Department of Management and Engineering

Design Education and Innovation at LiU

Johan Ölvander
Division of Machine Design
Departement of Management and Engineering

LINKÖPINGS UNIVERSITET

Linköping University

Founded 1975	
Students	27 000
PhD students	1 300
Employees	4 000
Total revenue, MSEK	3 500

LINKÖPINGS UNIVERSITET

A comprehensive university with four faculties

- Arts and Sciences
- Educational Sciences
- Health Sciences
- Institute of Technology (=Science and Technology)

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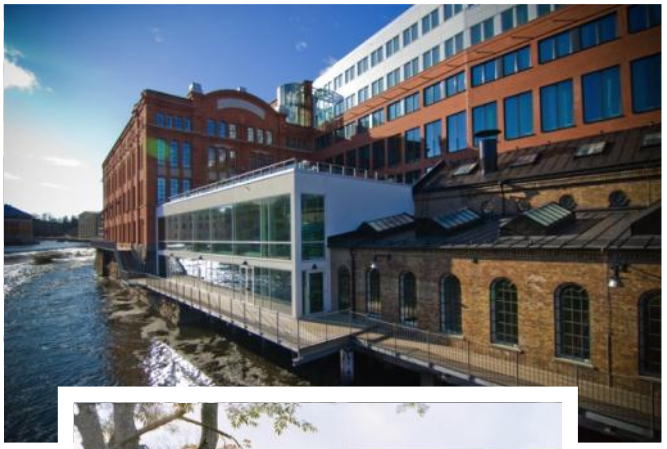
Our campuses

Campus Valla,
Linköping,
18,000 students



Campus Norrköping,
5,000 students

Campus US (University Hospital),
Linköping,
3,000 students

Malmsten's,
Stockholm,
70 students

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Internationalization

- 1,500 international students
- 570 students outgoing from LiU every year through different exchange programmes
- 500 partner universities in some 70 countries

- Approx 200 course in English in Science and Technology, mainly in year 4-5
  - See http://www.lith.liu.se/sh2013/en/courses_in_english.html

- Fifteen international master's programmes in Science and Technology

High in international rankings

- Among the top 2% in the world in international university rankings.
- Top ranked in student satisfaction
- Top rank in learning overall and lab facilities
- Students top in quickly finding employment

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The Department of Management and Engineering

- Merger between the departments of Mechanical Engineering and Economics
- 470 employees (300 teachers, 120 PhD students, 40 administration, 10 technicians)
- Revenue 500 MSEK (R$ 200 M).
  - Education 280 MSEK
    Engineering 170, Arts and science 110
  - Research 220 MSEK
    Engineering 150, Art and science 70
- 20 divisions, teaching on both the faculty of Arts and science and the Engineering faculty.
- 4500 full time students

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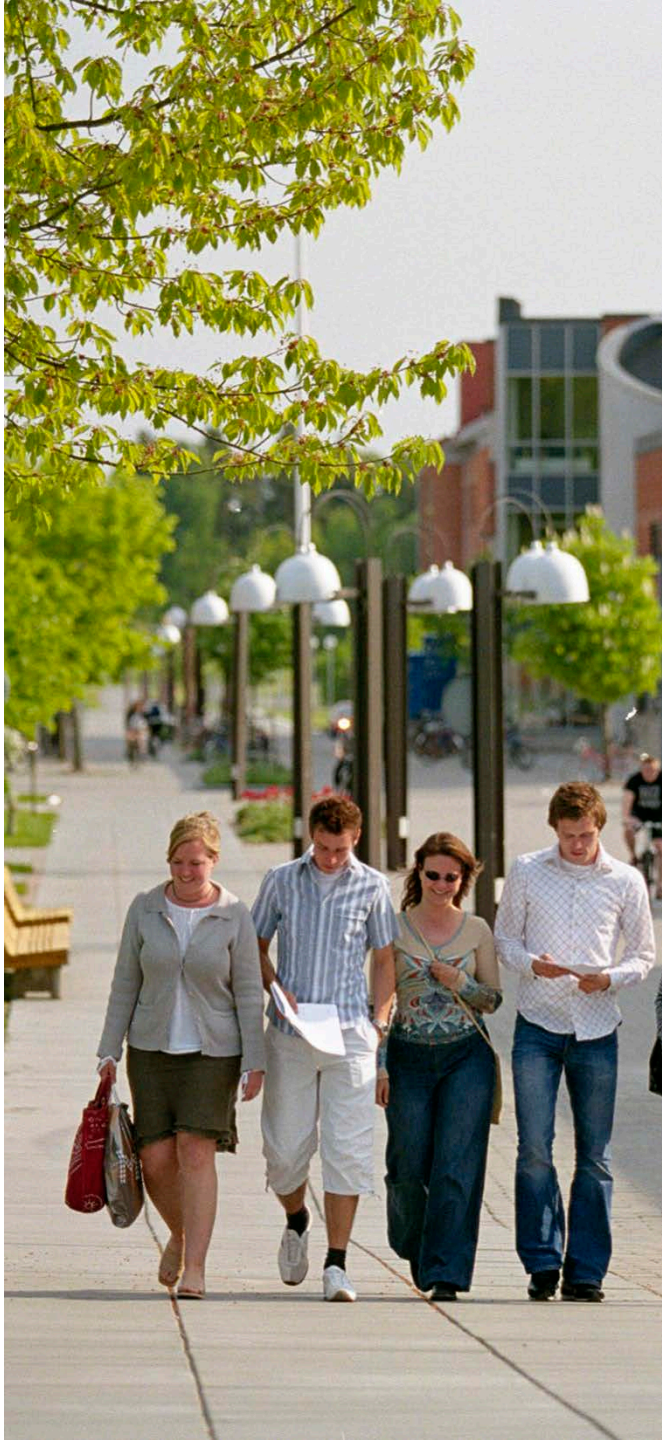
Divisions at IEI

- Applied Thermodynamics
- Business Administration
- Business Law
- Economics
- Energy Systems
- Engineering Materials
- Environmental Technology and Management
- Fluid and Mechatronic Systems
- Furniture Design
- Industrial Economics
- Information Systems
- Logistics and Quality Management
- Machine Design
- Manufacturing Engineering
- Mechanics and Solid Mechanics
- Political Science
- Production Economics
- Project, Innovations and Entrepreneurship



