



THEORY problem identification

Problem identification is finding opportunities to create new designs. This means finding out what needs a person, or group of people, has, in order to design a product to fulfil that need. Once a problem has been identified, a brief can be created to allow a designer to solve the problem. Problem identification is finding opportunities to create new designs. This means finding out what needs a person, or group of people, has, in order to design a product to fulfil that need. Once a problem has been identified, a brief can be created to allow a designer to solve the problem

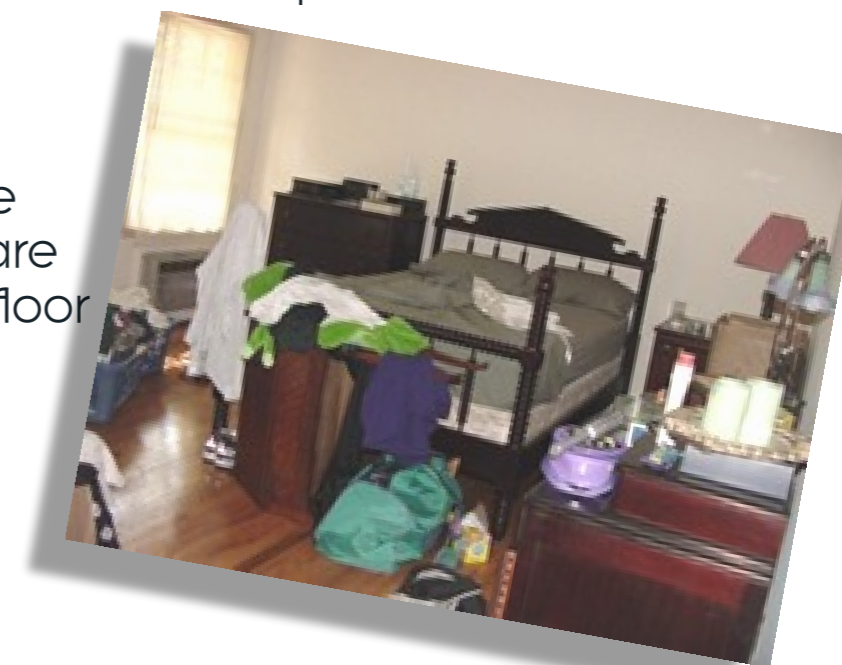
Methods of problem identification

Situation analysis identifies problems by looking at a scene and analysing ways that the situation could be improved. One way of doing this would be by taking a snapshot picture of a scene and using it to show problems. Describing in as much detail as possible the things that are happening in the snapshot breaks down the overall scene and suggests ways in which the whole situation could be improved.

Example of Situation Analysis

Situation–Messy bedroom.

Analysis–This untidy bedroom makes it difficult to find things or get to the bed. Clothes and grooming items are strewn across the room. Clothes are also piled near the heater which may be a fire hazard. There is limited floor space. There is nothing hanging on the wall. Possible Brief–Design a storage wall mounted system that would allow a variety of items to be stored neatly.

