ME 1110 – Engineering Practice 1

Engineering Drawing and Design - Lecture 10

Design Communication

Technical Writing &
Graphical communication

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www.staff.city.ac.uk/~ra600/intro.htm

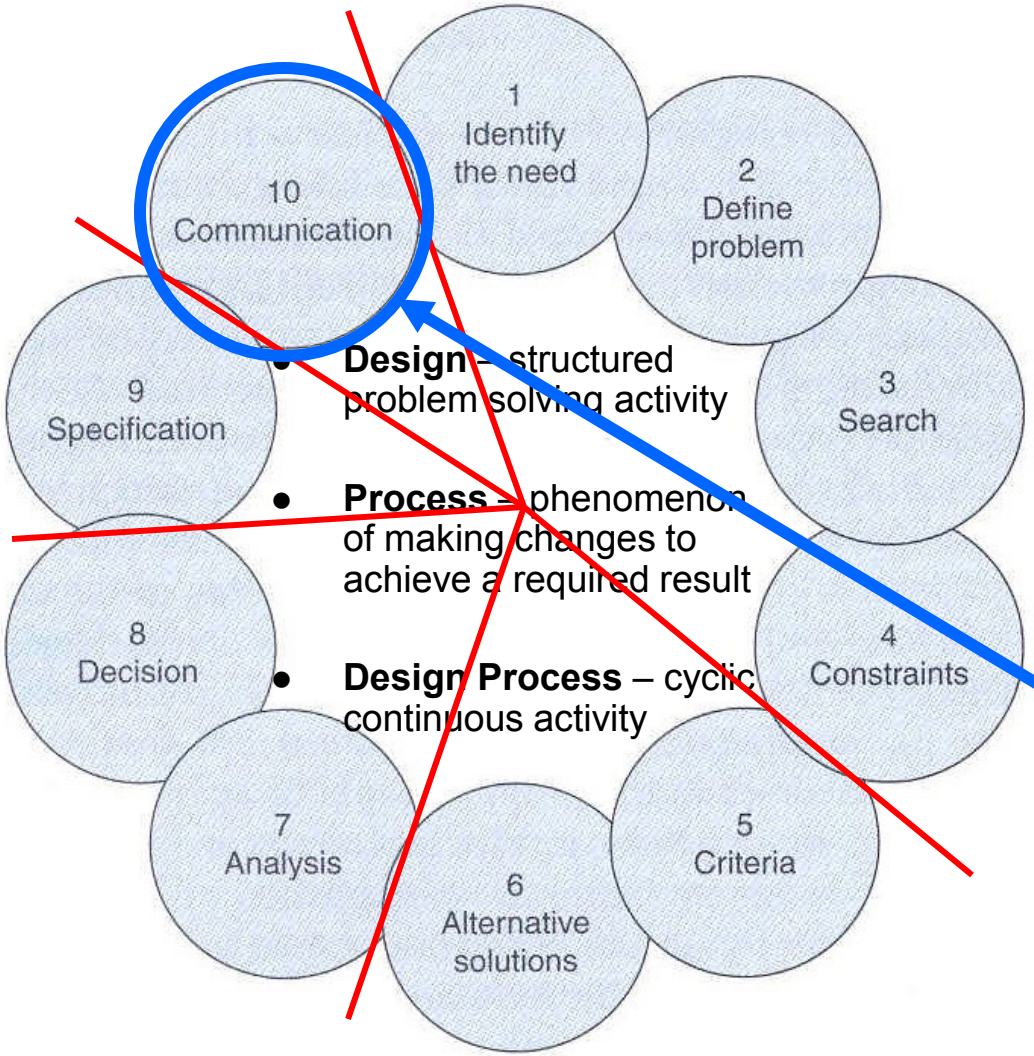
Objectives for today

Written communication

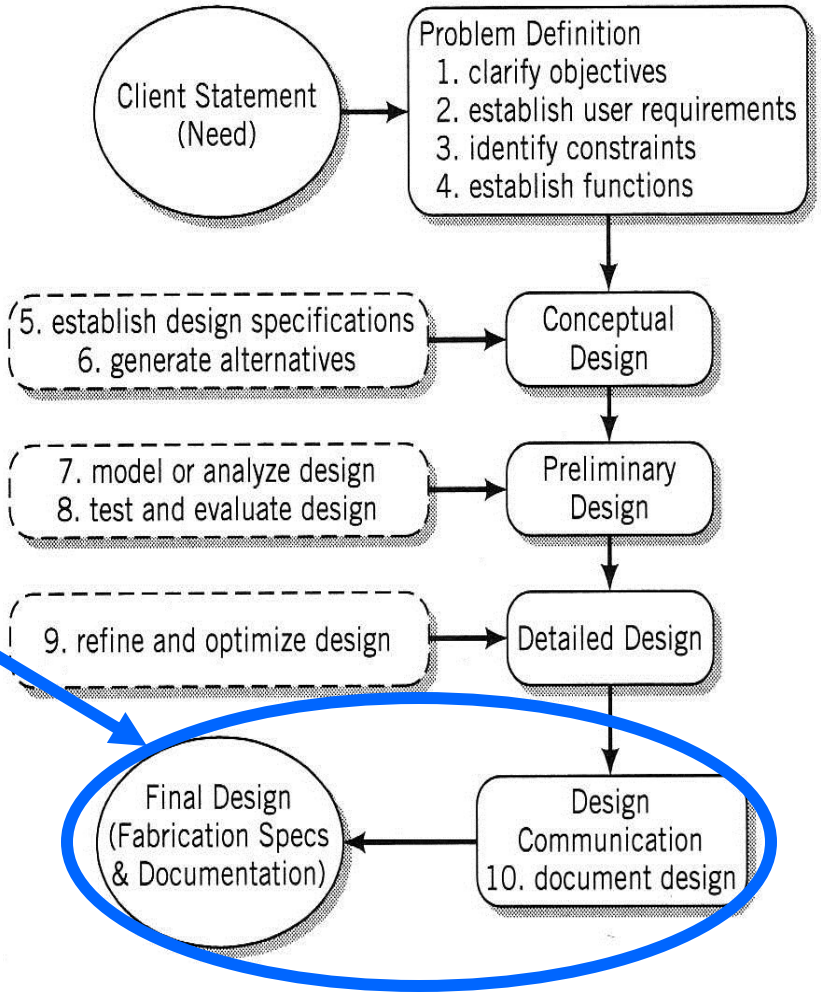
- Reports
- Diagrams and other graphical communication