The division of Machine Design

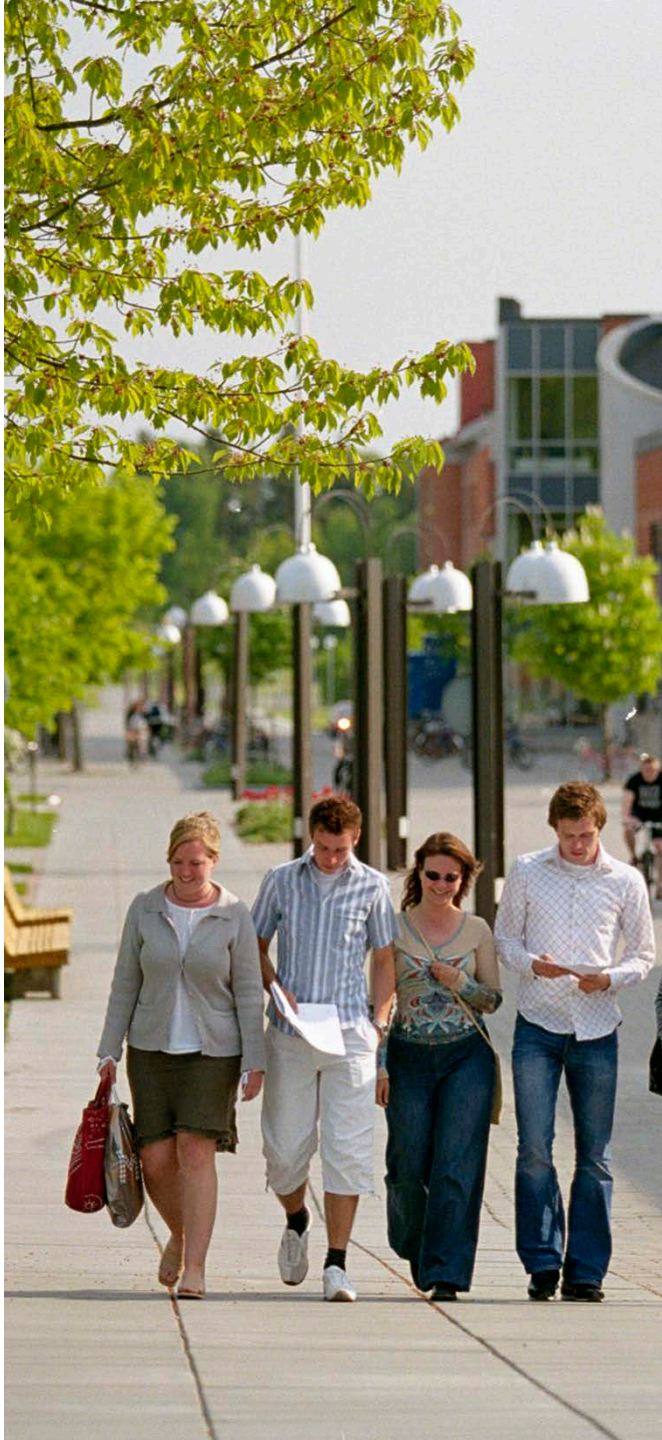
- 1 Professor
- 1 Adjoint professor
- 5 Senior lecturers (ass. Professors)
- 7 Lecturers
- 3 Post docs
- 4 PhD students
- 4 Industrial PhD students
- 1 Technician
- 1 administrator

25 persons

Budget:

Education 25 MSEK (R$ 10 M)

Research 8 MSEK



Example of Arts and Science programs

Master and Bachelor degrees in

- Business Administration (incl. international)
- Business Law (incl. European law)
- Economics
- Information Systems
- Political Sciences

Many students on independent courses

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Major Engineering programs

- Master of Science (5 year programs)
  - Industrial Engineering
  - Mechanical Engineering
  - Design and Product development
  - Energy and Environmental Eng.
  - Aeronautical Engineering (2 yrs.)
- Bachelor programs
  - Mechanical Engineering
  - Furniture Design (4 different programs)

