What is tool design?

- It is a specialized area of manufacturing engineering which comprises the analysis, planning, design, construction and application of tools, methods and procedures necessary to increase manufacturing productivity.

Tool?

- Work holding tools – Jigs and Fixtures
- Cutting tools
- Sheet metal dies
- Forging dies
- Extrusion dies
- Welding and inspection fixtures
- Injection molds
Catalogue description

- Integrated treatment of tool design, specification and application by the use of standard tooling data. Prerequisites: 330:008; 330:024; 330:170 or 330:172; junior standing.

Synopsis

- Manufacturing processing requirements in industrial practice.
- The importance of tooling in manufacturing
- Design aspects related to some tooling such as jigs and fixtures, press tools, cutting tools, inspection gages and welding jigs.

Objectives

- Aspects related to manufacturing engineering as practiced in the shop floor.
- The emphasis would be more in understanding the various concepts and background information related to the design of tooling.
Graduate students

- Graduate students registered for this course need to complete additional work as part of the department policy. Contact the instructor within the first week to get the additional work allocation.

Method of Instruction

- Lectures on the tooling design are given with enough practical and standard information to validate the basic concepts and their application.
- Design exercises would be used to demonstrate the principles.

Text book

References

- E. K. Henriksen - "Jig and Fixture Design Manual", Industrial Press, New York,

Assessment

- Examinations (3): 40%
- Projects (8) 50%
- Class participation 10%

Examinations

- Examinations during the semester are not comprehensive.
- Questions may be in the form of problems, short answers, fill in the blank and/or True/False.
- There will be no chance to makeup for the missed examinations, unless arrangements have been made before the examination that is considered reasonable by the professor.
Participation

- Participation (attitude, punctuality, attendance, etc.) in the class in terms of regular attendance is an important component for your evaluation.
- As a responsible and mature individual you are expected to be present in all classes.

Participation

- If you miss any particular class, then it becomes your responsibility to checkup with your colleagues about the coverage of that missed class.
- If you miss more classes, without any prior intimation or justification, then your final grade may be affected.

Laboratory Work

- **P1**: Selection of tool materials
- **P2**: Cutting tool selection
- **P3**: Design a Jig (CAD)
- **P4**: Design a blanking die (CAD)
- **P5**: Design a bending die
- **P6**: Design a welding fixture (CAD)
P3: Design a Jig (CAD)

A simple blanking die.

P4: Design a blanking die (CAD)

P5: Design a bending die
P6: Design a welding fixture CAD

![Diagram of welding fixture using gravity to help locate parts]

Figure 10-1. Simple welding fixture using gravity to help locate parts.

Project Reports

- A number of projects with substantial weightage (50%).
- Use of CAD and standard components is an essential element in tool design.
- Use the facilities in Lab. 19 and 24 for the purpose.
- Most of the 3D models of the standard components used in the tool design would be available from the manufacturer’s web sites.

Projects

- Projects are evaluated based on individual’s effort.
- However, it is suggested that a brainstorming with colleagues in the initial stages would be useful.
- This will help in identifying possible solutions and pitfalls in specific approaches.
Project Submission

- The report is to be word processed and printed using a high quality mode.
- All the drawings are to be made by a CAD program (Solidworks, AutoCAD, Inventor, or ProEngineer) following the national standards and plotted.

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Project Submission

- Each of the project, after completion needs to be submitted on the due date specified.
- **No reminders!**
- Late submission will carry a penalty of 10% of the points per day.
- If there is a justifiable reason for late submission, please explain it to me well in advance so that I may consider it.

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**Grade Scale**

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