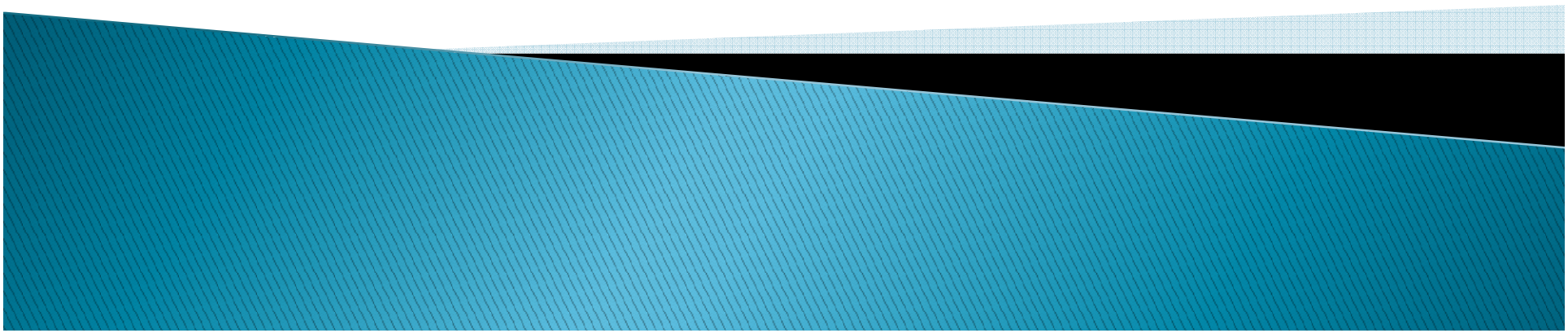
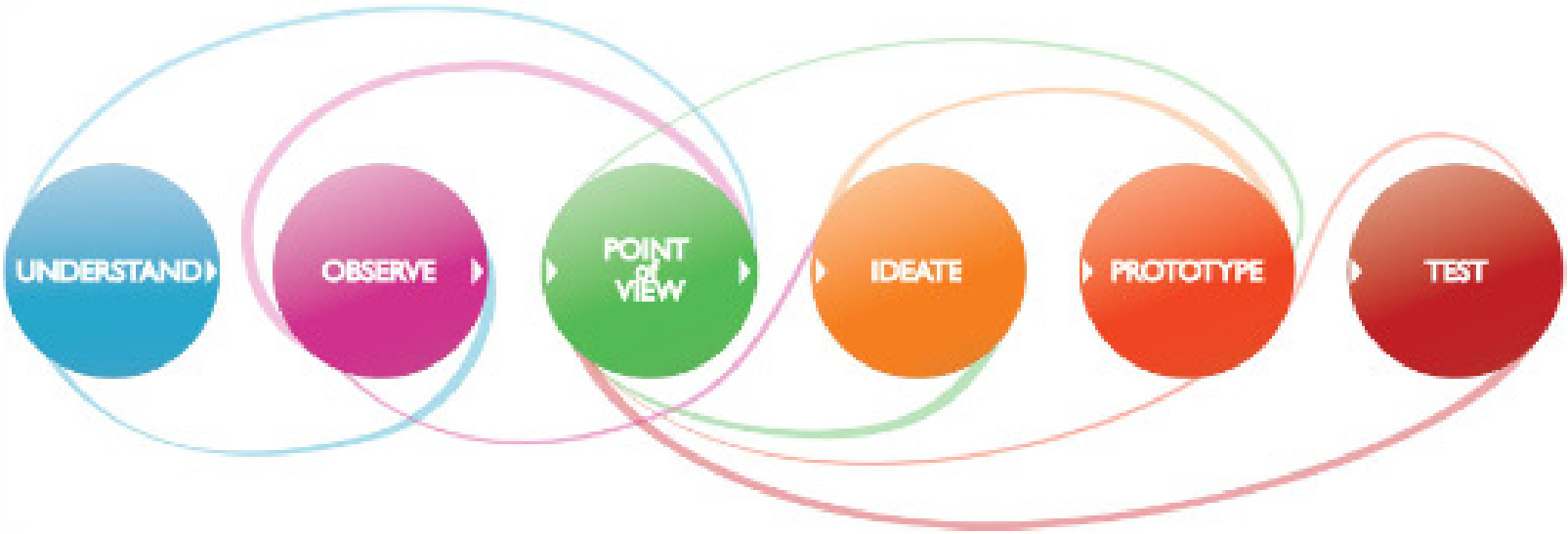
FDE 401
Process Design