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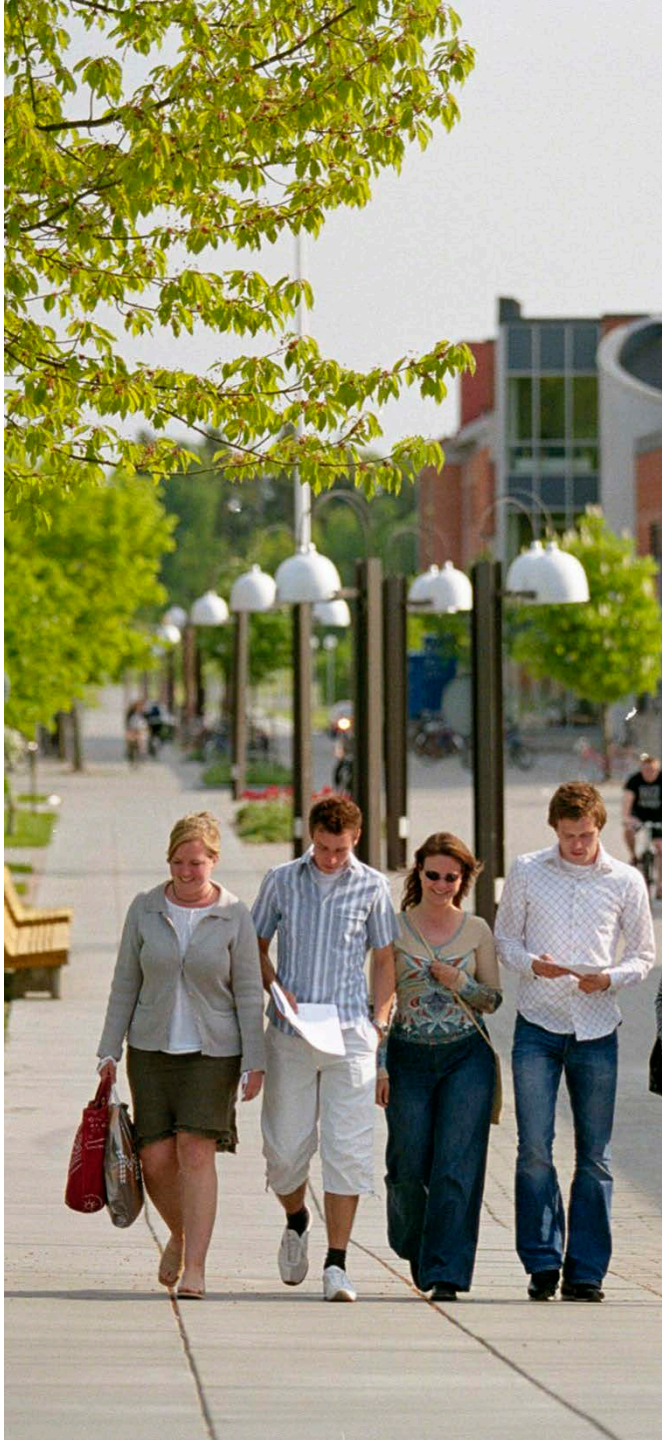
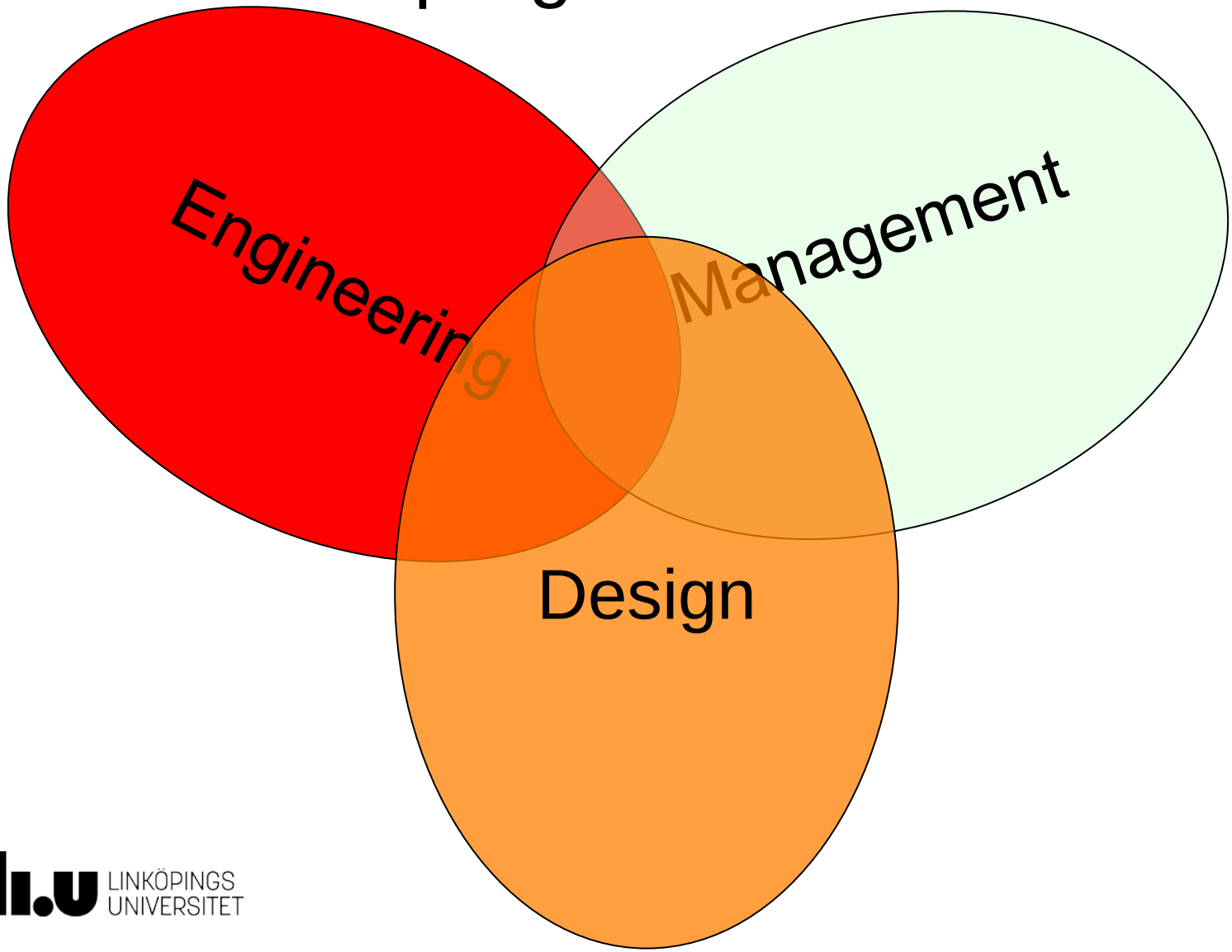


Design and Product Development program



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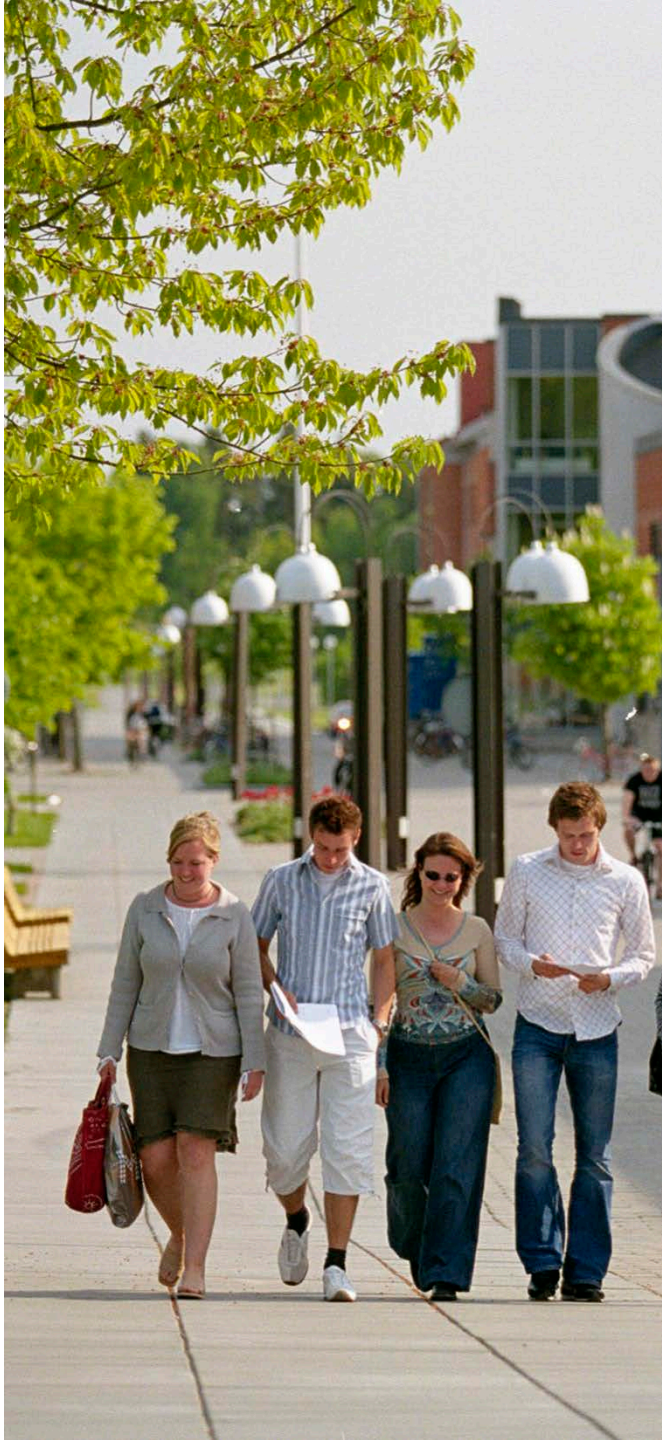
The Design and Product Development program