Test 1: 15th January @ 15,00–17,00 - Oakden

Engineering Design Process



- **Design** – structured problem solving activity
- **Process** – phenomenon of making changes to achieve a required result
- **Design Process** – cyclic, continuous activity



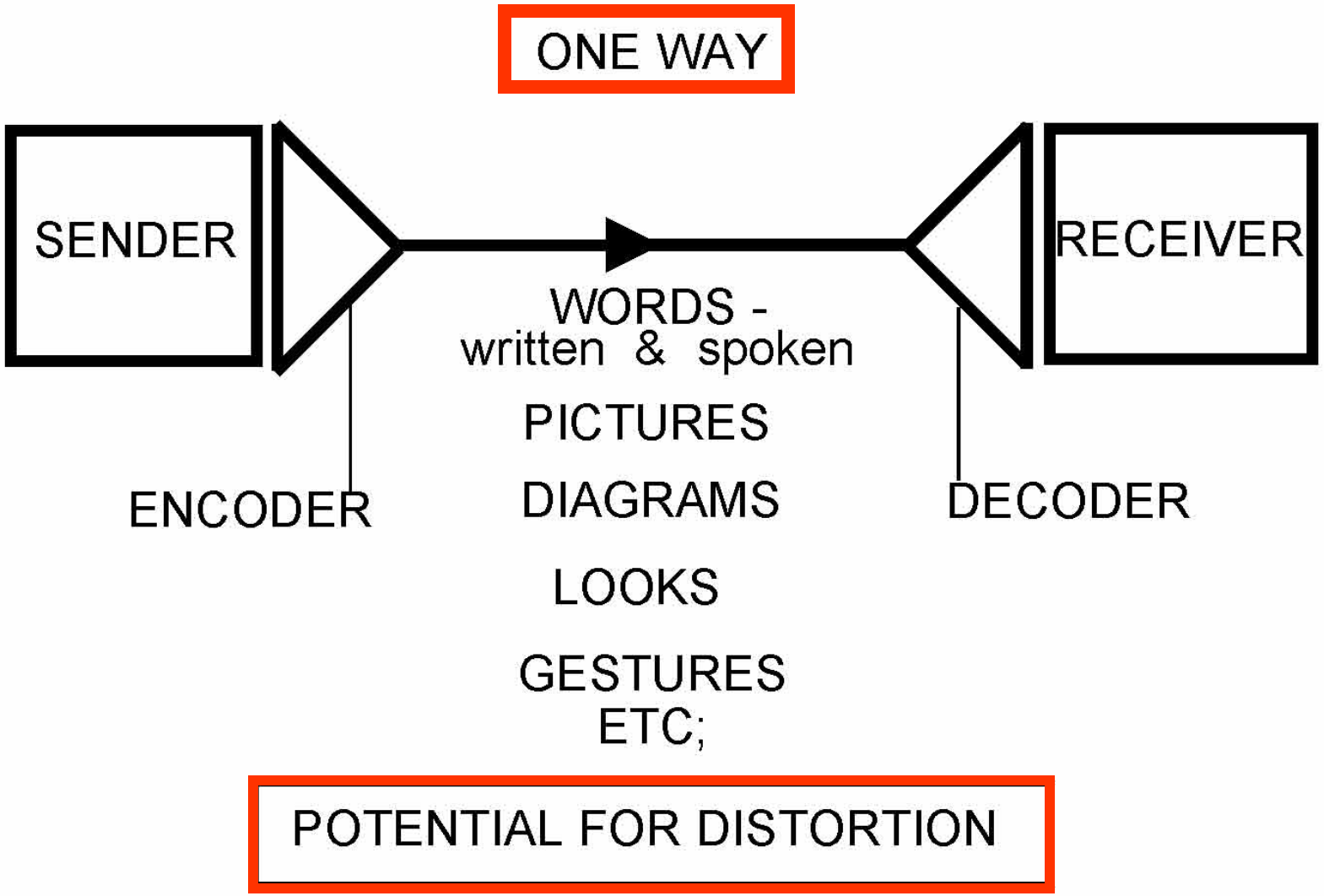
Introduction

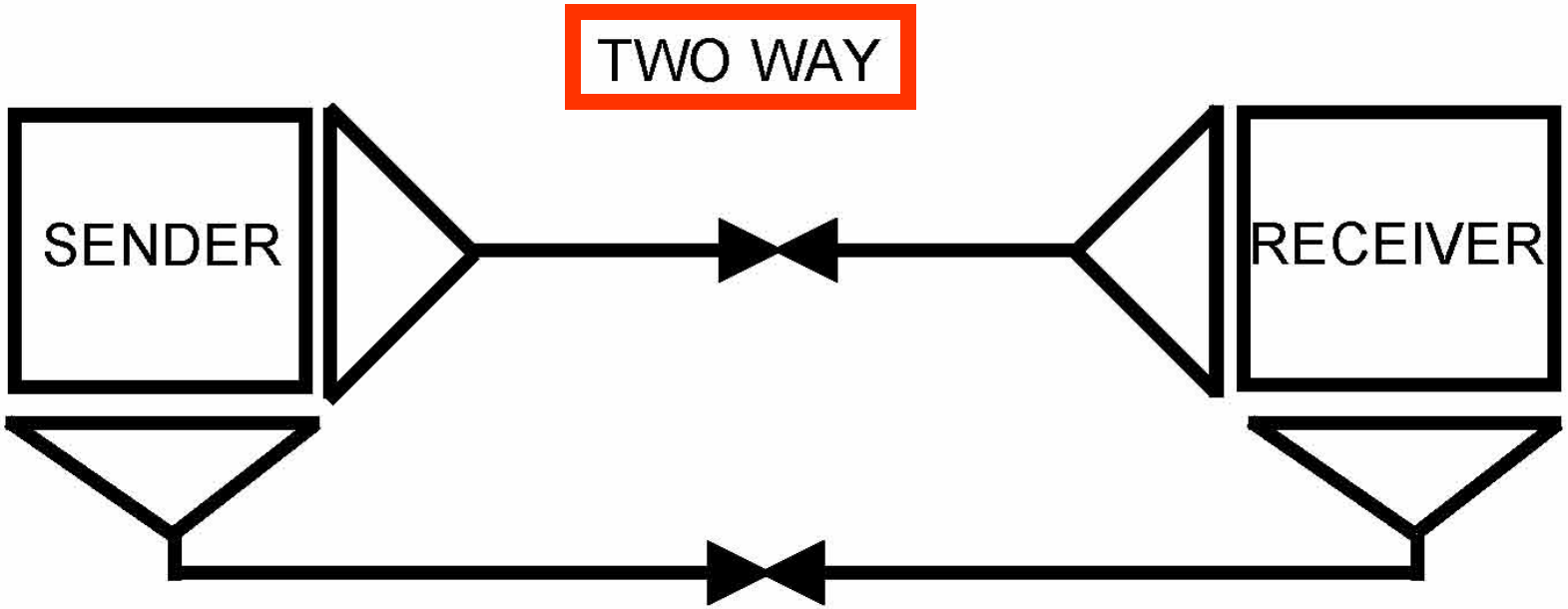
" The reason for some people to become engineers is because they are verbally inept, emotionally cool, and prefer to think spatially, rather than in words or feelings".

HOW you communicate is as important as WHAT you communicate!

The AIM of this session is to try and raise your critical awareness of your own writing. Not to teach you English!

THE ESSENCE OF COMMUNICATION





FEEDBACK - may be instantaneous or delayed " LISTENING "

