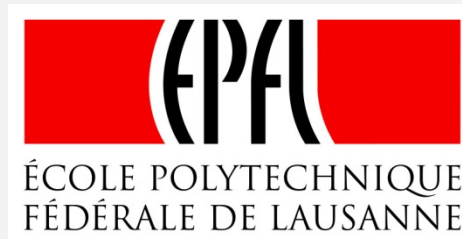


‘Product Design’

Introduction: learning objectives

Yves Bellouard

Galatea Lab, STI/IMT, EPFL
(Neuchâtel)



About myself ...

- MSc Physics (Univ. Pierre et Marie Curie)
- PhD EPFL – Microengineering (2000)
- Research Scientist / Rensselaer Polytechnic Institute (2001-2005) / Troy, NY, USA
- Assistant / Associate Professor / Eindhoven University of Technology / Eindhoven, the Netherlands (2005-2015)
- Associate Professor / Institute of Microengineering / STI / EPFL (2015-...)

Format

- **Two parts**
 - 3 ECTS – ‘Product design: managing projects and innovations’ – MICRO-403 – Fridays 13h00-16h00
 - 5 ECTS – ‘Product design in a team’ – MICRO-404 – Fridays 16h00-18h00 (meeting) + 3 ECTS ‘outside’
- **14 weeks**

Basic Philosophy

- Learn by doing → *‘Experience full product design cycle’*
- Real life situation means team work → *‘Work in team to develop essential social and communication skills’*
- Every person is unique and is more likely to have specific skills → *‘Form teams reflecting skills diversity’*
- Innovation is essential → *‘Projects open to innovation, opportunities for brainstorming’*

'Core Microengineering'

Integration for MT
products, based on case
studies
4 cr
(*'contrôle continu'*)



MICRO-404
'Product Design in a team'
(Project - 5 ECTS)

Format

- Teams of 6 students (15 groups)

Learning objective

- Create a 'product' fulfilling a given set of specifications
- Experience all the phases leading to a 'product' design
- Be able to coordinate/plan a project over a semester period

Additional skills

- Team work
- Meeting dynamics / planning
- Manage budget

Deliverables

- A demonstrator
- Report containing:
 - *Design selection process*
 - *Dimensioning*
 - *Fabrication / Testing*
 - *Patent search & analysis*
 - *etc.*

MICRO-403

**'Product design:
managing projects
and innovations'**
(3 ECTS)

- Project management
- Structure of a company
- Intellectual property
- Supply chain
- Market survey
- Etc.

Class exercise (15 min)