- It is a five year program
- 3 year bachelor, 2 year master
- Fall semester starts in September and end in January.
- Spring semester starts in January and ends in June.
- Each semester is 30 ECTS credits and typically contain 3 to 5 courses.



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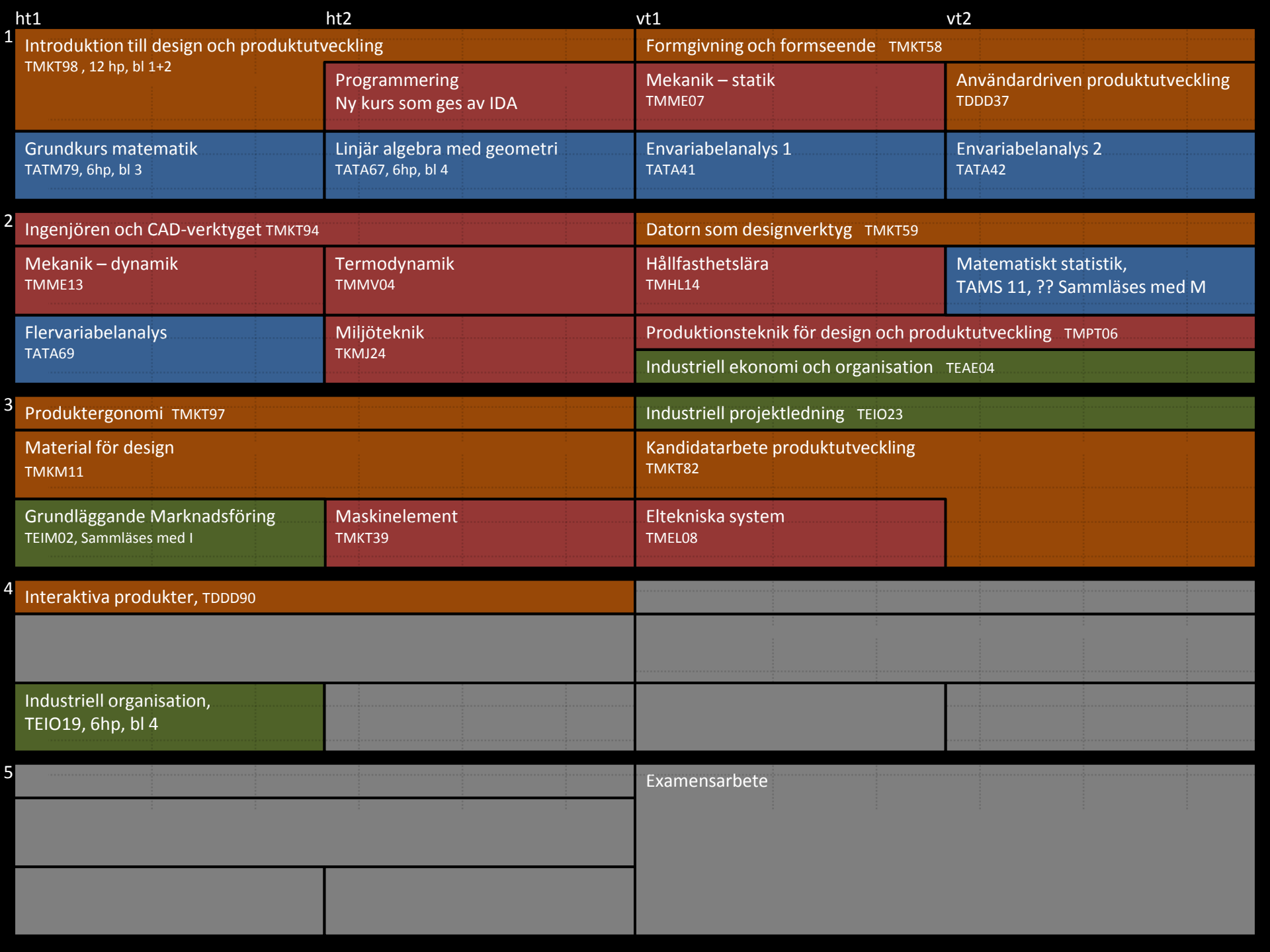
Program structure

