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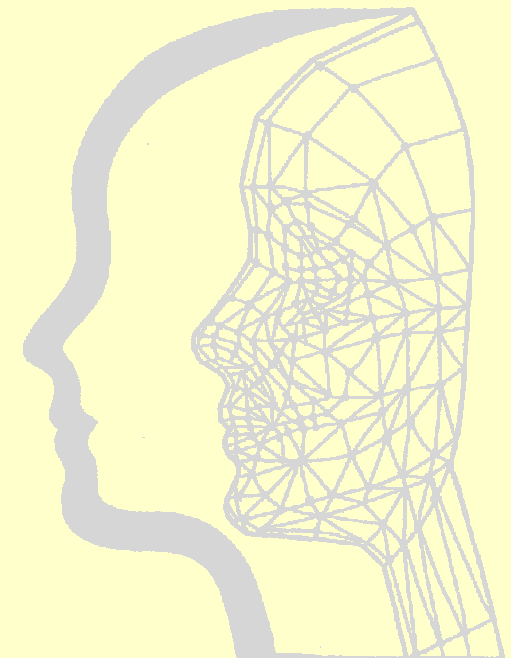
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# STUDENT PROJECTS FOR ENGINEERING DESIGN AND OPTIMIZATION

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TMCE 2006

Ljubljana, April. 18-22, 2006





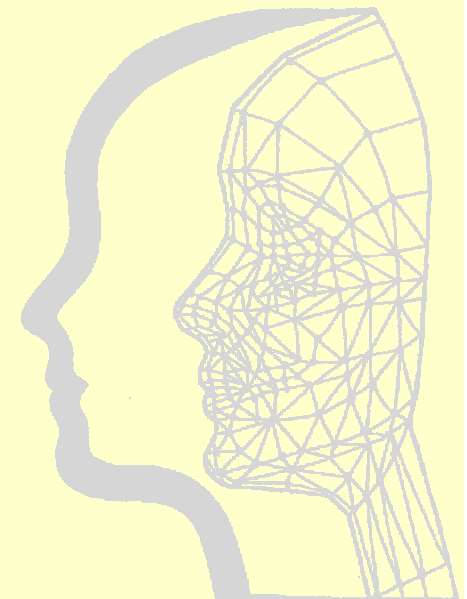
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**The aim of the presentation is to describe semester-long Design Projects supervised jointly by industrial and academic partners.**

## **Content**

- Training Objectives**
- Design-related MSc subjects**
- Project Preparation and Milestones**
- Description of the Design Project**
- Industrial project illustrations**



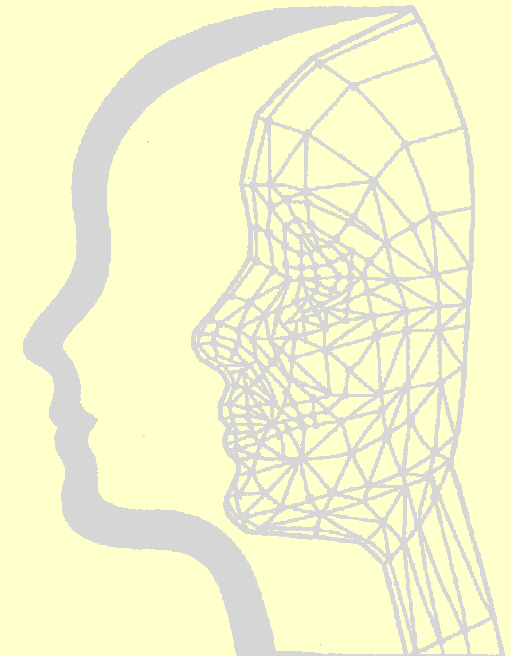


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## Training Objectives

- To learn the industrial environment for product innovations and development
- To integrate the knowledge of
  - Engineering science fundamentals
  - Design and manufacturing processes
  - Economics, environment and society
- To develop practical skills in
  - Communications (oral, graphic and written)
  - Team work
  - Thinking both creatively and critically