MORE POTENTIAL FOR DISTORTION!

BEFORE WRITING.

THINKING

WE THINK IN WORDS
and PICTURES
and FEELINGS

RANDOM NOTES OR JOTTINGS

WORDS
PHRASES
PICTURES

PLANNING

SETTING IN ORDER

- priority
- importance
- sequence

THINKING <------> WRITING <------> PLANNING

Help Each Other

Writing is a linear sequential process :-

letter by letter

word by word

sentence by sentence

paragraph by paragraph

chapter by chapter

book by book

shelf by shelf

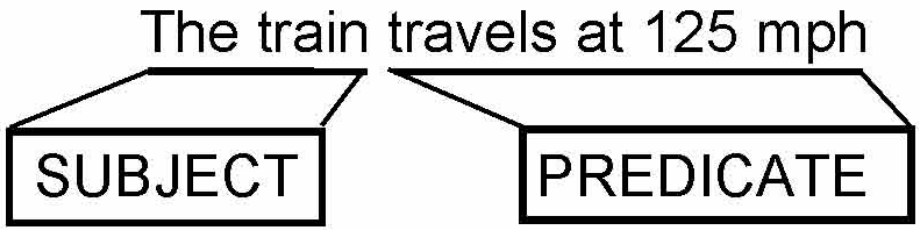
library

Hence the need for PLANNING & THINKING

SENTENCES

Fowler - " a group of words expressing a complete thought --- with SUBJECT and PREDICATE --- "

what is said of the subject including a linking verb



Modern thinking defines a sentence as ' a statement of communication ' (Bailey & Morgan)