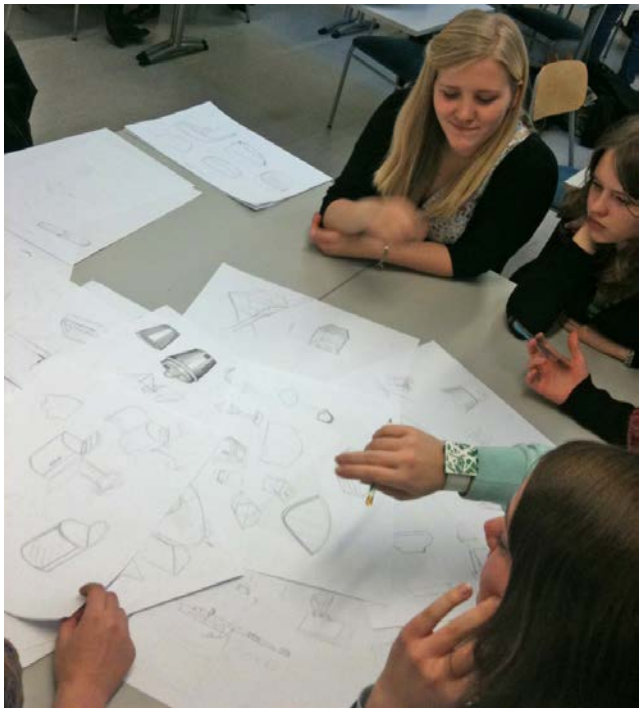
=Math =Engineering =Design and PD

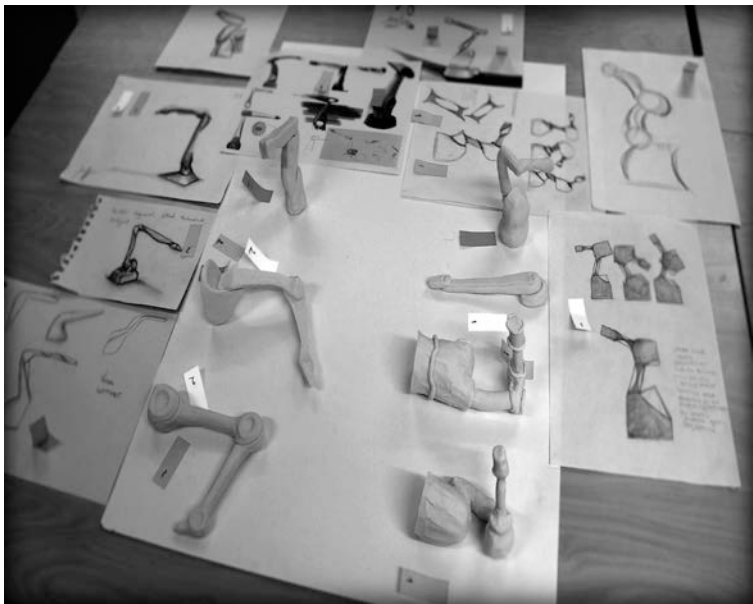
Bachelor

Master


ht1
ht2
vt1
vt2
1
Introduktion till design och produktutveckling
TMKT98 , 12 hp, bl 1+2
Programmering
Ny kurs som ges av IDA
Formgivning och formseende TMKT58
Mekanik – statik
TMME07
Användardriven produktutveckling
TDDD37
Grundkurs matematik
TATM79, 6hp, bl 3
Linjär algebra med geometri
TATA67, 6hp, bl 4
Envariabelanalys 1
TATA41
Envariabelanalys 2
TATA42
2
Ingenjören och CAD-verktyget TMKT94
Datorn som designverktyg TMKT59
Mekanik – dynamik
TMME13
Termodynamik
TMMV04
Hållfasthetslära
TMHL14
Matematiskt statistik,
TAMS 11, ?? Sammläses med M
Flervariabelanalys
TATA69
Miljöteknik
TKMJ24
Produktionsteknik för design och produktutveckling TMPT06
Industriell ekonomi och organisation TEAE04
3
Produktergonomi TMKT97
Industriell projektledning TEIO23
Material för design
TMKM11
Kandidatarbete produktutveckling
TMKT82
Grundläggande Marknadsföring
TEIM02, Sammläses med I
Maskinelement
TMKT39
Eltekniska system
TMEL08
4
Interaktiva produkter, TDDD90
Industriell organisation,
TEIO19, 6hp, bl 4
5
Examensarbete

Industrial design activities





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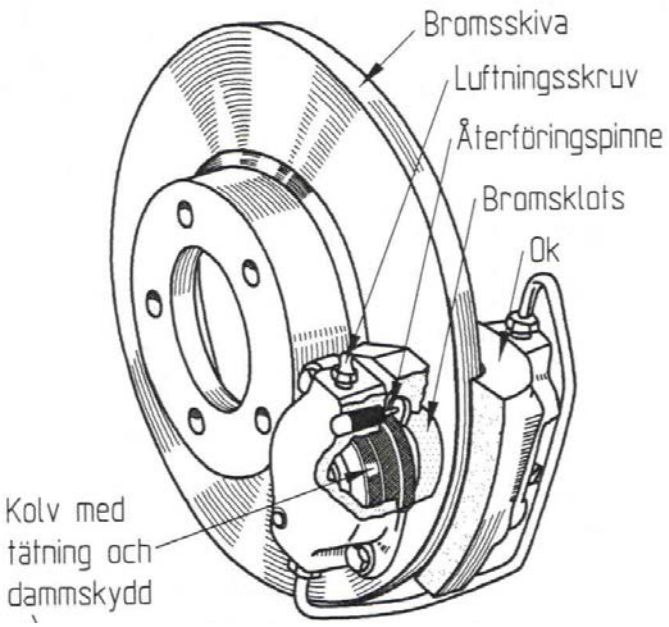
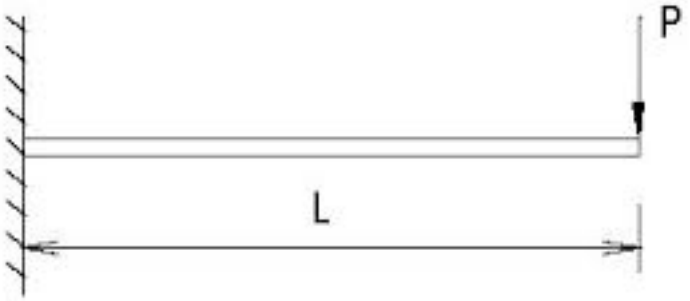
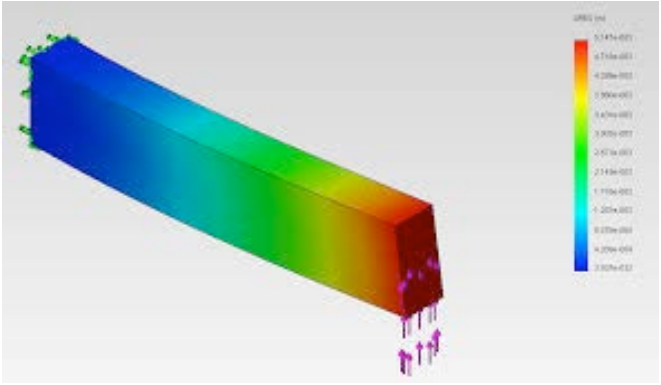
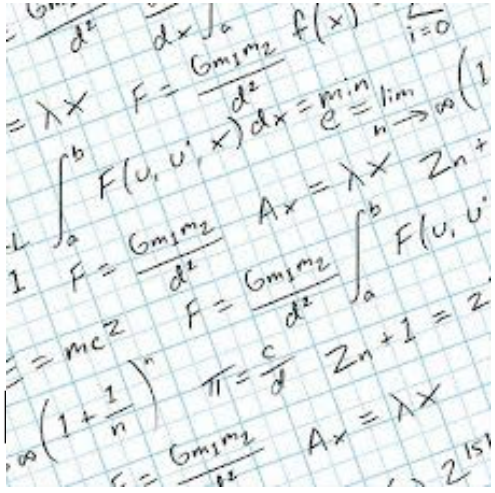
Engineering activities