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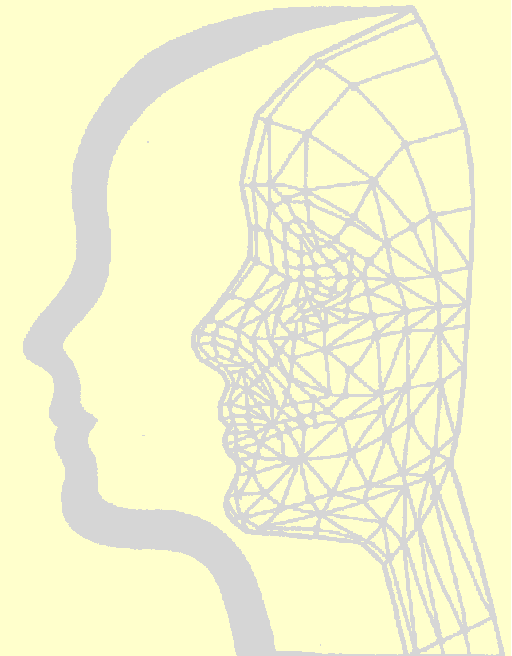
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## Corelation with the industrial demand

### PRODUCT REALIZATION PROCESS

1. Team work (I+A)
2. Communication
3. Design for Manufacturing
4. CAD Systems
5. Professional Ethics
6. Creative Thinking
7. Design for Performance
8. Design for Reliability
9. Design for Safety
10. Concurrent Engineering

(ASME survey)





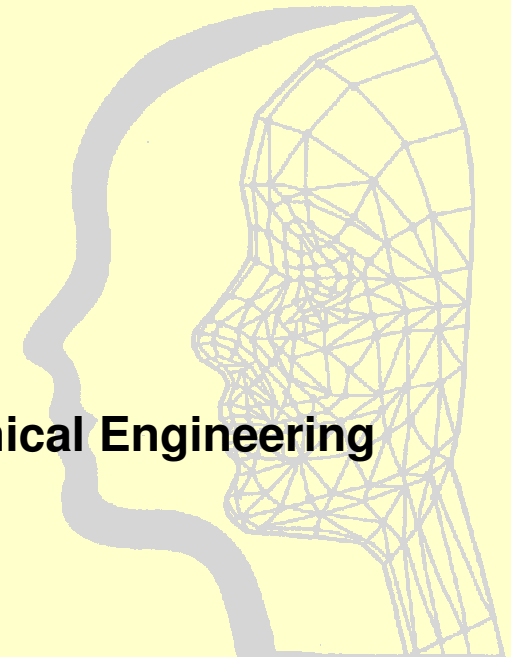
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## **Design-related MSc subjects (before taking Design Project)**

- Design theory and methodology**
- CAD technology I. and II.**
- Product development**
- Design of ME structures**
- Structural analysis and optimization**
- Marketing**
- Applied ergonomics**

**-The Design Project is a regular course for the MSc Mechanical Engineering Design student.**



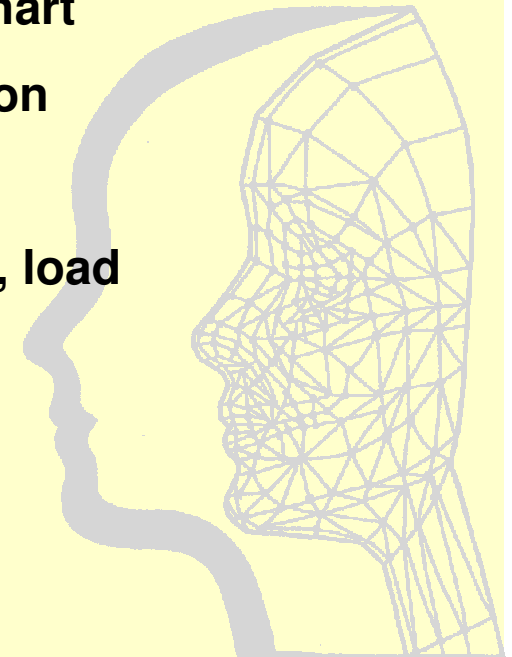


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## Project Preparation and Milestones

