



## Basic Design and Pipe Drafting

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# Contents



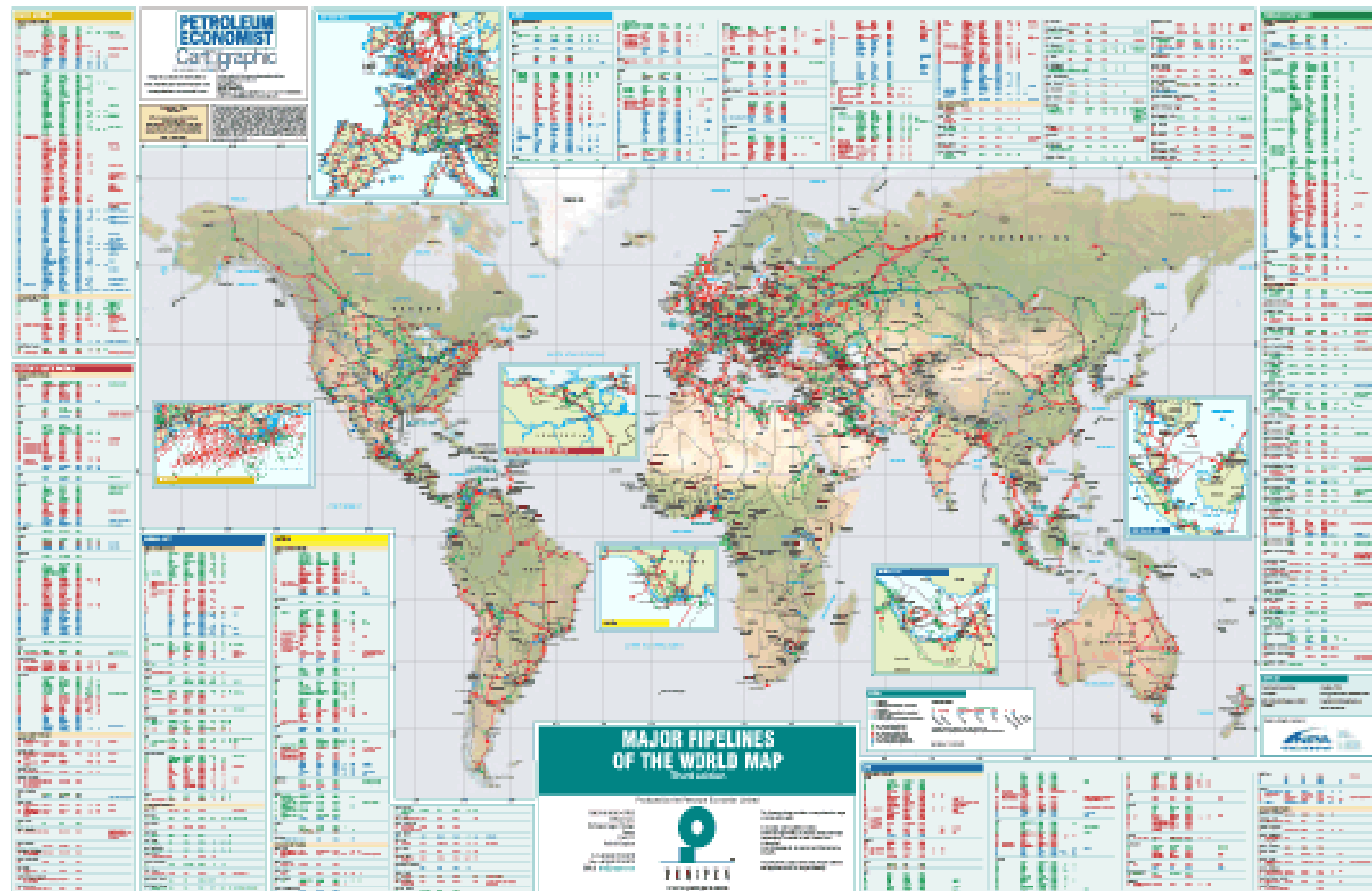
- 1) Introduction to design concept, engineering design process, how to do design, conceptual design, design cases, design software.
- 2) Introduction pipe drafting and design.
- 3) Steel pipe
- 4) Pipe flanges
- 5) Valves
- 6) Mechanical Equipment
- 7) Flow Diagrams and Instrumentation
- 8) Codes and Specifications
- 9) Isometrics

Lecture Times : Tuesdays EST 14-16 on class days

Lab /Tutorial Times: Sunday EST 14-15



# Major Pipelines of the World



# Course Preparation Guidelines



Type of Assessment	Grade %
Participation/Engagement/Performance	10%
Assignments	15%
Quizzes	10%
Research Project	15%
Midterm Exam	20%
Final Exam	30%
<b>Total</b>	<b>100%</b>

# Suggestions



- 1) Attend class and involve class activity (+)
- 2) Read lecture materials (Intranet)
- 3) Practice, practice and practice for drawing skills
- 4) Team work
- 5) Work hard, finish assignments on time
- 6) Honesty and integrity - not cheating/copy, your work. It is important for your future also.
- 7) For excellent students, read extended materials, try to do excellent work and get bonus.