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Design web

Word Types

- NOUN - naming word - eg: beaker, thermometer
- VERB - doing word - eg: run, think
- ADJECTIVE - describing word - eg: large, pink, bent
- ADVERB - says " how " - slowly, quietly
- PHRASE - a group of words without a verb
  - " by the table “
  - " in the test tube "
- CLAUSE - a group of words containing a verb
  - " which caught her imagination“
  - " that came with the package "
- PARAGRAPH - a set of sentence(s) about, or developing, one topic

ANALYSE YOUR SENTENCE

KEEP SENTENCE SHORT TO ENHANCE ITS MEENING

EXAMPLES

Noun

Verb

Adverb

The temperature of the water rose slowly for as long as heat was applied but fell rapidly when the heat source was removed.

In Engineering, an understanding of Newton's Law is essential if one is attempting to solve mechanical problems.

Adjective

An Engineer who wishes to command respect and credibility also needs to be a good communicator otherwise he\she will not be listened to, which could lead to discouragement or disillusionment.

TENSE

Present - I make

Past - I made

Future - I shall make

Perfect - I have made

Imperfect - I was making

These are in the ACTIVE VOICE

ie: the subject is performing the action

When the subject is suffering the action - PASSIVE VOICE

eg: A test was done on the liquid

The rig was built

Use the PASSIVE voice for reports

as opposed to - I built the rig

- I tested the liquid

- You put the tube in the tyre

USING PERSONAL PRONOUNS

	singular	plural
1st person -	I (me)	We (us)
2nd person -	You (French tu)	You (French vous)
3rd person * -	He, She, it (him, her)	They (them)

* Used for report writing

THINK - PLAN - WRITE

TYPES OF WRITTEN DOCUMENTS

- LETTERS
- REPORTS (Informal and Formal)
- PROFESSIONAL REPORTS
  (e.g. YOUR FINAL YEAR PROJECT
  or DESIGN PROJECT REPORT)
- CURRICULUM VITAE (CV)

date....

YOUR ADDRESS

Include post code.
If to overseas include 'UK'

Mr/Ms/Dr.....
designation
(eg MD, Personnel Mgr etc)
address

My ref. (optional)

Your ref. **dated.....** (if replying)

Dear Emily, Fred, Mr ...../Sir/Madam

re: Subject of your letter

Text of letter

Yours sincerely/faithfully

Your signature

Your name (in block capitals or typed)
& designation

cc. to : list of names

encl. ..... if there are any enclosures

INFORMAL REPORTS

- Cover sheet
- Results, observations, answers to questions and/or brief discussion and conclusion
- Each drawing exercise is an Informal report

Remember:

- Do not forget to put YOUR and the Tutor/Lecturer name on your report
- Separate reports for each assignment
- Bind the report properly as a document
- Keep your assessed reports securely

FORMAL REPORTS

» COVER PAGE:

- Your name; - Subject; - Lecturer/Tutor
- Date of Experiment; - Year; - Due date

» AIM: What you set out to achieve or demonstrate

» METHOD: The procedure and techniques used to achieve the aim

» EQUIPMENT: Diagrams/photos/description of hardware used

» RESULTS: Tables, graphs, illustrations, drawings …

» DISCUSSION:
Validity of results, accuracy and precision of measurements, factors affecting results, any other circumstances affecting results

» CONCLUSIONS: Listed statements to summarize you findings

PROFESSIONAL REPORTS

Final year projects or Design Project Reports

» FRONT COVER :

- Your name - Degree and Year
- Project Title - Date - Supervisor

» ABSTRACT: A very brief summary giving aim and outcome.

» ACKNOWLEDGEMENTS

» INTRODUCTION:

Brief background of problem, literature survey and summarise

» AIM: Brief outline of tasks and the expected outcome.

PROFESSIONAL REPORTS (cont.)

- METHODS, CALCULATIONS, DESIGN:
  - Assumptions; Quote references
  - Graphical and tabular data presented clearly
  - References to drawings and software …
  - Headings, sub-headings
- DISCUSSION:
  - Concise elaboration of results
- CONCLUSIONS: Preferably numbered
- REFERENCES – BIBLIOGRAPHY
- APPENDICES

Curriculum Vitae - Front page summary

Mary Jane Kermit

Date of birth : 29th October 1970

Sex: F

Nationality: British

Marital status: Single

Home address: 3 Paddington Green, Little Fawley, Hants., BR3 9TY
Tel: [0345] 786 543

Business address: General Tools Ltd, 34 Toolbox Street, St Labans, Beds. MK4 8RQ Tel : [0234] 540 612 ext 211
Fax: [0234] 540 600

Present position:- Production Controller, Small Power Tools Div.

