

AS LEVEL Section D

FACT FILES

Technology & Design

For first teaching from September 2011

For first award in Summer 2012

Designing Part 1



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design



### Learning Outcomes

#### Students should be able to:

- Demonstrate knowledge and understanding of the Design Process including:
  - design briefs;
  - research methods (primary and secondary sources) questionnaires and surveys;
  - purpose and information included in a Specification - design and manufacturing specifications.



### Course Content

#### Designing

Design problems are always complex having a number of (often conflicting) objectives, many constraints and just as many possible solutions. The designer will attempt to satisfy a client, the specialised requirements of a user group, the constraints of manufacture, the limitations of equipment and material suppliers, and the demands of the marketplace.

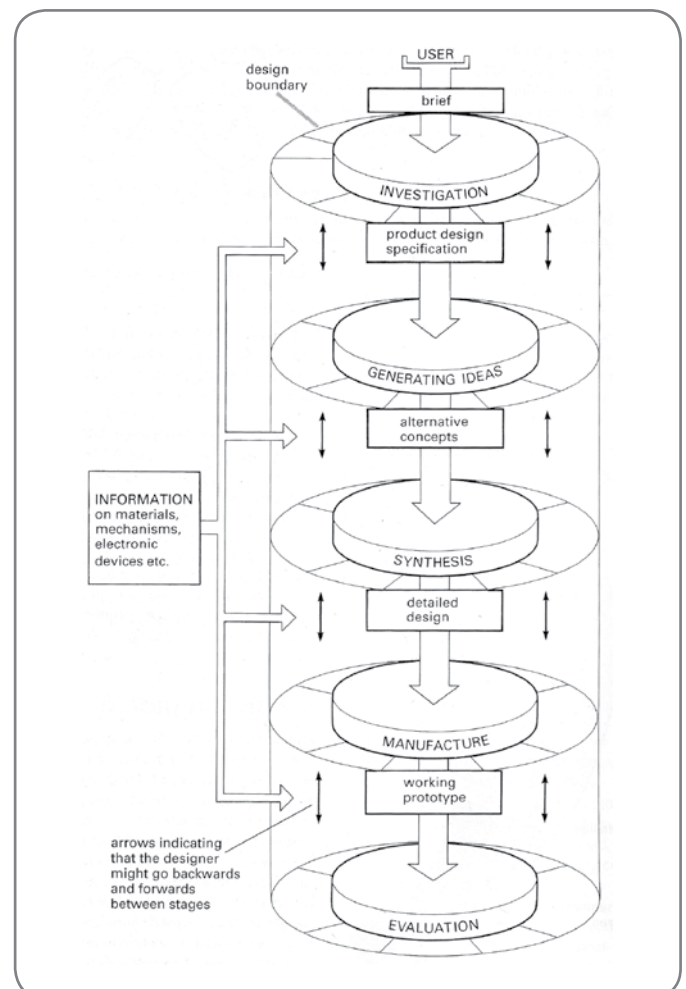
The process of design is at times noisy, active, exciting and creative. In other phases it can also be a slow process of developing and refining a set of ideas. Drawing becomes a thinking device, drawing as you 'feel' as well as to communicate with others – both intuitive and rational at the same time. Designers need to look, question, interpret, communicate ideas and respond imaginatively to problems.



Designing is more than just solving problems: it involves leading and directing a creative and innovative activity, sometimes managing teams of specialists and experts, to bring together all the contributions to a design optimisation.

The designer's role is one that is always responding to change and in many cases it means bringing about change. This is set against the constantly changing attitudes and desires of society and advances in materials and technology.

The diagram below shows a model of the total design and development activity. There is a design 'core' consisting of the key phases of investigation, generating ideas, synthesis, manufacture and evaluation.



## Design Briefs

Design briefs must give sufficient information to put the problem in context and to indicate the requirements but they must not impose unnecessary constraints on any solutions which might be proposed. The designer's role is to interpret the client's brief. In cases where clients are very sure of their requirements this can be more straight forward. However, when clients are less sure designers need, through negotiating with their client, to conduct research and to develop a more precise statement of need.