Please tell me if there is a question – too fast, already know, or don't know...

# Suggestions



- 1) Think a good aim and act
- 2) Work smart and hard
- 3) No study, no grade

# Introduction



## Design Videos

[Engineering design video](#)

[Good design video](#)

# Some Characteristics of Engineers

**What do engineers do?**

**MAKE** things

**REPAIR** things

**ORGANISE** things

**MANAGE** things

**PLAN** things

**CREATE** things

**What do engineers have to sell?**

**KNOWLEDGE**

**EXPERIENCE**

**SKILLS**

**Who will buy**

**?**

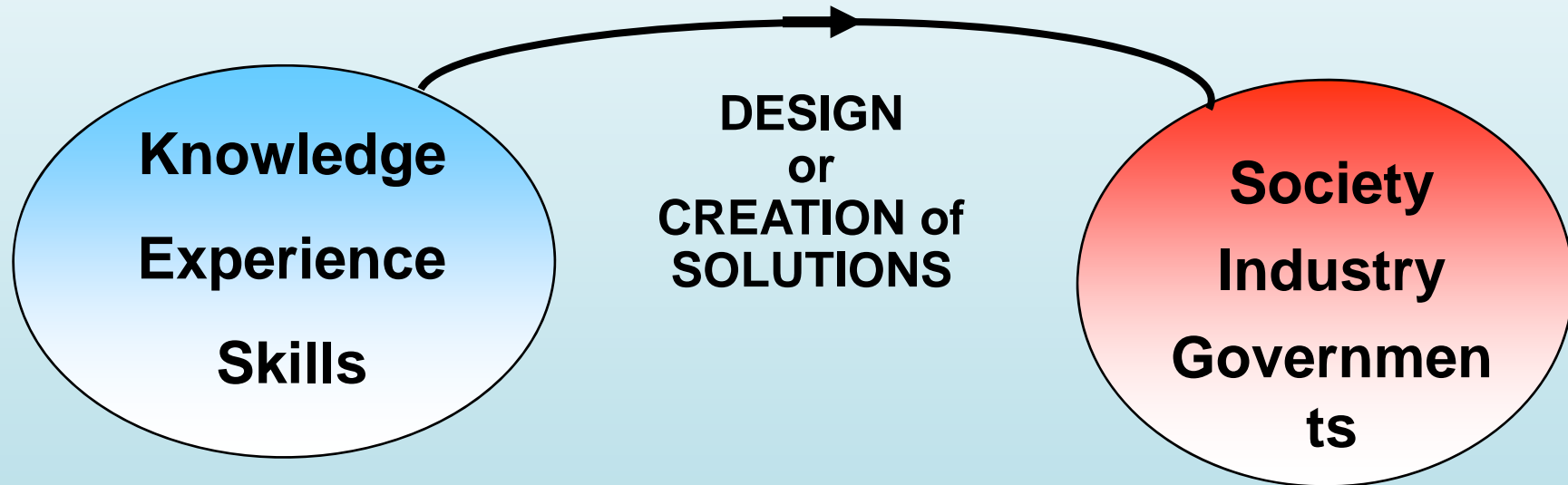
**SOCIETY**

**INDUSTRY**

**GOVERNMENTS**



# What is Design?



## DESIGN is

- The creation of an idea or solution
- The application of knowledge to the implementation an idea or solution



# Definitions of Design

1. To conceive or **Create; imagine** and; **invent** (contrive – arrange, plan)
2. To formulate a plan for; devise.
3. To **plan out** in systematic, use **systematic** form.
4. To **create** contrive for a particular purpose or effect.
5. To have as a **goal** **purpose** intend.
6. To create or execute in an **artistic** **highly skilled** manner.
7. To make or execute plans.
8. To have a goal or purpose in mind.
9. To create designs.

Source: <http://www.answers.com/topic/design>

# Features of Design



- Create
- Invent
- Conceive
- Plan out
- Systematic
- Goal
- Purpose
- Artistic
- Highly skilled
- etc...