Education & Qualifications:

1985-92 : Little Fawley Junior School

1993 - 99 : John Grant Comprehensive School - 9 GCSE's; 3 A-levels in Physics (B); Maths (C); General Studies (A)

1999 - 2003 : University of Plymouth ; BSc Degree 2 (i) in Mechanical Design and Manufacture

Professional Qualifications:

2004 - Graduate Member of Institution of Incorporated Engineers

Employment record:

1990 - Sales assistant; J Sainsbury Ltd.(12 weeks)

1993 : Trainee with Bloggs and Partners, Engineering Consultants

Other affiliations/interests:

Member of Dunstable Downs Gliding club

Chairman of local Chess Club

Member of St Patrick's Church Choir

EDUCATION:

Give brief details about schooling, and more detailed information about recent education.

EMPLOYMENT HISTORY:

Give exact dates. Give a brief precis of the type of work and experience you achieved, and objectives reached. Include promotions etc.

CONTINUING PROFESSIONAL DEVELOPMENT

Give details of specialised training courses, seminars, conferences attended. etc.

FURTHER TRAINING & SKILLS

eg. IT skills; languages; driving license; etc

PUBLICATIONS:

Include published reports or papers etc giving date and names of co-author's, and where published.
Often a separate list is desirable.

OTHER AFFILIATIONS & INTERESTS:

Give information to illustrate other talents or attributes

GRAPHICAL SKILLS IN COMMUNICATION

On one of the sheets of graph paper supplied draw a graph of the following function over the range t = 0 to t = 50

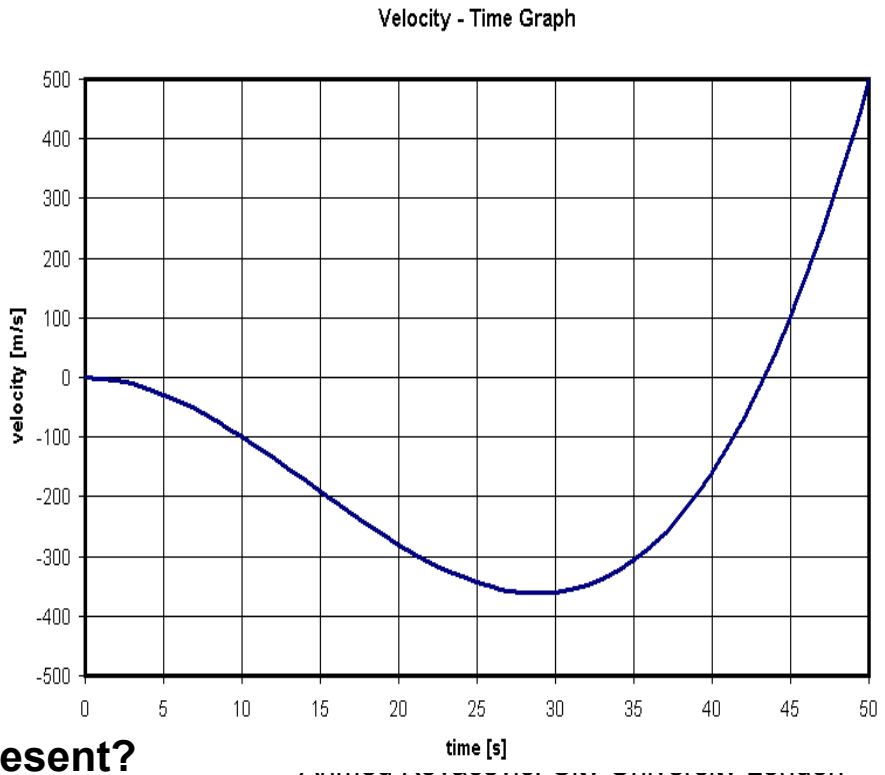
$$v = 0.03t^3 - 1.3t^2$$

v = velocity in m/s, and t = time in s.

Graphs (Graph drawings):