Design briefs should not be regarded as unchangeable they can change as designers begin their research and communicate their findings.

## Research Methods

Research and investigation supports and is vital to the success of the project. Information gathering requires careful planning and thoughtful application. It is important that valuable time is not wasted collecting information that is unnecessary.

An interview or discussion with the client/user group to establish their thoughts and preferences regarding the proposed product can be a good starting point. This information should be used to guide analysis and research activities. In the analysis, the focus should be on the identified need and avoiding general statements.



Research could include the analysis of existing products to find out about materials, processes and construction methods used in commercial manufacture. Market research will allow the testing of the viability of the intended product beyond the needs of the client/user group. Surveys or questionnaires should be designed carefully and avoid questions that are too general and are not useful in helping the design process.

## Primary Sources

Primary research involves collecting information yourself, from various sources, including:

- direct contact with experts
- communication with a client or user
- fieldwork – physically collecting data
- questionnaires which are carefully constructed and offered to representative sample groups
- exhibitions and displays
- testing and experimentation
- modelling and computer simulations



Primary sources are original contributions, and have not been gathered in quite this form before. Many primary sources are people, others are direct observation, recording and measurement.

## Secondary Sources

Secondary sources are generally easier to obtain and can provide good background information. They include:

- articles from books and magazines
- items from catalogues
- printed materials from companies
- handouts
- data sheets
- the Internet



## Planning Your Research

It is important to establish a clear course of action when planning your research, otherwise too much information will be collected and this will waste time. Planning can be made easy by doing the following.

- identify the information needed and produce a research brief
- clarify how you expect to use the findings to improve your designing
- plan your information gathering
- use primary and secondary sources
- consult experts or your client/user
- keep accurate records
- evaluate your research activity against the research brief

When all the information gathering has been completed, you should analyse your research in order to help you write a Product Design Specification (PDS) that is relevant, meaningful and measurable.

## Specifications

### Design Specifications

The specification is a statement of the qualities that a design must possess in order for it to be a good solution to the problem. It is more precisely known as the Product Design Specification (PDS). A detailed specification will be used throughout the design process to review ideas and their development, and to check that the design requirements and client/user group needs are being satisfied.

The specification should be used as a basis for testing and evaluating the completed product. Any future modifications suggested should be referenced to specification criteria in order to check the success of the final product.

Consultation with the client/user group is needed to agree the specification points and to ensure that the criteria meet their needs.

The following sub-headings can be used to organise a logical and effective specification:

- purpose – what is the aim or end-use of the product?
- form – what shape/style must the product take?
- function – what must the product specifically do?
- user requirements – what qualities must the product have to make it attractive to the client/user group?
- performance requirements – what technical considerations need to be achieved within the product?

- materials and components – what materials and components should be used to aid performance?
- size – what physical dimensions are required?
- safety – what factors need to be considered to make the product safe to use?
- quality – how can a high-quality product be assured?
- scale of production – how many are to be made and by what manufacturing process?
- cost – what are the considerations in determining cost?