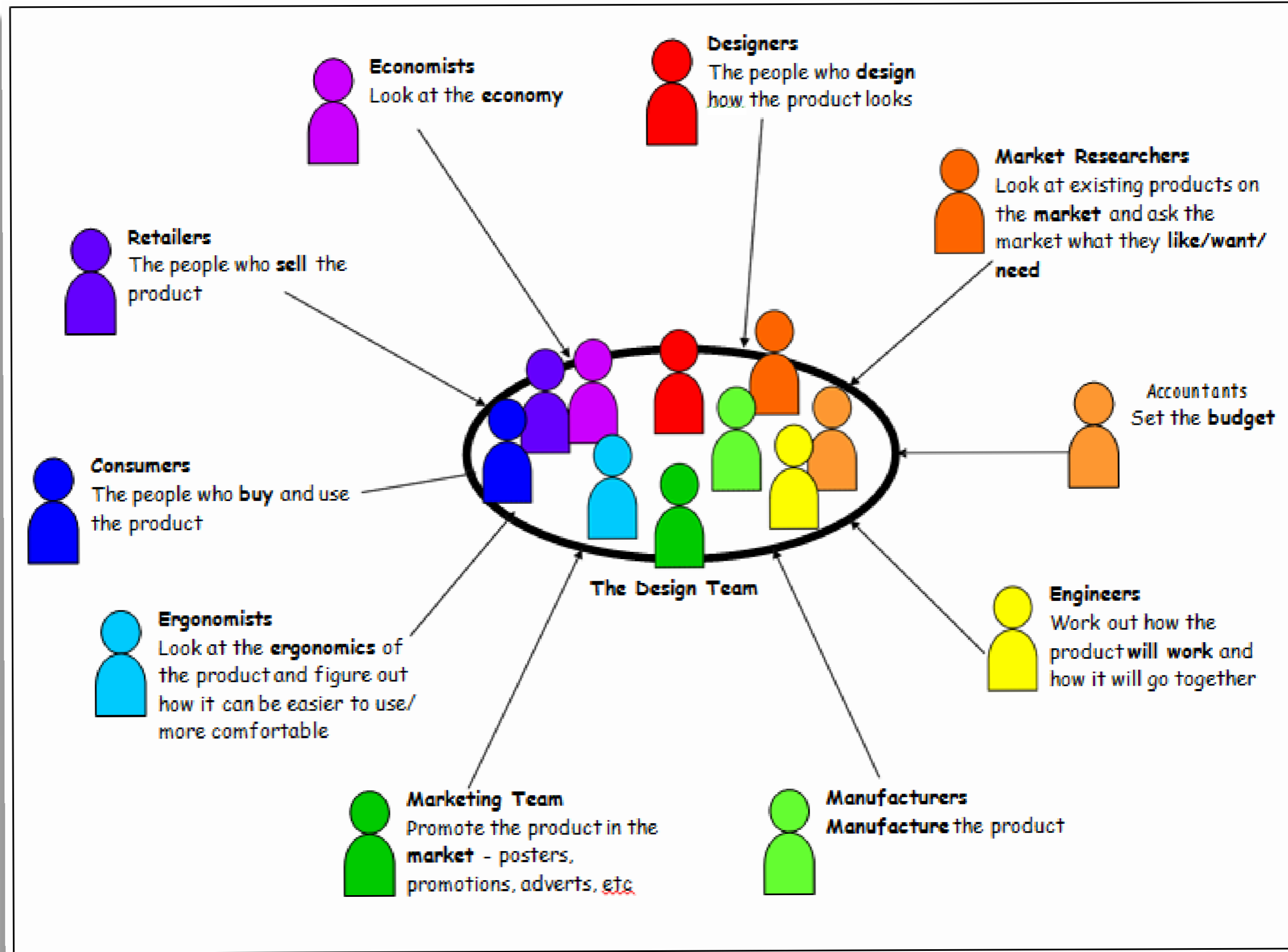


Product Evaluation

Product evaluation tests existing products and tries to find weaknesses in the product's design. All aspects of the product will be looked at including function and performance, durability, material choice, manufacturing and assembly methods, ergonomics, aesthetics, and economics.

Once a weakness has been found, a brief can be created to allow the designer to redesign and improve the product.

THEORY design team



THEORY design team

Ergonomist - Works with all aspects of ergonomics specific to the product being developed. Will give suggestions to the designer as well as facts relating to the human body and human behaviour

Manufacturer - Manufactures the components of the product and assembles the final product. Uses the plans and specifications given by the designer.

Engineer - Has knowledge and experience of engineering. There are different types of engineer that specialise in specific areas. Can advise the designer about this area with regard to what is possible for the product.

Consumer/client and user - Person who will buy/use the product. Can aid the designer by offering opinions and feedback on the product at various stages of the design process. **Consumer demand**: the consumers have either a need or a want to which the designer will try to respond.

