

# *Automation (21-541)*

*Advanced Manufacturing Laboratory  
Department of Industrial Engineering  
Sharif University of Technology*

*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 automatisisation of the textile factory caused uproar of the workers)*
  - *replacement of conscious activity by reflexes (e.g. drill of the sailors allows the automatisisation of ship handling)*
- **Automation:**
  - *The use of computers and machines instead of people to do a job*

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3

## *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*

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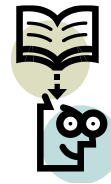


4

## *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*

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5

## *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.*

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6

## *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)*

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▪ 000001 <<HEADER>> ;|
▪ 000002 DATABASENAME ;|
▪ 000003 DATABASELOCATION ;|
▪ 000004 DATABASECREATOR ;|
▪ 000005 <<T>> POINT ;|
▪ 000006 <<T>> LINE ;|
▪ 000007 <<A>> PCODE 000005 ;|
▪ 000008 <<A>> PX 000005 ;|
▪ 000009 <<A>> PY 000005 ;|
▪ 000010 <<A>> PZ 000005 ;|
▪ 000011 <<A>> LCODE 000006 ;|
▪ 000012 <<A>> PSCODE 000006 ;|
▪ 000013 <<A>> PFCODE 000006 ;|
▪ 000014 <<K>> PCODE 000007 ;|
▪ 000015 <<K>> LCODE 000011 ;|
▪ 000016 <<F>> STTPOINT 000012 000007 ;|
▪ 000017 <<F>> FNSPOINT 000013 000007 ;|
▪ 001001 <<DATA>> ;|
▪ 001002 000002 TEST1 ;|
▪ 001003 000003 D:\TEST FOLDER ;|
▪ 001004 000004 OMID FATAHI ;|
▪ 001005 000001 TEST1 ;|
▪ 001006 000005 <<ROW>> ;|
▪ 001007 000007 1 001006 ;|
▪ 001008 000008 0 001006 ;|
▪ 001009 000009 0 001006 ;|
▪ 001010 000010 0 001006 ;|
▪ 001011 000005 <<ROW>> ;|
▪ 001012 000007 2 001011 ;|
▪ 001013 000008 1 001011 ;|
▪ 001014 000009 1 001011 ;|
▪ 001015 000010 1 001011 ;|
▪ 001016 000006 <<ROW>> ;|
▪ 001017 000011 1 001016 ;|
▪ 001018 000012 1 001016 ;|
▪ 001019 000013 1 001016 ;|

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9

## Homework: AT:G:01:#

- Provide a simple implementation regards to your theoretical activities in steps one to three:
  - Define a simple discourse
  - Use a programming language
  - Define some simple objects in the selected discourse
  - Define some simple attributes for selected objects
  - Implement your theoretical procedures in step 3
  
- The HW should be sent to [FValilai@sharif.edu](mailto:FValilai@sharif.edu).
- Email subject: "AT:G:01:#"