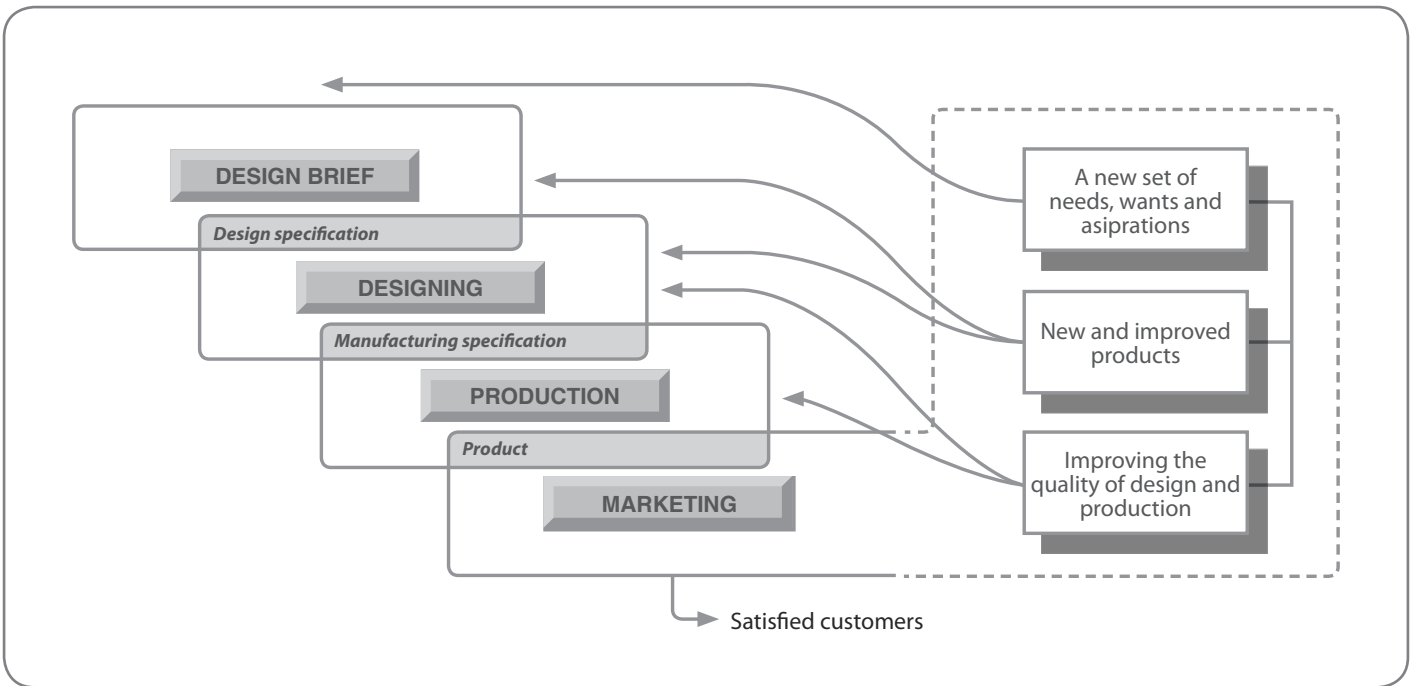


Each specification point must contain more than one piece of information. Each statement should be fully justified by giving a reason for the initial point. Specification points should be technical and measurable where possible, so that testing and evaluation can be realistic.

### Manufacturing Specifications

Throughout the design development process the specification is detailed further until it reaches a more or less final form ready for manufacture. At this stage, the materials and processes that have been decided upon go into the development of the original specification to make up a manufacturing specification.

The manufacturing specification is an important reflection of the two-way dialogue between design and manufacture. It will include detailed working and/or engineering drawings. Manufacturing companies use manufacturing specifications to ensure that every possible decision has been considered adequately and then recorded prior to the major investment required to prepare for manufacturing.



## Revision questions

- The role of the designer when designing products is to work closely with the client, user and manufacturer.
  - Give **two** main reasons why it is so important for the designer to establish a clear design specification with the client.
  - Outline **two** examples of the type of information that the designer would need to establish from the user in order to produce designs.
  - Outline **one** example of the type of information that the designer would need to establish from the manufacturer in order to produce designs.
- When designing a household product such as an electric kettle the role of the designer is to compromise on the views of many individuals.
  - With reference to an electric kettle suggest whose views the designer might need to consider and why there might be a need to compromise.
  - With reference to the electric kettle suggest **two** ways in which British Standards may have influenced the design of this product.
- The role of the designer when designing a mobile phone is to work closely with the user and manufacturer.
  - Give **two** main reasons why it is so important for the designer to establish a clear design specification with the manufacturer.
  - Outline **two** examples of the type of information that the designer would need to establish from the user or from the manufacturer in order to produce designs.