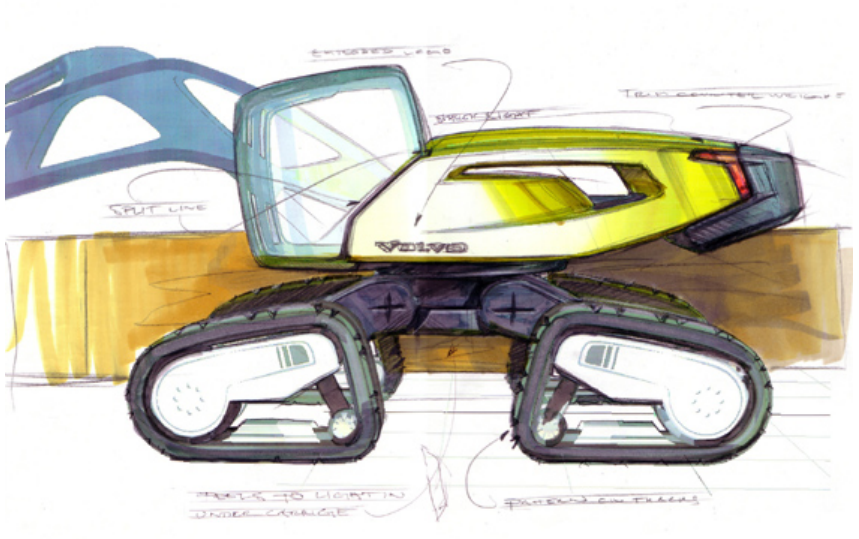


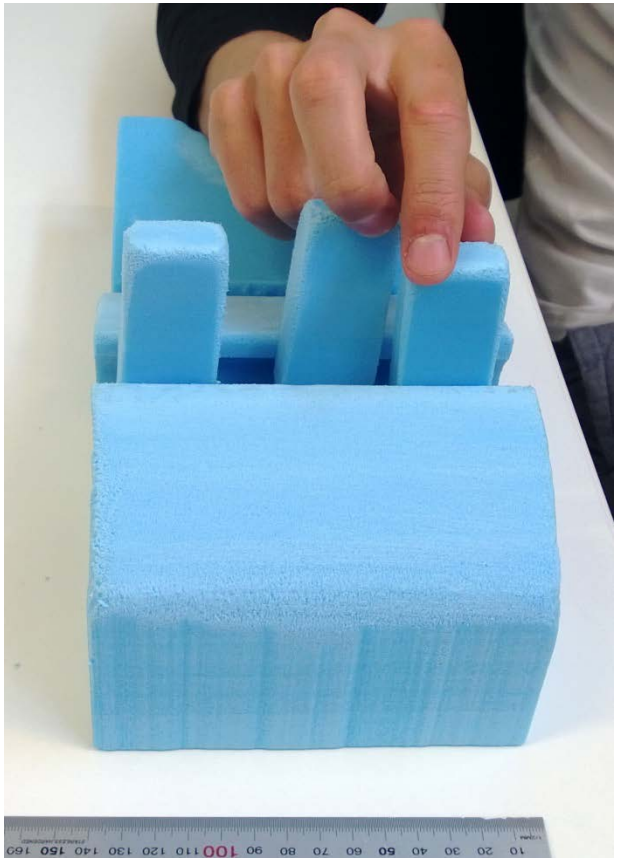


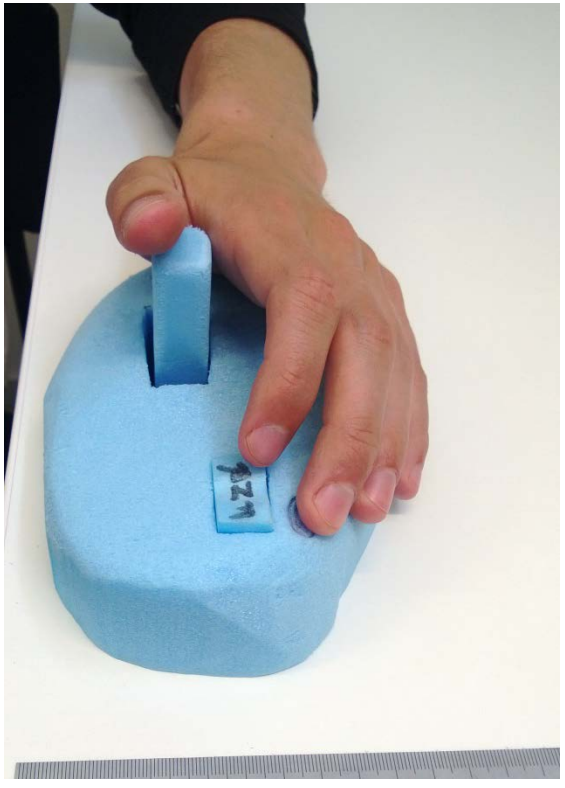


Product ergonomics

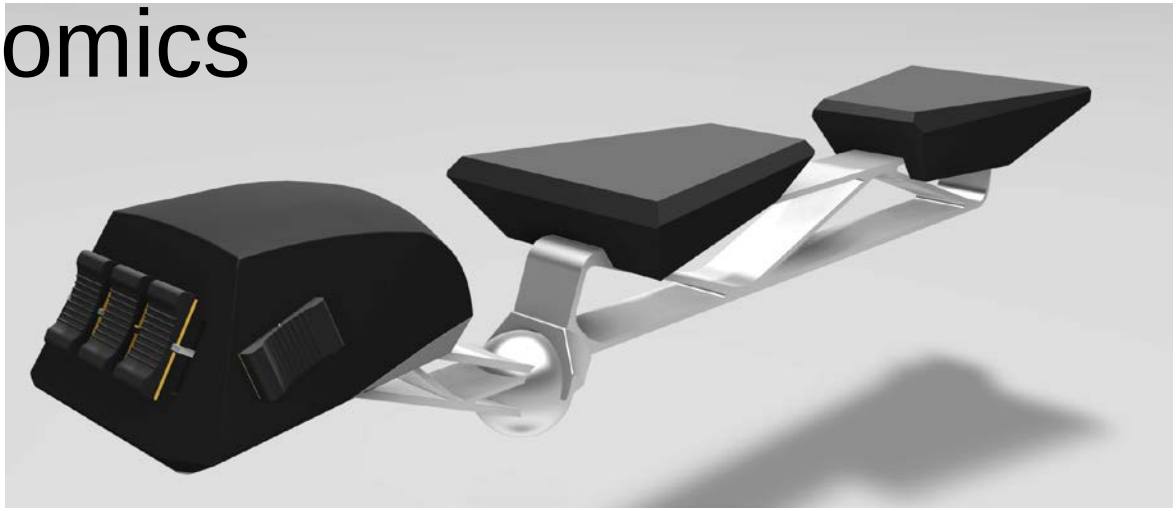
- Industrial cooperation
- Improve controls for a wheel loader







Product ergonomics



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Integrated Product Development

Bachelor project

- Integrated projects: Market – user demands – design – detailed engineering – production – “prototype”
- Students working in groups of apprx. 8
- Realistic industrial projects
- Project management – group dynamics
- Bachelor thesis (specialization in groups of two)

Integrated Product Development

Bachelor project

MOVIE

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Master program (Design profile)

Design studio 1

Design studio 2

Interactive products

Adv. development methodology

