and machines instead of people to do a job*

CIM hardware and software considerations

- *CIM equipment:*
  - *CNC machines*
  - *Computerized work centers*
  - *Robotic work cells*
  - *DNC/FMS systems*
  - *Work handling and tool handling devices*
  - *Storage devices*
  - *Sensors, shop floor data collection devices*
  - *Inspection machines*
  - *Computers, controllers*
  - *CAD/CAM systems, workstations / terminals, data entry terminals, bar code readers, RFID tags*
  - *Printers, plotters and other peripheral devices, modems, cables, connectors*

CIM hardware and software considerations

- *CIM software comprises computer programs like:*
  - *Management Information System; Database Management*
  - *Sales, Order Entry*
  - *Marketing*
  - *Finance*
  - *Analysis; Modeling and Design*
  - *Simulation*
  - *Inventory Control; Materials Handling*
  - *Monitoring; Shop Floor Data Collection*
  - *Process Planning*
  - *Manufacturing Facilities Planning; Production Control*
  - *Work Flow Automation*
  - *Quality Management*

CIM Database management

- *Varied tasks one might expect to accomplish in a CIM environment:*
  - *Designing assemblies and performing tolerance analysis on those assemblies.*
  - *Preparing production drawings of assemblies, individual parts, tooling, fixtures and other manufacturing facilities.*
  - *Preparing part lists and bill of materials (BOM).*
  - *Preparing process plans for individual part manufacture and assembly.*
  - *Programming CNC machines for processing complete parts (CAM).*
  - *Designing work cells and programming the movement of components in those cells using work handling devices like robots, conveyors, AGV's/ RGV's.*
  - *Preparing inspection programs including programs for CNC machines.*

Make your own CIM database !!

- *Third step:*
  - *Theoretically plan the procedures which enable:*
    - *The storage of object related data (attributes)*
    - *The sort of data related to an array of objects (Tables, Primary keys)*
    - *The storage of relation among related objects (relational database, Foreign keys)*
    - *The retrieve operation of a definite object by means of its attributes (Select)*
    - *The modification/delete operation of a definite object by means of its attributes (Update/Delete)*

Make your own CIM database !!

- *Third step: (Continued …)*
  - *Theoretically plan the procedures which enable:*
    - *The transfer of your data base from one computer to another (Back up operation)*
    - *The extract of information from an array objects (Information)*
    - *The extract of knowledge from a series of information (knowledge)*