Analytical results

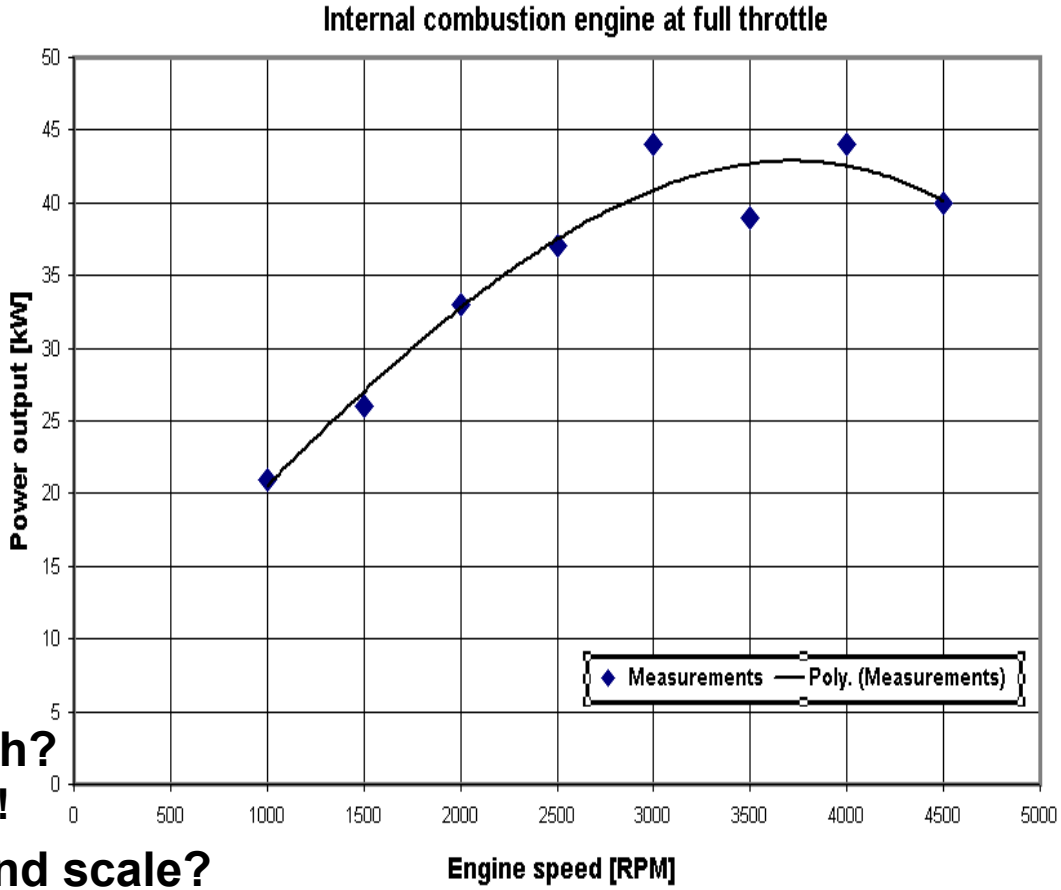
1. **What technique did you use?**
   visualisation?, programmable calculator? spreadsheet?
2. **What is the purpose of the graph?**
   (a) **to show the shape only? (compact)**
   (b) **to obtain values from? (large)**
3. **Do you need construction points? NO**
4. **You need labelled graph**
   with a title, axes and units!
5. **What is the interpretation of the graph?**
   - **where is v=o?**
   - **what does the slope represent?**
   - **what does the area under the graph represent?**



Experimental results

The following results were obtained from a test on an internal combustion engine. They represent the power output (in kW) against engine speed (RPM) for a test at full throttle at standard sea level atmospheric conditions. Plot the results on a graph to show the variation of power output with speed.

RPM	Power output (kW)
1000	21
1500	26
2000	33
2500	37
3000	44
3500	39
4000	44
4500	40



1. **What technique did you use?**
   Are the points important? – Very
2. **What is the purpose of the graph?**
   To present results and show trends!
3. **How did you choose the axes and scale?**
   Include origin!
   Consider space!
4. **Is the graph labelled?**

GOOD PRACTICE WITH GRAPHS

1. Decide on a graph purpose:
   - To show trends
   - To display results
   - To make comparisons
   - To extract data from
2. Choose axes carefully – divisions
3. Proportion close to square
4. Include the origin for correct proportion, otherwise use ‘broken’ axes
5. Use a grid/white border format – clean effect
6. Ensure the graph is stand alone:
   with title, labelled axes …
7. Keep the graph clear, clean and neat.

Other Graphical Techniques

- Histograms – bar charts - pictograms
- Pie charts
- Sankey Diagrams
- Circuit and symbolic diagrams/sketches
- Scale sketches
- Manufacturing drawings
- Assembly and General view drawings

HISTOGRAM

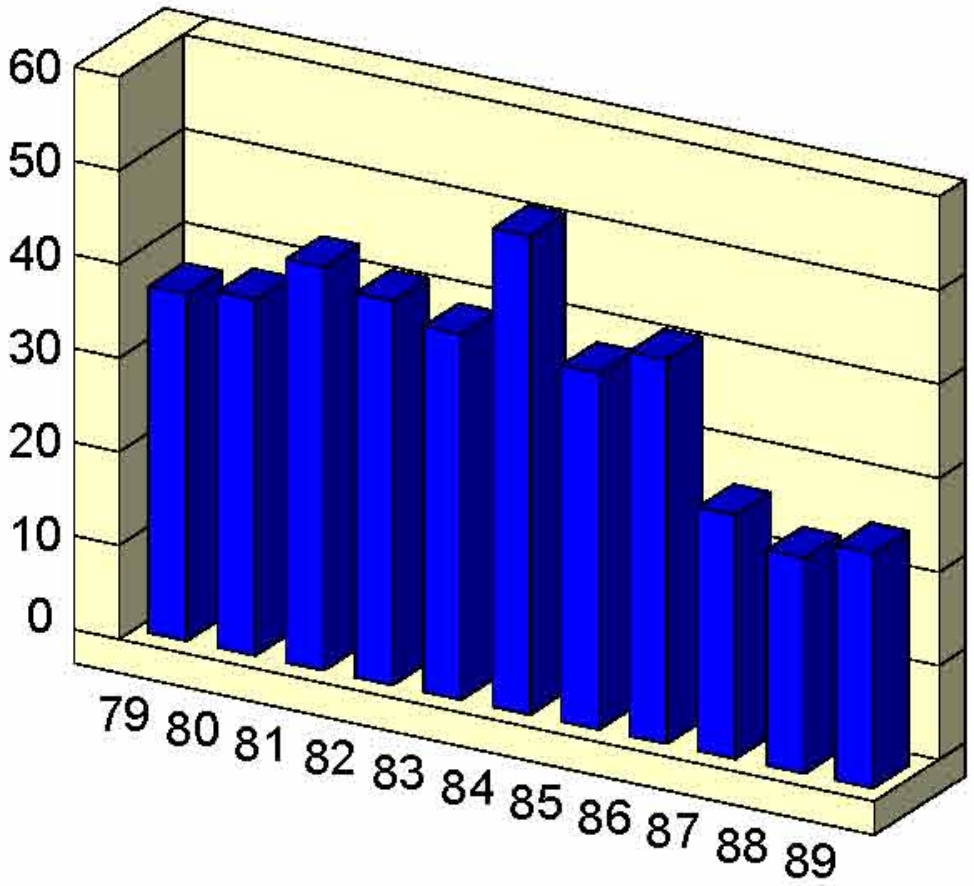
Year	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89
Intake	37	38	43	41	39	51	38	41	26	23	25