Industrial organization

Elective

Elective

Elective

Integrated project work

Master thesis

Design, strategy, management

Elective

Elective

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Master program (Engineering profile)

Industrial organization	Finite Element	Mechatronics	Advanced CAD
Interactive products		Adv. development methodology	
Elective	Elective	Design optimization	Elective
Integrated project work		Master thesis	
Elective			
System safety/ MDO	Elective		

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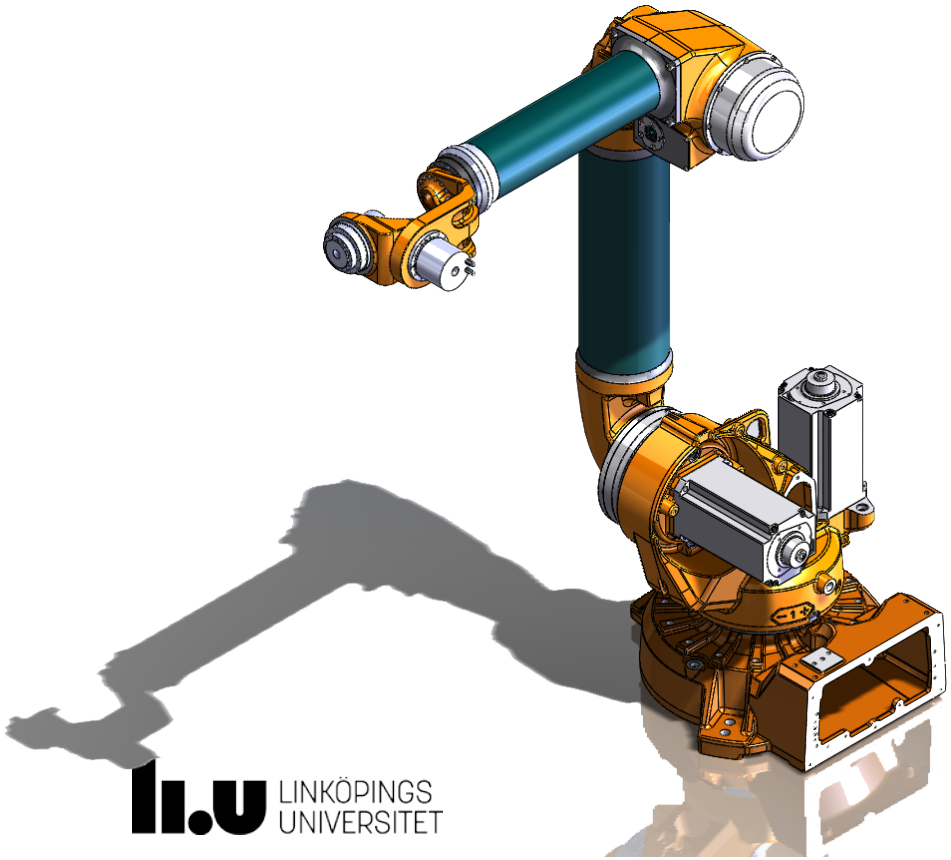
Final year project: *Light Weight Robot*

Task:

To design a new robot concept that through its shape enhances the technical characteristics of the robot.



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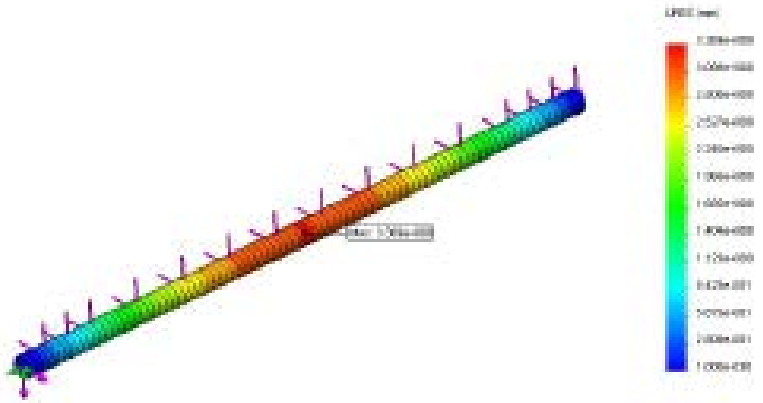
Final year project: *Light Weigh Robot*