Retailer: Sells the product to the consumer. Can aid the designer by telling him/her what the public want and when they want it. Retailers can identify trends in sales and target markets, i.e. who is buying what and when. Retailers are the first people to know what is selling well and what is not.

Accountant: Budgets the project. Offers advice to the designer on the costing of the project, restrictions, etc.

Economist: Has knowledge of local, nationwide and worldwide economies and can offer advice on whether or not people are likely to buy the product. Taxes, house prices, petrol costs, etc., have a direct effect on people's lives and can control their standard of living.



Production specialist: Has strong knowledge of available processes and offers this to the designer during certain stages of the design process. Will try to find the most suitable method of production for a product by taking into consideration economics, environmental concerns, materials, availability, etc.

Marketing team: Carries out research on what the consumers' wants/needs are. Compiles findings and presents to the designer. Also is involved in the advertising and aids with sales of the product

Materials Technologist - Has knowledge of materials and their properties. Offers advice to the designer about the materials which would be best suited to the job, taking into consideration their properties, working characteristics, cost, availability, etc.

THEORY design process

Design Brief

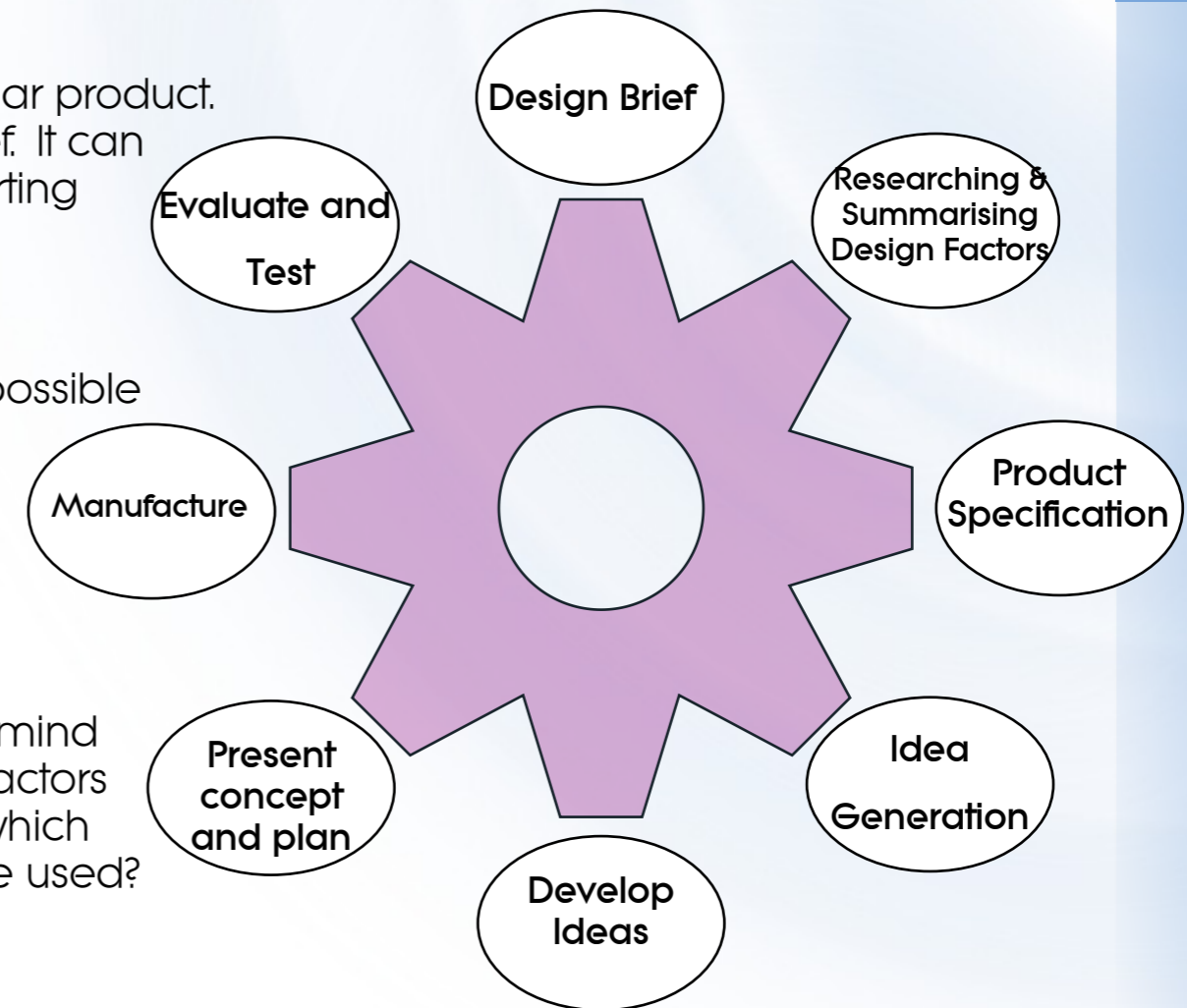
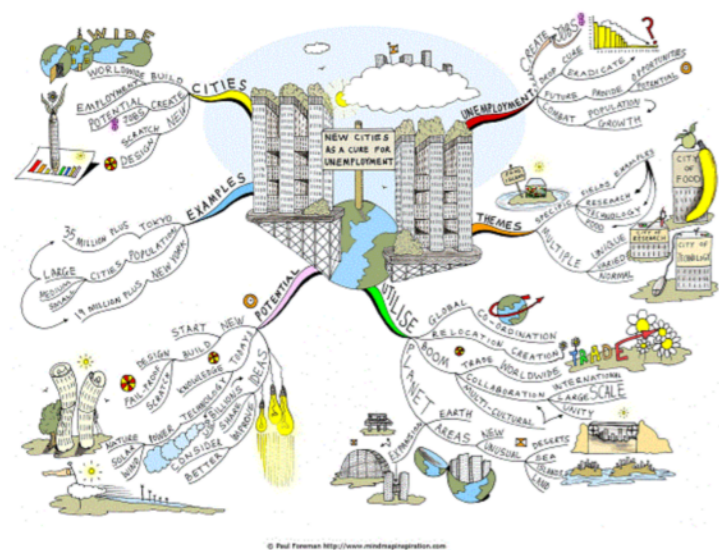