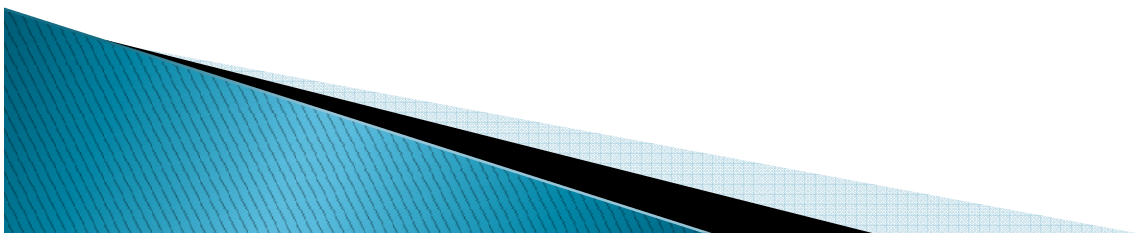
WHAT IS DESIGN?

- Design is a process.



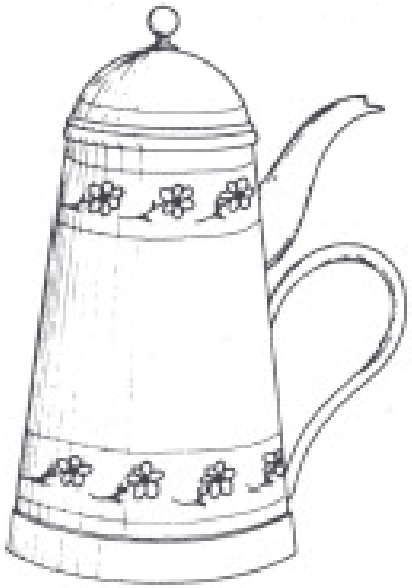
- The only way to learn design is to design.

- 3 types information are used to design.
  - Information to produce an idea.
  - Information to evaluate produced idea.
  - Information to form design process.



- The most important characteristic of a good design
  - Simple and understandable
  - Easy to use

Good Designs Look Simple

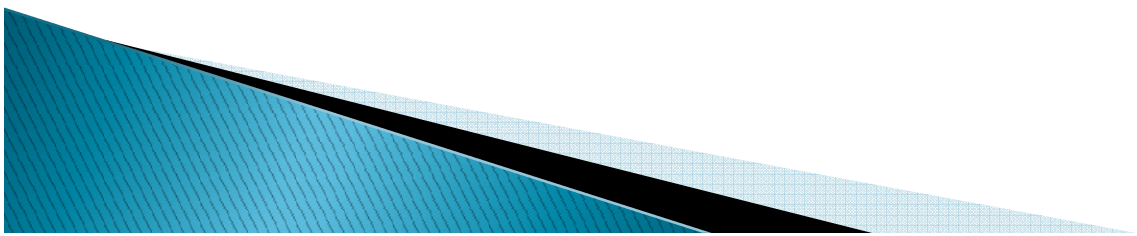


Carelman's Coffeepot for Masochists

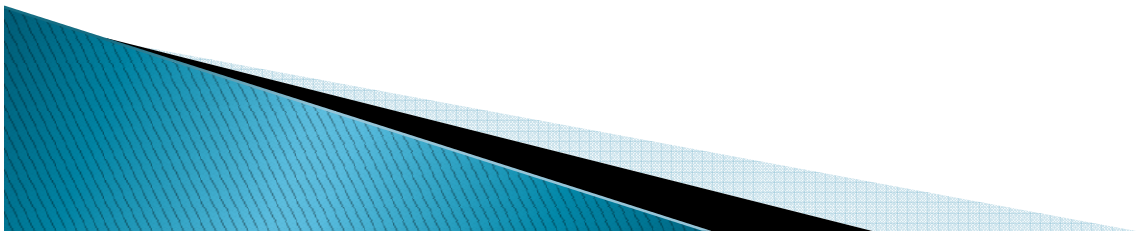
- The role of engineering in design;
  - Ask the right questions,
  - Get the right answers.

- According to a famous designer;

To ask the right questions is more important than to get the right answers. The main problem is the construction of the problem.

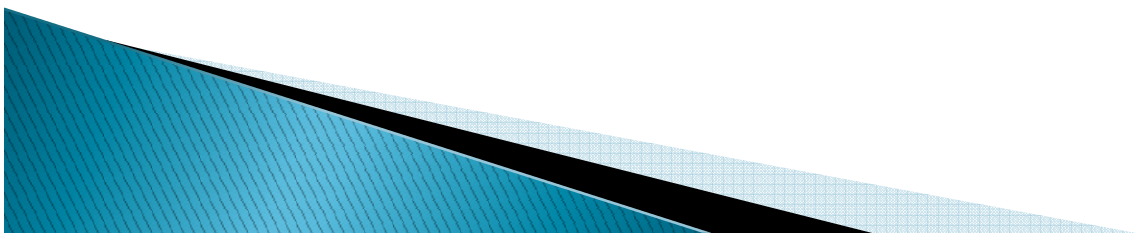


- Process design can be a new plant design or can be an improvement of current plant, efficiency or capacity increase.
- Design problems are open ended.
- In a design, two different design groups is not expected to reach the same conclusion by using the same method of attack.