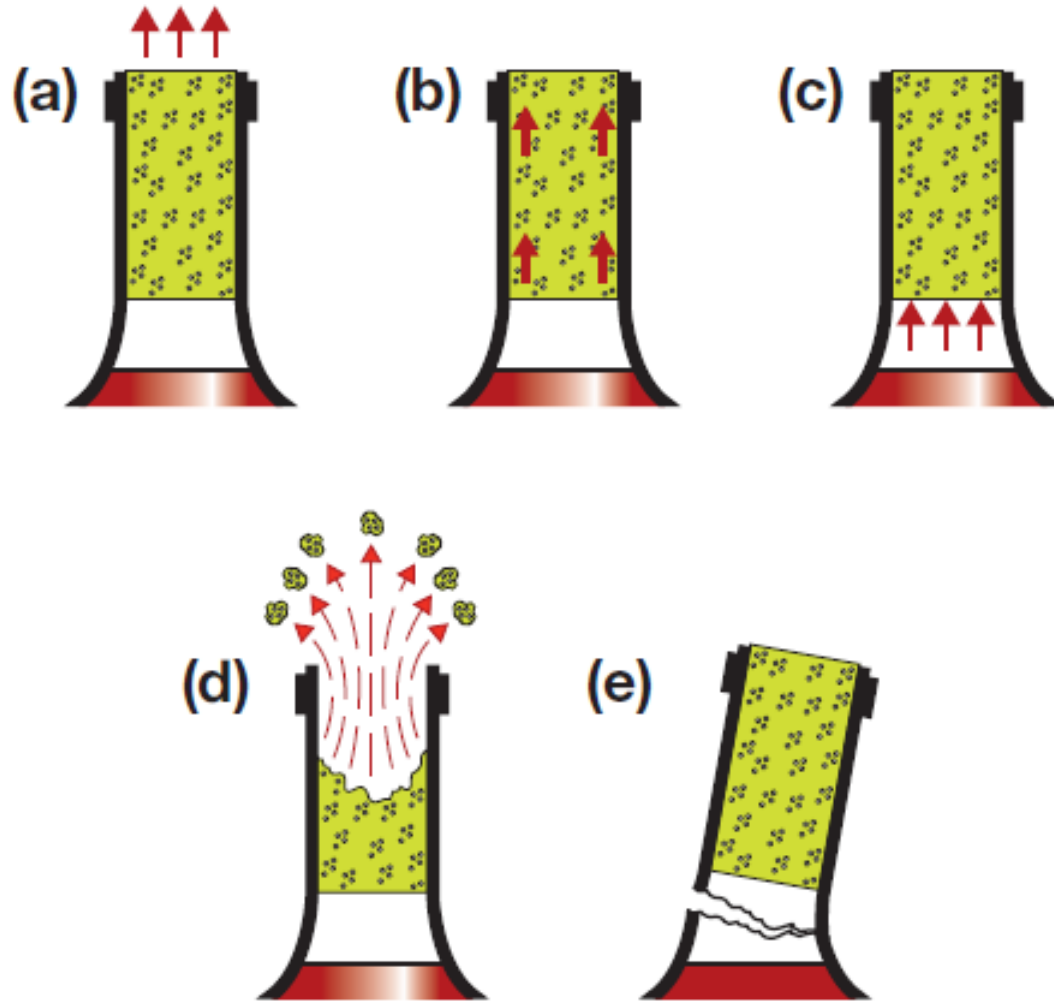
'Fête des vendanges'

- Propose at least four different design of cork removers



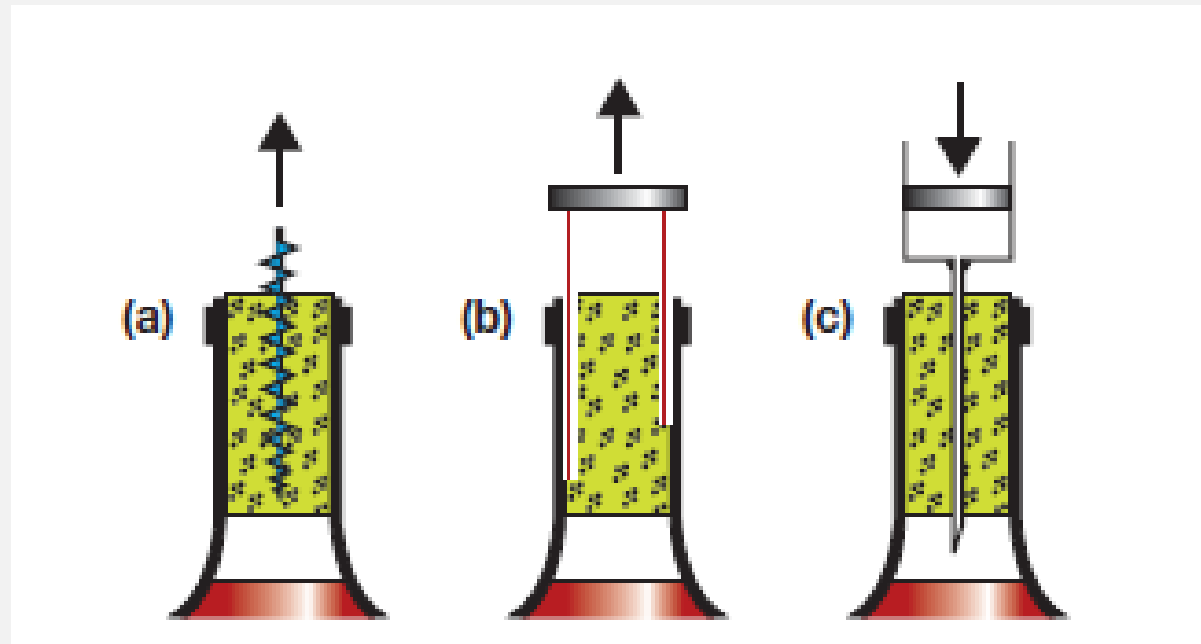
(Inspired from M. F. Ashby, Materials Selection in Mechanical Design, 4th Edition)