The starting point in any design assignment is a need and/or want for a particular product. This need or want is generally put to a designer in the form of a problem or brief. It can be a short statement or a long detailed specification. The DESIGN BRIEF as a starting point basically states what has to be designed to solve the need or want.

Researching and Summarising Design Factors

This is where you try to fully understand the DESIGN BRIEF by researching all the possible factors which may have an influence on potential solutions. This might include; looking through catalogues, talking to the client (the person who has come to you to design for their need or want) or looking at similar products in the market place.

Initial research

This stage of the design process is often started by tackling the problem using a mind Map (brainstorming). A mind map tries to tease out early thoughts about what factors will be required to resolve the problem. Some of the most important questions which will require to be asked are; Who will use it? Where will it be used? When will it be used? Why will it be used? What will it be used for? How will it be used?



Detailed Research
Having carried out the mind map to try to tease out the various pieces of information which influence in the design, the next stage is to carry out a more detailed investigation into the following **DESIGN FACTORS**.

- **FUNCTION & PERFORMANCE** – What exactly the product must do.
- **ENVIRONMENT** – Where the product will be used & stored.
- **ERGONOMICS** – How the product can be made to suit the users.
- **ANTHROPOMETRICS** – Ensuring the correct sizes are used to suit the users.
- **AESHETICS** – The image, appearance, colour & finish of the product.
- **MATERIALS & MANUFACTURE** – Properties of the material and build.
- **RESTRICTIONS** – Limits in time, cost, size, skill & performance.

