

Embodiment design

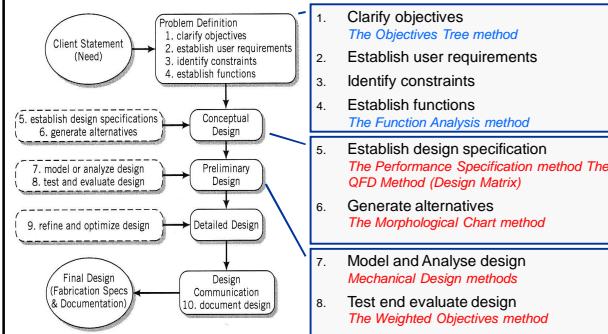
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[www.staff.city.ac.uk/~ra600/intro.htm](http://www.staff.city.ac.uk/~ra600/intro.htm)

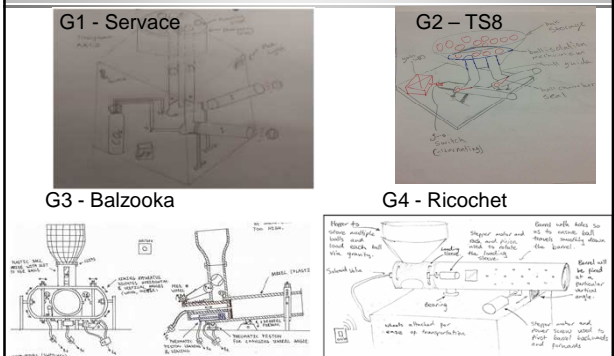
Plan for today

- Review of term 1 (15 min)
  - » What is expected in term 2...
- Presentation from technical staff (40 min)
  - » Manufacturing schedule and principles
  - » Materials provided to teams
  - » Control system
- Lecture Embodiment design (35 min)
- Q&A (10 min)

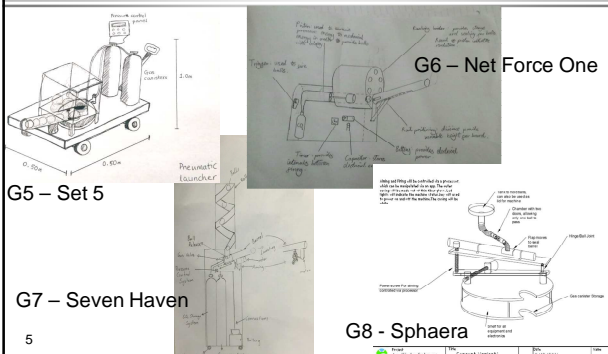
What did we do in Part 1?



Concepts developed



Concepts developed



What next?

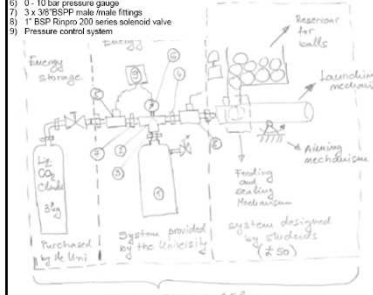
- Implement feedback from coaches on 2<sup>nd</sup> PR
- Embodiment design before 9<sup>th</sup> February
- Detailed design by 23<sup>rd</sup> February
  - » To include detailed calculation of all relevant elements (fluid, structure, control...)
  - » Full 3D CAD model and manufacturing drawings (assembly and detailed)
  - » Shopping list and purchase plan
- 3<sup>rd</sup> Project review -  
Materials to be ordered by 27<sup>th</sup> February

## Technical issues

Mr Richard Leach – technical lead  
 Mr Jim Ford – control systems  
 Mr Grant Clow – fluid system

## To be supplied to you

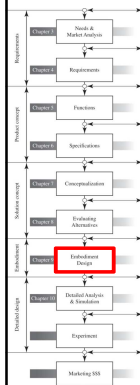
- 1) CO<sub>2</sub> fire extinguishers to use as pressure vessel
- 2) BSP T piece 1"
- 3) 1" BSP male - 3/8" BSP female bush
- 4) 1" BSP male-male nipple
- 5) 10 bar 3/8" BSP female solenoid valve
- 6) 0 - 10 bar pressure gauge
- 7) 3 x 3/8" BSP male female fittings
- 8) 1" BSP Ferruzzi 200 series solenoid valve
- 9) Pressure control system



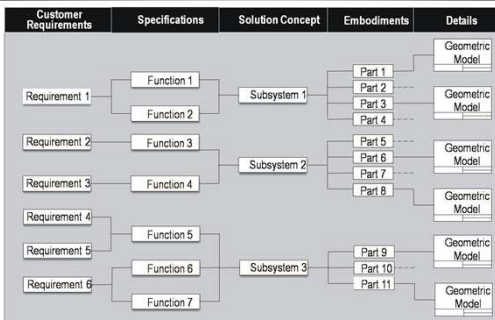
# Lecture time!

## Embodiment design

- Engineering Design Process 2<sup>nd</sup> Edition, Chapter 9
  - » Discuss the different types of presentations of a product
  - » Discuss the difference between prototype and mock-up
  - » Understand the term design for 'X'



## Representing Embodiments within the Design Process

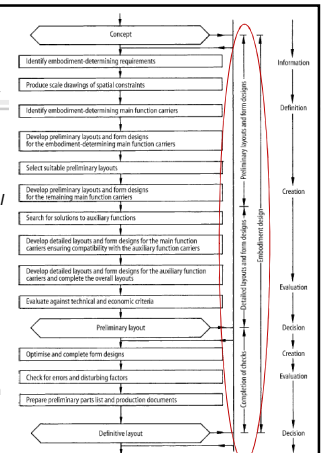


## Steps in embodiment design

Embodiment design is the part of design process in which, starting from the principle solution or concept of a technical product, the design is developed in accordance with technical and economic criteria to the point where subsequent detail design can lead directly to production.

The definitive layout must be fully developed so that a clear check of function, durability, production, assembly, operation and costs can be carried out.

Only when this has been done is it possible to prepare the final production documents.



## Product documentation

- Sketches – Conceptual design
- Assembly Drawings – Embodiment design
  - » Each component is clearly represented and identified in the list of references
  - » Detailed views are included as necessary
  - » Each component is calculated and validated
- Detail Drawings – Detail design
  - » Complete manufacturing drawings with dimensions, tolerances, material selection and manufacturing details

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## Design for X

- Design for manufacturing – minimising:
  - » cost of production, time to market
  - » high quality standards
- Design for assembly
  - » reduced number of parts, ease of assembly
- Design for environment
  - » Legislation, disposal, cost

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# Q & A

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## Tasks for this week

- Use feedback to update your concepts (select 1)
- Review the elements of conceptual design you made
- Update requirements list and QFD
- Construct main function carrier table
- Start working on identification of parts
- Decide who is going to do what
- Meeting on Thursday:

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