Intake to the BEng course

It is difficult to detect trends only from the data or table

Histograms are used to show actual values and trends of discrete statistical data.

Always include origin.

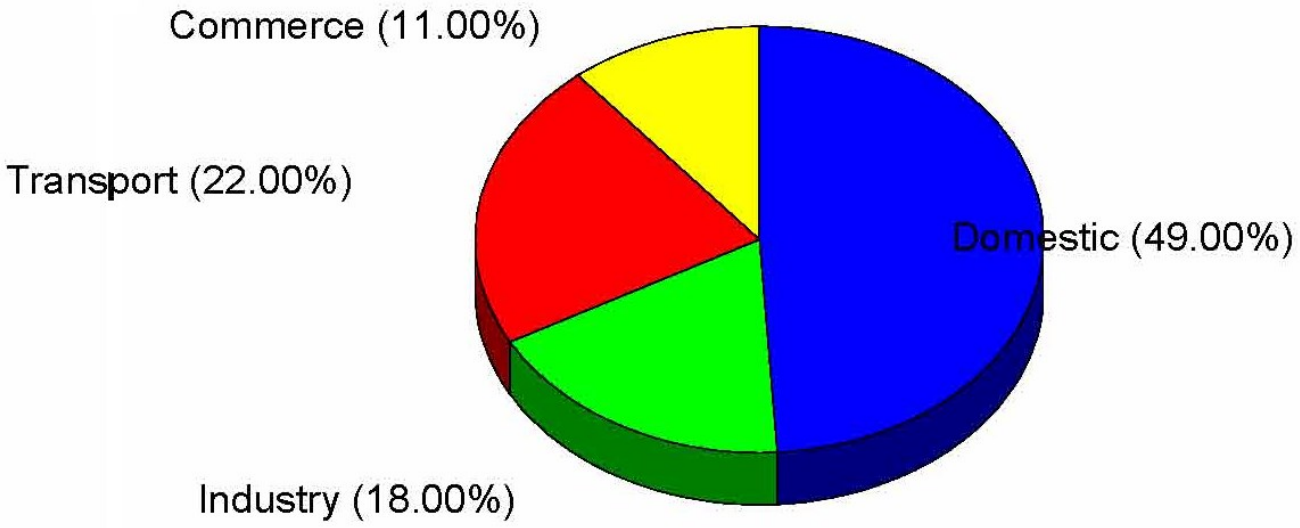


PIE CHART

Use of energy in the UK

INDUSTRY	18%
TRANSPORT	22%
DOMESTIC	49%
COMMERCE	11%

Pie charts illustrate relative sizes of components which make up the whole.