Cork removal principle



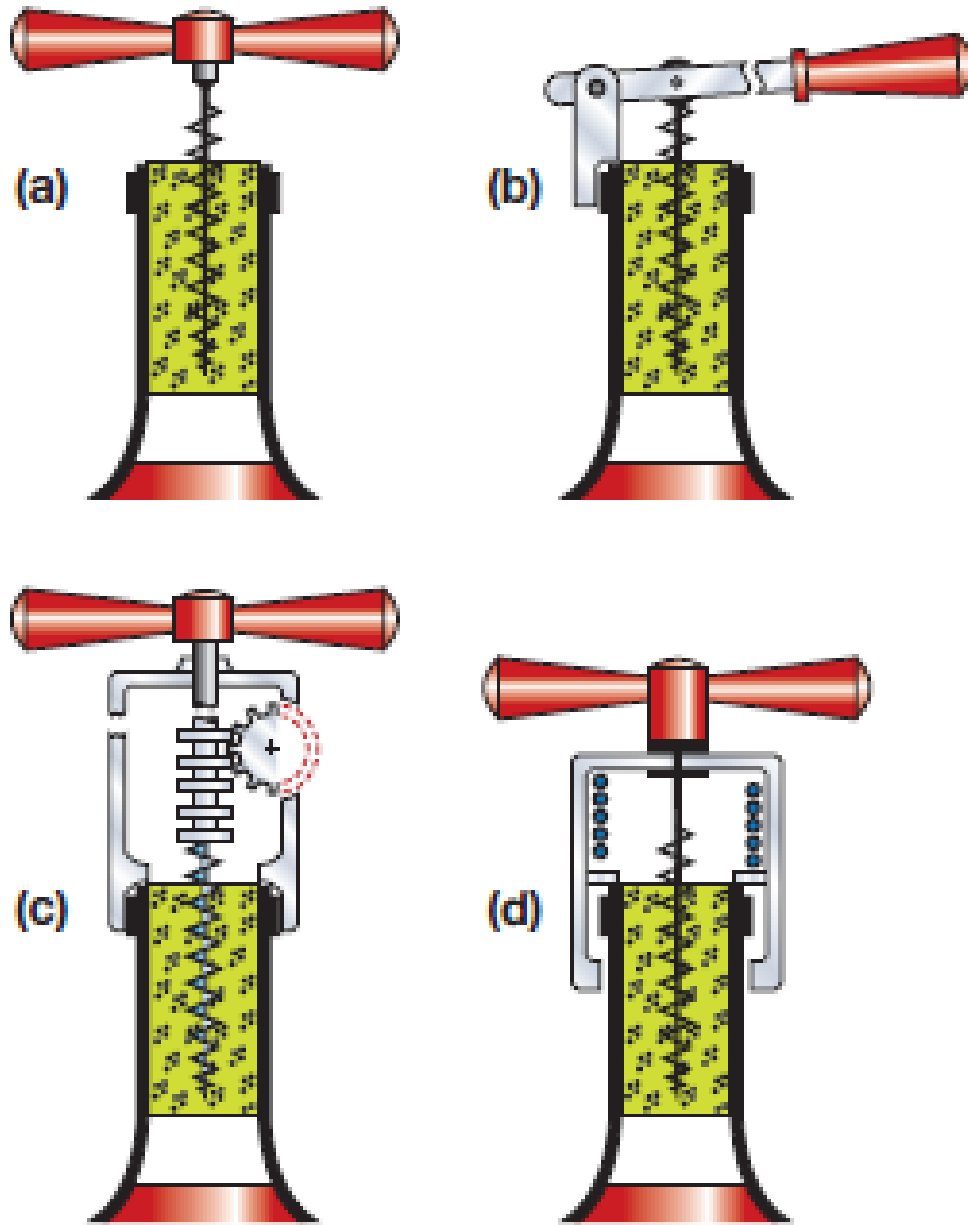
(M. F. Ashby, *Materials Selection in Mechanical Design*, 4th Edition)