# Alternative Definitions for Design



- 'The art of directing the great forces of power in nature for the use and convenience of man'.  
**Tredgold (1828)**
- Doing well for one dollar
  - what any fool can do for two.
- **Engineering makes things happen.**
- "Engineers translate into action the dreams of humanity, traditional knowledge and concepts of science to achieve sustainable management of the planet through the creative application of technology".
- Useful application of knowledge.

# Why is Design Important



You will spend most of your time here acquiring knowledge. But this knowledge will be of no use to you unless you can learn to apply it.

Engineers get paid for what they can *do*,  
not for what they *know*.

**DESIGN** is the core activity of Engineers  
and Engineering

# Inherent Design Characteristics



Design can only be taught by doing it - **SKILL**

It is intrinsically different from knowledge

Design problems are **NOT UNIQUE** to engineering

Design problems tend to be open-ended - **NO  
UNIQUE SOLUTION**

e.g. Consider the Design of

a **LOW COST, WOODEN** Chair

# Design of a Chair

Chairs could be designed  
by:-

Craftsman

Interior Designer

Artist

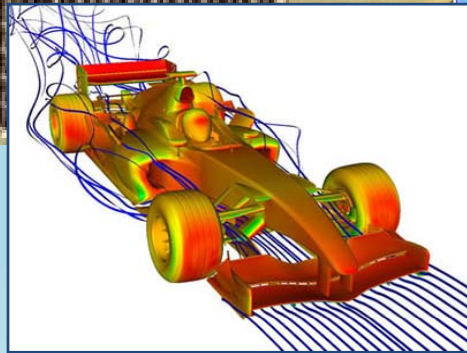
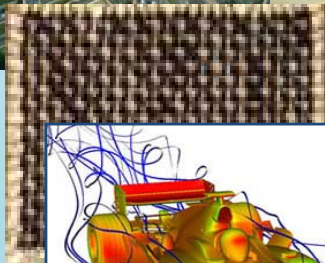
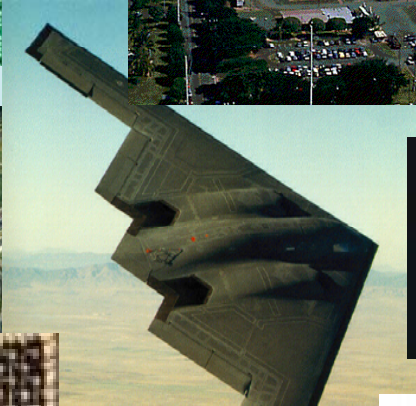
Chiropractor