- 1. Specifying the design aims, list of requirements, selecting design variables**
- 2. Collecting information and data, preparing a flowchart**
- 3. Preparation of the design alternatives and evaluation**
- 4. Approximate calculation and assumptions**
- 5. Specifying the structural model (specific geometry, load cases, boundary conditions, material properties)**

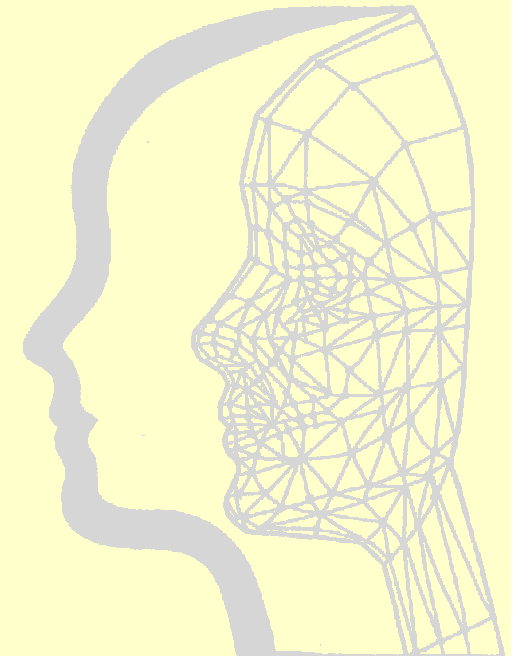




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## **Project Preparation and Milestones**

- 6. Presentation 1**
- 7. Working on 3D solid model for the selected solution**
- 8. FE calculation (static, dynamic, thermal,...)**
- 9. Results of the first model; critics and questions**
- 10. Presentation 2**
- 11. Selecting the final design solution**
- 12. Preparing report and design documentation**
- 13. Final presentations**
- 14. Submitting report and documentation**



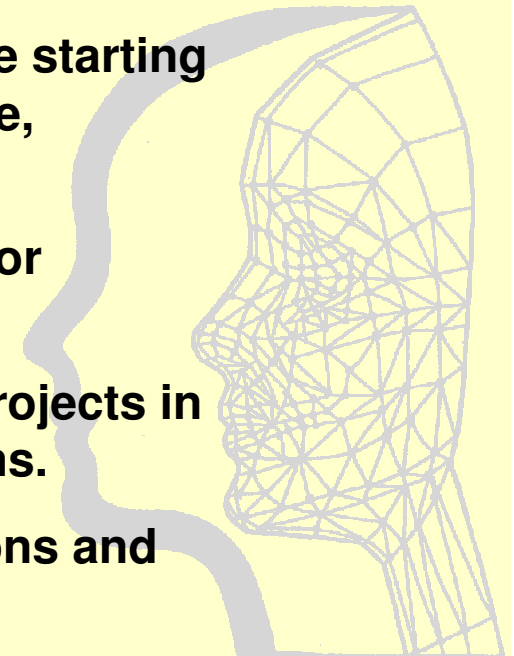


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## Description of the Design Project

- Problems are raised by companies and selected by university as well as the design process is supervised by an academic and industrial instructors.**
- Students start with conceptual design followed by the task-specifications within the team members.**
- The design alternatives are evaluated and compared before starting the 3D modelling phase (using ProE, SolidWorks, SolidEdge, Inventor,...)**
- Usually there are FE modelling tasks using the same CAD or additional FE packages.**
- Structural optimization is a frequent requirements of the projects in order to search for the most economical/reliable/... solutions.**
- The projects are usually finished by detailed documentations and reports.**







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## **Difficulties in industrial & academic supervising**

- Common goals and requirements should be discussed at first,
- Similar and different motivations:
  - Industrial partners: product development on their specific way,
  - Academy: training requirements (design specifications, team work,...)
- Different suggestions (methodology, manufacturing technologies),
- Different language between industrial and academic supervisors,
- Communication between students and industry is a critical issue,
- Personal contact first, followed by mainly e-mail communications.