Generic principles



(M. F. Ashby, Materials Selection in Mechanical Design, 4th Edition)

Variations



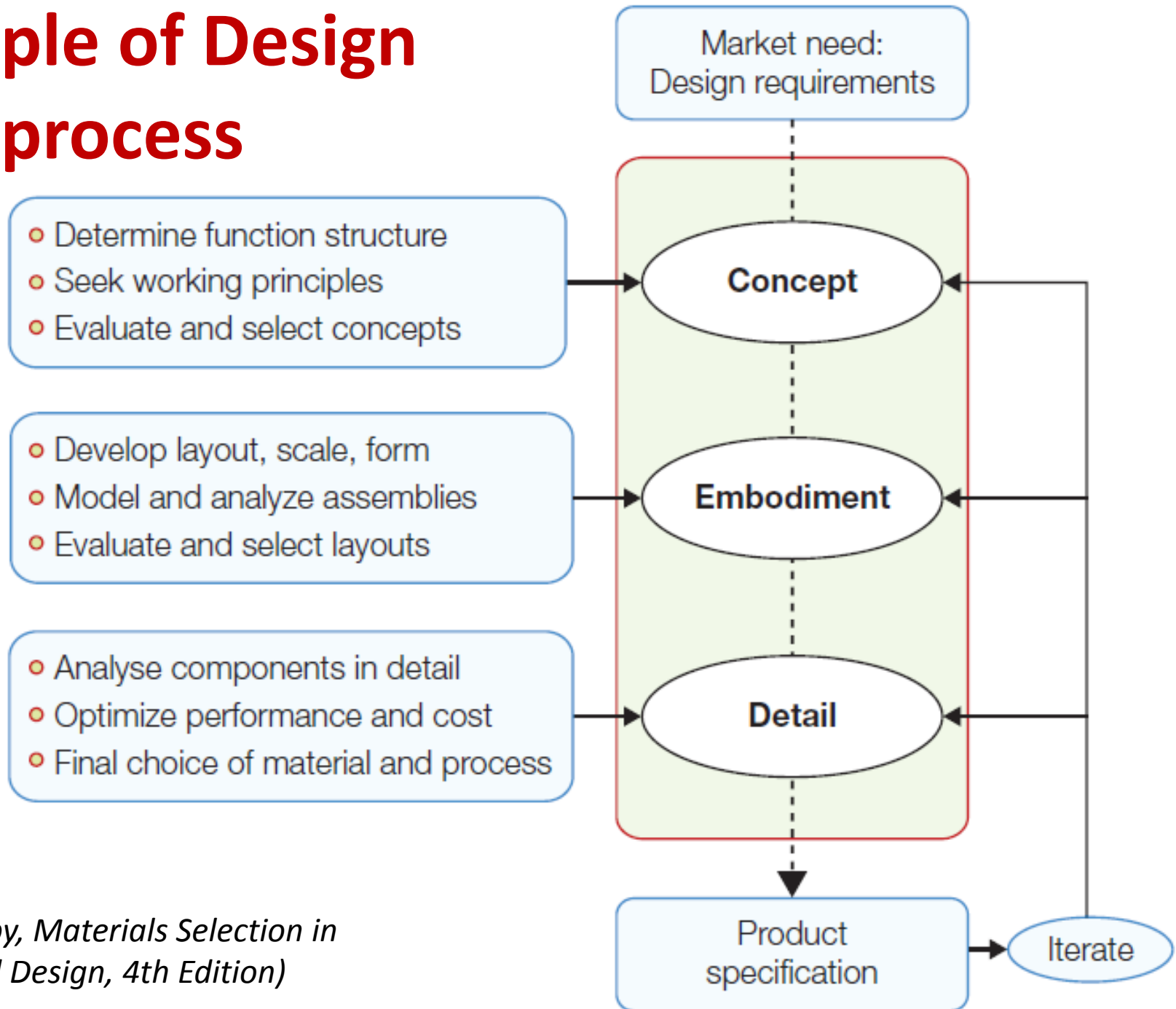
(M. F. Ashby, *Materials Selection in Mechanical Design*, 4th Edition)