**ENGINEER**

Each brings a flavour of his/her  
background



# Designs with a **STRONG** Engineering Flavour ??

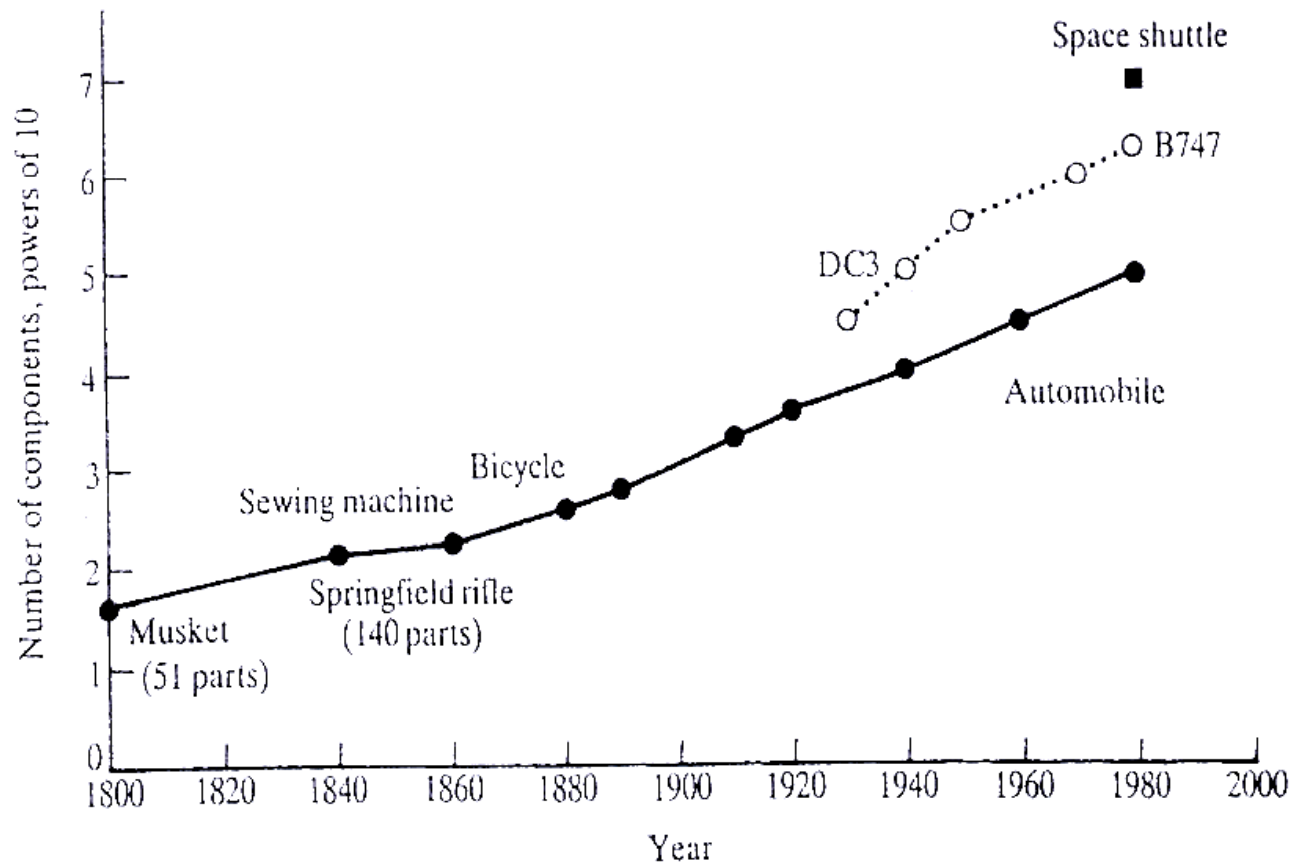




# Some Characteristics of Engineering Design

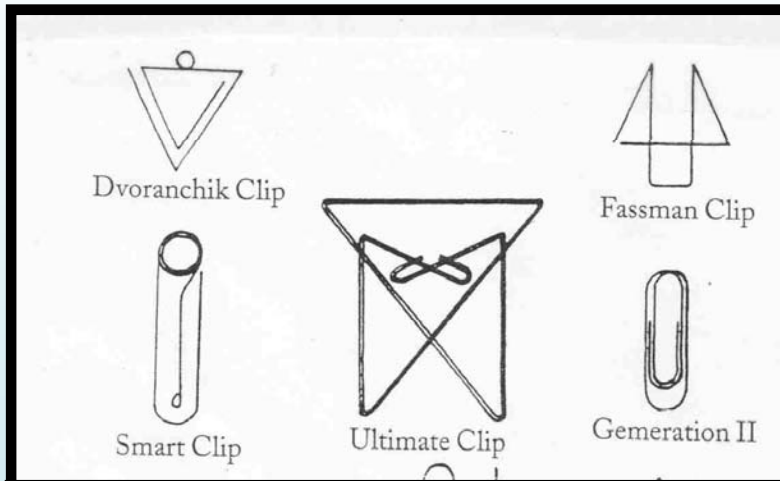


- Design projects are (**GENERALLY**) large and expensive.
- Design projects (**GENERALLY**) require teams
- Design projects require proof that the design will succeed.



The Growth of Complexity

# Design Problems



## PAPER CLIPS

Existing designs

**Would you like to make your fortune???**

**CAR AIR BAGS** How should they be folded for optimum performance.

**DISPOSABLE DIGITAL CAMERA** that will cost \$5 to manufacture.

**GEOLOGICAL DRILL** that will produce a 5km deep vertical hole. Such a design would permit geothermal power stations to be built.

**ELECTRICAL PLUG STANDAND** that can used simplify connections behind domestic machines.

**UMBRELLA** that does not collapse in the wind .

**BATHROOM MIRROR** that will not mist.

**ENVELOPE** replacement.

# Wood Design Examples



Wood Design Examples

# Design for Today's Economy



- The ability to design innovative new products is **a key for the survival of a business** in our modern, global economy.
- Design is also becoming more and more complex, with increasing **demands on designers**, they must
  - Consider **new** materials, technologies and processes,
  - Find new solutions to traditional problems, and
  - Deal with increasingly **complex** problems and stronger global **competition**.

# Design for Today's Economy



- Other factors need to be considered in order to achieve good design are the
  - Need for **collaborative** design using multi-disciplinary teamwork,
  - **Increased customers requirements**,
  - High product development **cost** and
  - Demand for **shorter development times**.

*To achieve this it is necessary to apply a modern and systematic approach to design*



## Project (15%)

Design water piping in the three rooms house and writing a report including description, requirements or constraints, sketch, analysis, manufacturing/installing, testing and review. You can work in a team (max. 3) and submit your own report (max.15 pages)



# Assignment 1 (5%)

Write an essay (4-5 pages) about design, engineering design process and application. You can work in a team (max. 2).