Purpose of a process design;

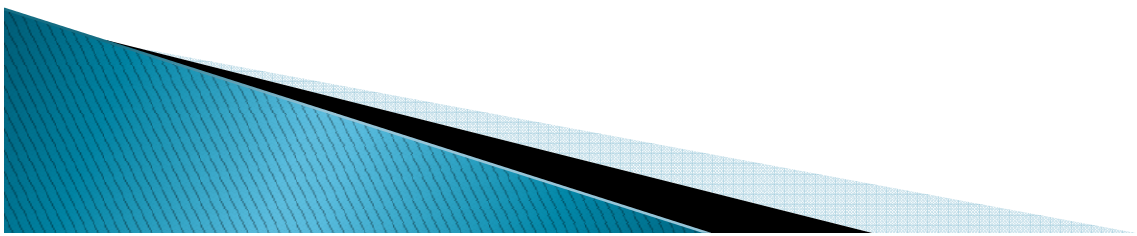
- Continuity of the process in maximum capasity,
- High efficiency,
- Realistic,
- Minimum energy and other operation cost,
- Production in narrowest quality and process limits



Factors to be considered while designing process

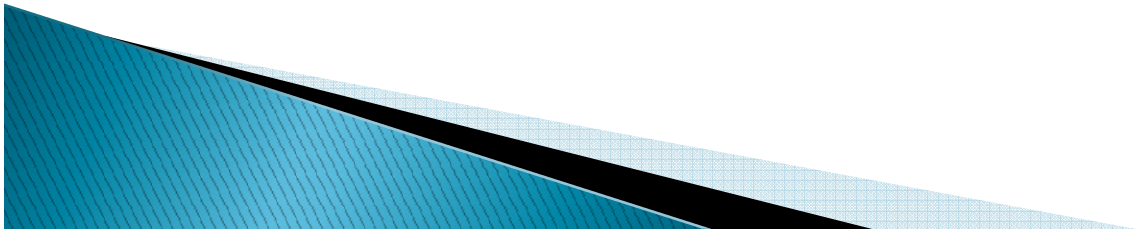
1. Technical factors
- Flexible and reliable process
- Process type (continuous or batch)
- Commercial efficiency
- Energy requirement
- Occupational safety

2. Raw material
- Accessibility in current and future.
- Essential pre-treatment
- Storage requirement
- Transfer problems of raw material in process.



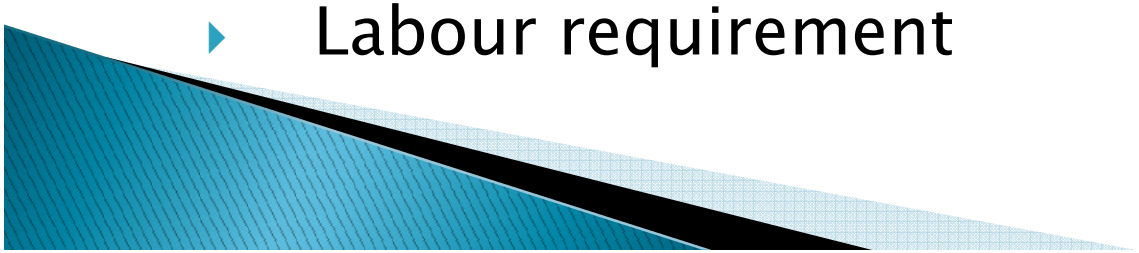
3. Waste and byproducts
- Production
- Cost
- Sale and usage potentiality
- Minimizing the toxic chemical usage
- Reducing the waste amount
- Maximum recycling

4. Equipment
- Accessibility
- Using material
- Cost
- Cost of maintenance and setup.



5. Factory Location
- Required fields
- Transport of raw material and product
- Labor forces in factory
- Power sources in factory
- Climate
- Legal restrictions and taxes

6. Economy
- Low initial investment capital
- Raw material
- Energy
- Amortisation
- Other constant expenses
- General expenses
- Labour requirement



Design through realistic circumstances

- The equipments and materials used in the middle stages and the final design's reality reflecting property are all quite important to have a successful design,
- Example: In piping system, the design engineer should first define the pipe diameter or pump power that will be used in the system.
- Example: Designing a heat exchanger, determination of plate spacing and area.
- Example: Designing a cold storage, selecting correct isolation material.