Illustrations



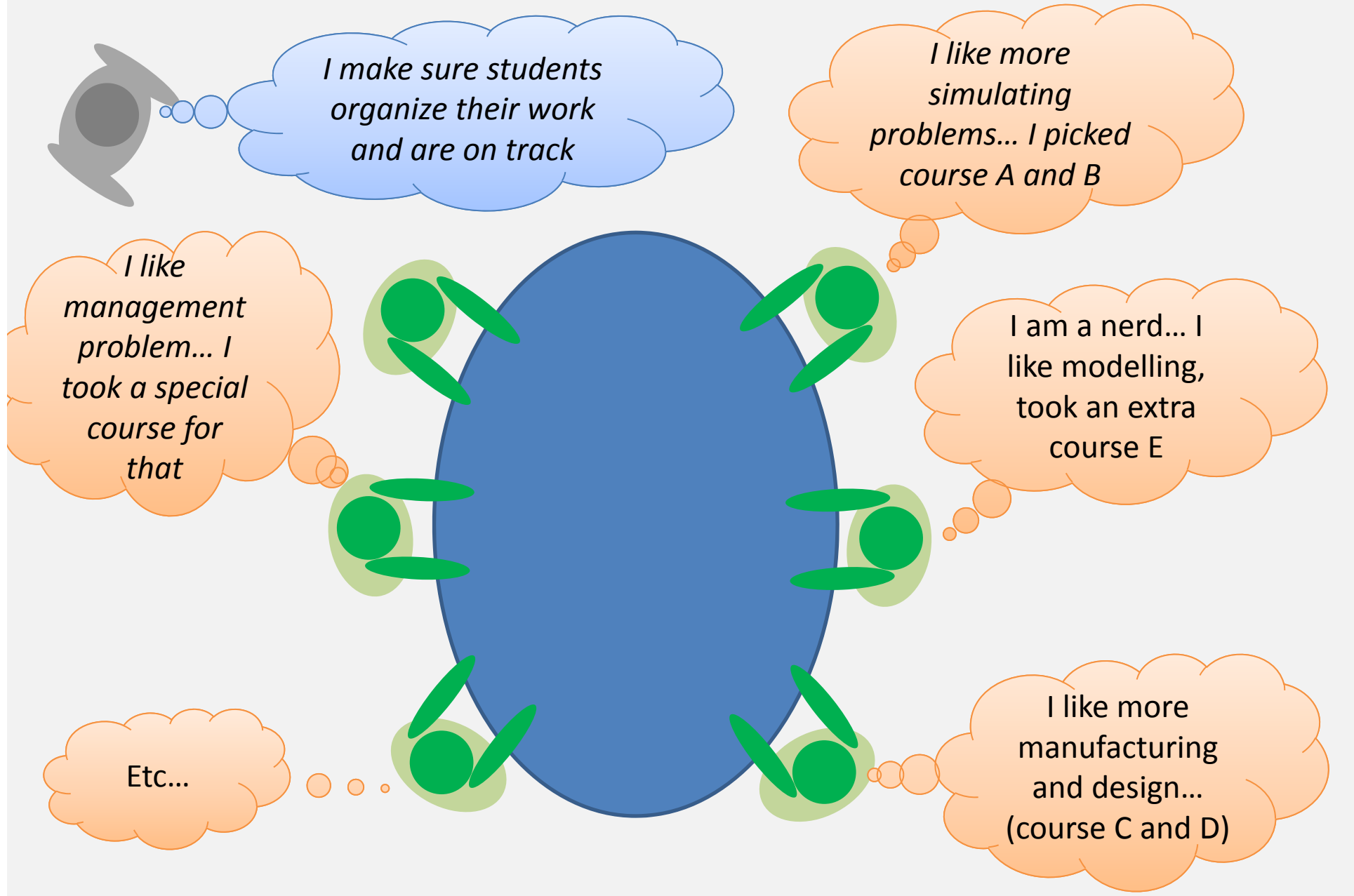
(Picture A-Best, Akron, Ohio)

Example of Design process



(M. F. Ashby, Materials Selection in Mechanical Design, 4th Edition)

'project team biodiversity'



Your coach

- A PhD student
- **Meet** the student team *one time a week*
- **Make sure the team organizes his work** (planning, deadlines, objectives, task distributions among students)
- **Observe** the group dynamics (who is pro-active, who seems to have difficulties, etc.)
- Suggest possible source of information / help but **does not actively participate** in the design project itself.