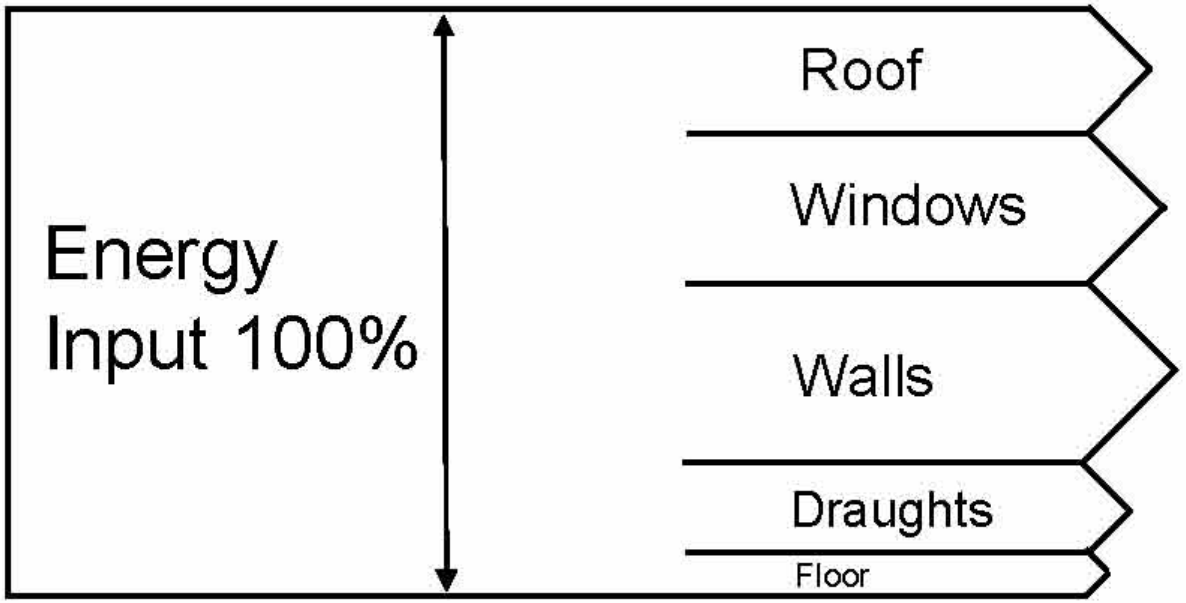


SANKEY DIAGRAM

Energy losses from a typical dwelling

Floor	1.9 kW	7.5%
Walls	8.2 kW	32.3%
Windows	6.3 kW	24.8%
Ventilation	4.0 kW	15.7%
Roof	5.0 kW	19.7%
TOTAL	25.4 kW	100%

Sankey diagram illustrates input output situation drawn in scale

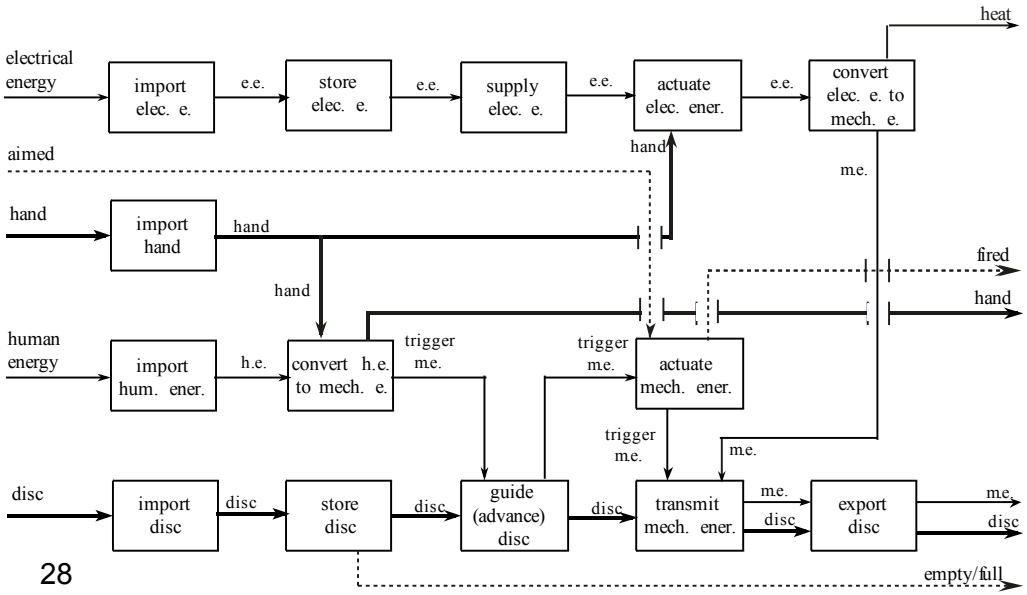


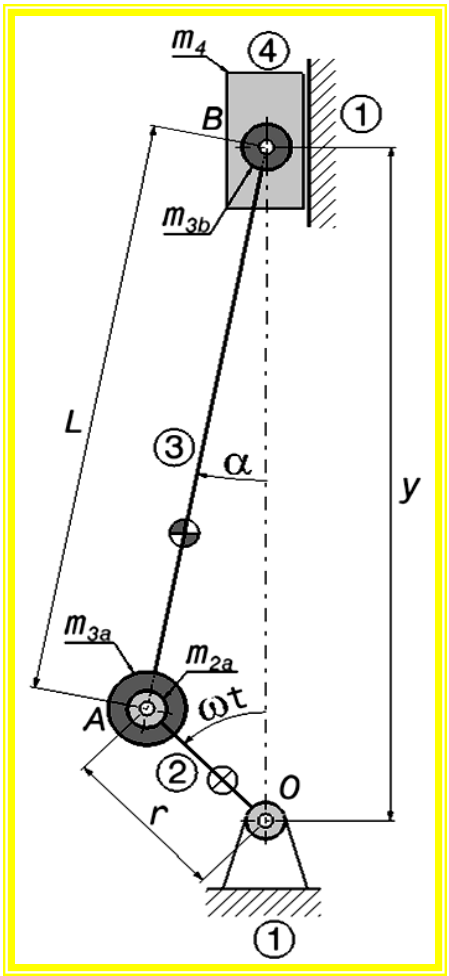
SYMBOLIC DIAGRAMS

Often used for electrical; pneumatic; hydraulic and other systems, functional models …

Use standard symbols (BS)

Help to understand the system – especially its operation, control and trouble shooting.





Revision

Moodle

Test 1 Example:

Questions

http://moodle.city.ac.uk/pluginfile.php/421782/mod_label/intro/Term1_Test_Sample.pdf

Answers

http://moodle.city.ac.uk/pluginfile.php/421782/mod_label/intro/Term1_Test_Sample_Solutions.pdf