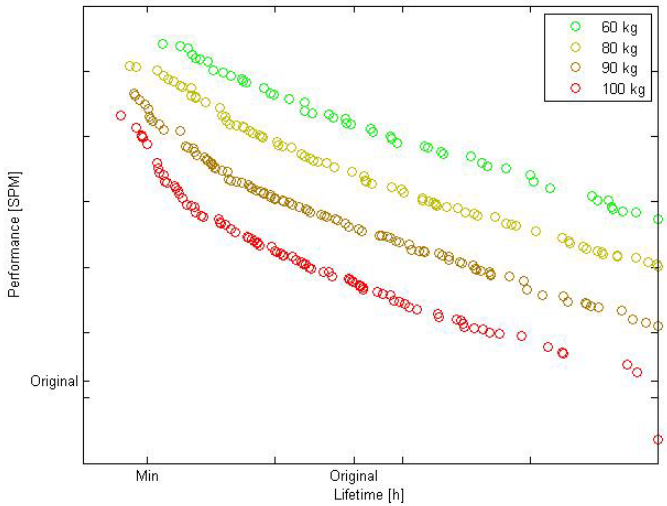
MOVIE

Master thesis – Engineering:
Industrial robotics

Twin robot crossbar

- Significant contribution for new product development
- Product release 2013
- Conference publication in Mechatronics 2014





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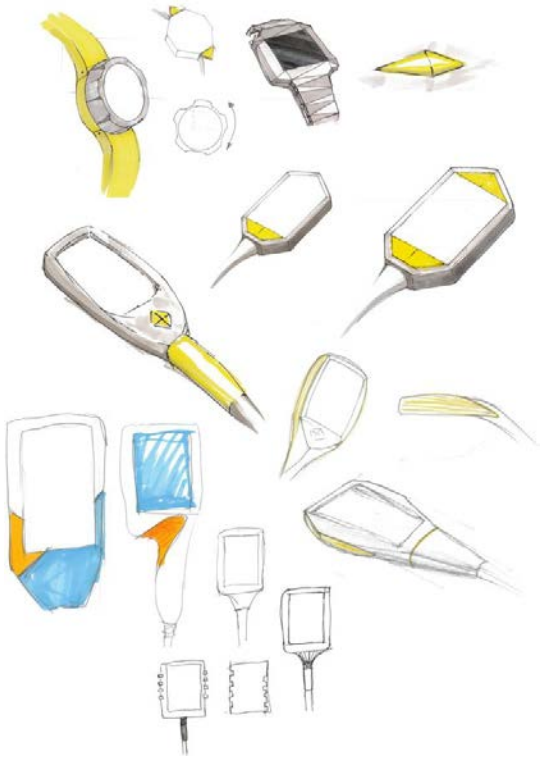
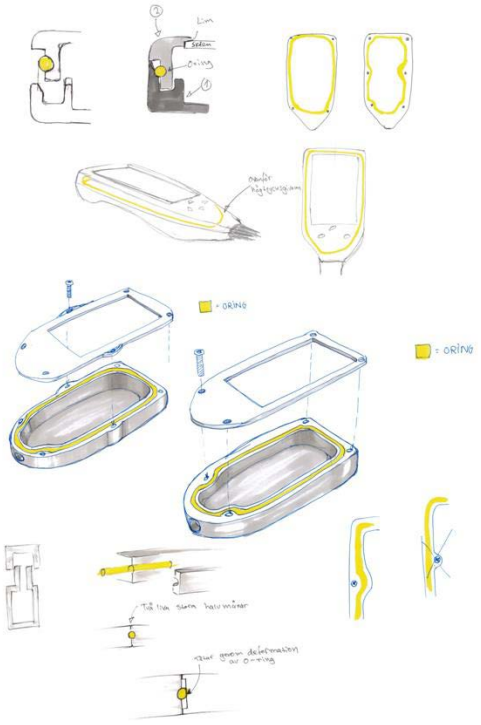
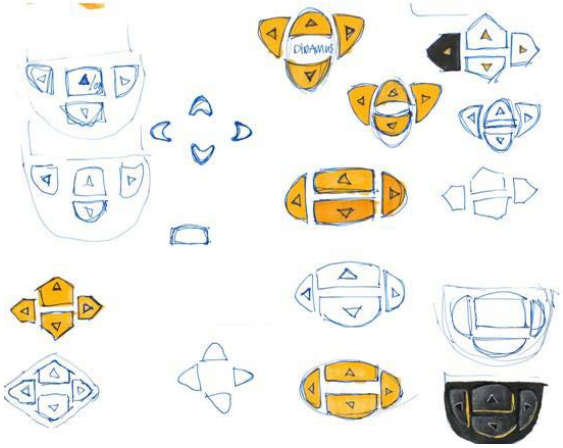
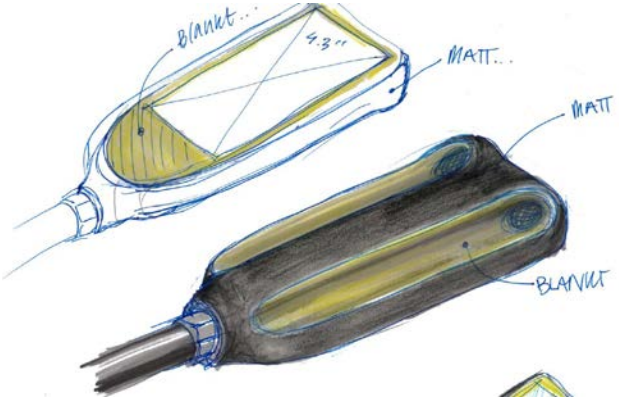
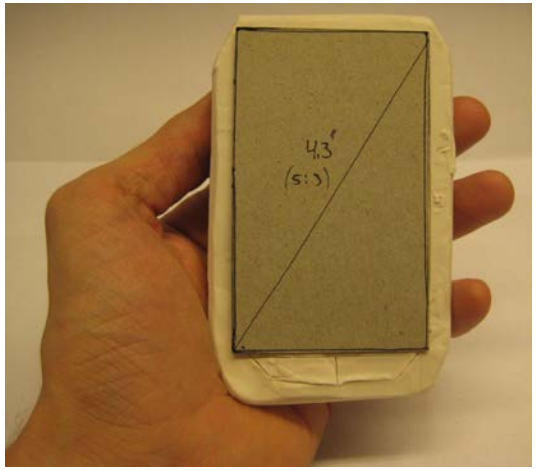
Master thesis - Design: *Dive computer*











Master thesis: *Dive computer - result*

Digital model

Physical prototype

Summary

- The students are very satisfied with their program
- The program attracts good students (high grades) and equally numbers of men and women
- The students get jobs directly after their education
- It is easy to get industrial projects to our education
- The students obtain creative results combining engineering and design in new product development
- From a teaching perspective it is a demanding but fun program to work with
- CDIO has been intergrated into the program to a large extension

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