Your coach

- **Check the finance** for each group / approval / disapproval
- Establish a **blog** for each team (as the managing person)
- <http://blog.epfl.ch/productdesignteamxx>

During the weekly meeting (2h)

1. First part (must not exceed one hour)

1. One team member chair the meeting
2. One takes the minute for the meeting
3. Going through action points from the week before
4. Brief discussion of problems encountered / remedies
5. Definition of new action points
6. Refine the project schedule

2. Second part

Brainstorming on a specific topic

After the meeting (3h)

- Homework for each team member who works on the task assigned to him during the team meeting
- Team members may team up in subgroup of 2 or max 3 for specific tasks

Work ethics in team

- Everybody should have a say
- Take turn to speak
- You may not agree, but you respect opinions as well as the work from your colleagues
- Consensus when not all the team agrees / Decision making process / vote
- Be responsible... You are all on the same boat

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MICRO-403

**'Product design:
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(3 ECTS)

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- Supply chain
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- Etc.

MICRO-403

Product design: managing projects and innovations (planning)

1	23 Sept.	Course objective / Learning objectives / How it works?	Yves Bellouard (EPFL)
2	30 Sept.	Project Management / Product development basics	Alexandre Pauchard, BOBST
3	07 Oct.	Supply chain I	Max-Olivier Hongler (EPFL)
4	14 Oct.	Time, cost and other management aspects	Alexandre Pauchard, BOBST
5	21 Oct.	Supply chain II	Max-Olivier Hongler (EPFL)
6	28 Oct.	Risk, quality and project economics	Alexandre Pauchard, BOBST
7	11 Nov.	No lecture / Projects mid-term review...	Review panel / jury

MICRO-403

Product design: managing projects and innovations (planning)

8 9	18.nov	Structure of a company	Vincent Dessene, Heraeus
10	25.nov	Intellectual property / How to find information? / efficient information collection / Patents	Christian Schott, Melexis
11	02.déc	Quality control / Metrology	Swatch Group
12	09. Dec.	Marketing concepts / Market study	Christopher Tucci (EPFL)
13	16. Dec.	From idea to a spin-off: testimonies from former microengineering students / Innovation put in practice	
14	19 déc. / 23.déc	- No lecture - Final Projects presentation event	

Grading (Micro-403 & 404)

- 1/3 – Prototype and presentation of the results
 - Prototype itself
 - Is it completed?
 - Does it work?
 - Is it innovative?
 - Presentation skills
 - Mid-term review: Slides, presenters, answering questions
 - Final presentation: Slides, presenters, answering questions

Grading

- 2/3 – Report
 - Discussion of ideas / presentations of the various concepts / Chosen concept / Specifications
 - Team work distribution / Management aspects
 - Task planning (Gantt chart) / Risk analysis
 - Technical content
 - Modelling
 - Technical drawings
 - Design qualification (performences measurements)
 - Intellectual property (Patent search)
 - Discussion on Marketing / Project economics (Fabrication costs)
 - Innovative aspects

Prototyping

- Main parts of the prototype must be done by professional
- Budget per team = 500 CHF
 - Machining parts
 - Buying small components (electronics), etc.
- Can be used anywhere
 - Machine shops on campus, outside, etc.
 - But:
 - Must have a quote first
 - Must be approved by your coach
 - More practical information later on

Project design topic 2016

- Design a 'battery-less flash light'
- Constraints:
 - Must fit in one hand
 - Stay on for a minute
 - Must use mechanical action for charging (direct or indirect)
- Complete freedom for the rest...
 - Additional functions?
 - Particular design?
 - Etc... be innovative! (think of what could be unique selling point of your product)

Dynolight Philips (WWII)



Goal for today's team meeting

- Form the team, get to know each other (including your coach)
- One team member chair the meeting, another one writes the minute
- Brainstorm on possible project ideas along an elaborated concept of battery-less flash light
- Defines important steps in your project/ what should be achieve and when? / Milestones
- Distribute roles among team members
- Post minute and meeting agenda online