THEORY design process

Market Research

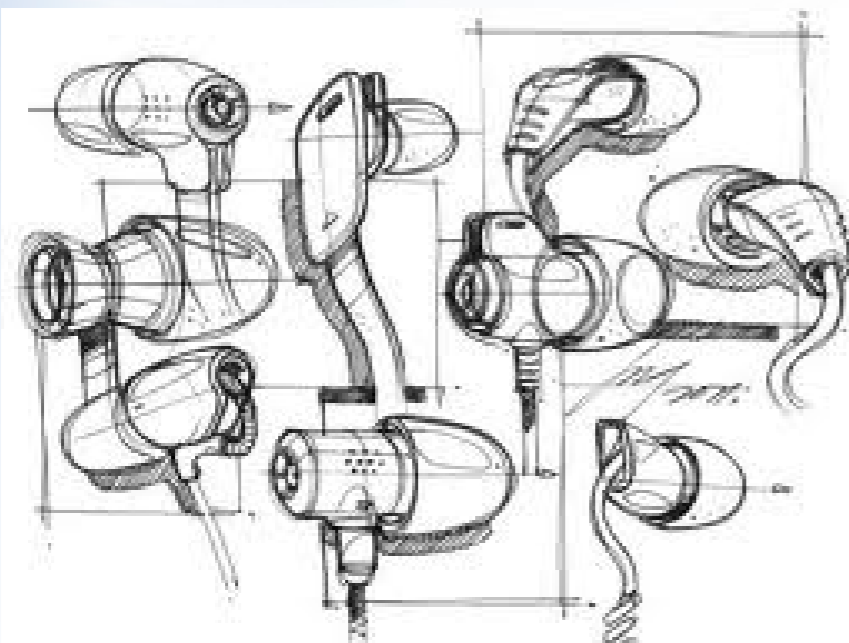
As part of the detailed research it is very important to carry out MARKET RESEARCH, this is where we need to ask the people (the market) who are potentially going to buy the product being designed. This is very important because if we want them to buy the product being designed we need to ensure it is what they want (i.e. the most popular colour, texture, shape, etc). A typical SURVEY would ask thousands of people questions of this type to try to establish what the current trend in the market is (what they the buyers want). To carryout market research would involve using a pre-determined QUESTIONNAIRE which normally, would not be too long because if it was too long they would lose interest in it, therefore when making up such a questionnaire the types of question being asked must be kept to a minimum and be thoroughly thought out beforehand.



Product Specification

Having carried out the research to establish all the important facts which will have an influence in the final design of the product, the PRODUCT SPECIFICATION should be a listed summary of all these important facts. What the Product Specification is doing is SPECIFYING what the final product must have as part of its design. "It must", "it should" statements can be used here. i.e. a specific detail for the design of a chair could be as follows:-

- It must be comfortable to sit on as the user will require to sit on it for long periods of time.
- It should have four legs for stability.



Idea Generation

At this stage of the design process your actual ideas of potential solutions are SKETCHED down on paper. The quality of the sketch at this stage is not important, what is important is the quantity of different ideas. A habit to get into at this early stage is to ANNOTATE your sketches. What is meant by this, is, to write comments about all your ideas so as the reader can see what you are thinking] about for each of the sketches.

Develop Ideas

Here all your best ideas are examined in detail and improved with respect to improving the quality of the sketch, adding in sizes, exploding the views, etc. It could be that two or three ideas need to be combined to create the final solution.

THEORY design process

Present Concept & Planning

At this stage of the design process details such as sizes are added to allow the building of the design. Various types of suitable joints are investigated. The final concept will be presented as a fully rendered drawing. Review your existing PRODUCT SPECIFICATION and make amendments to it if necessary. Your final concept may have changed throughout the Design Process and no longer meets the Specification.



3D model

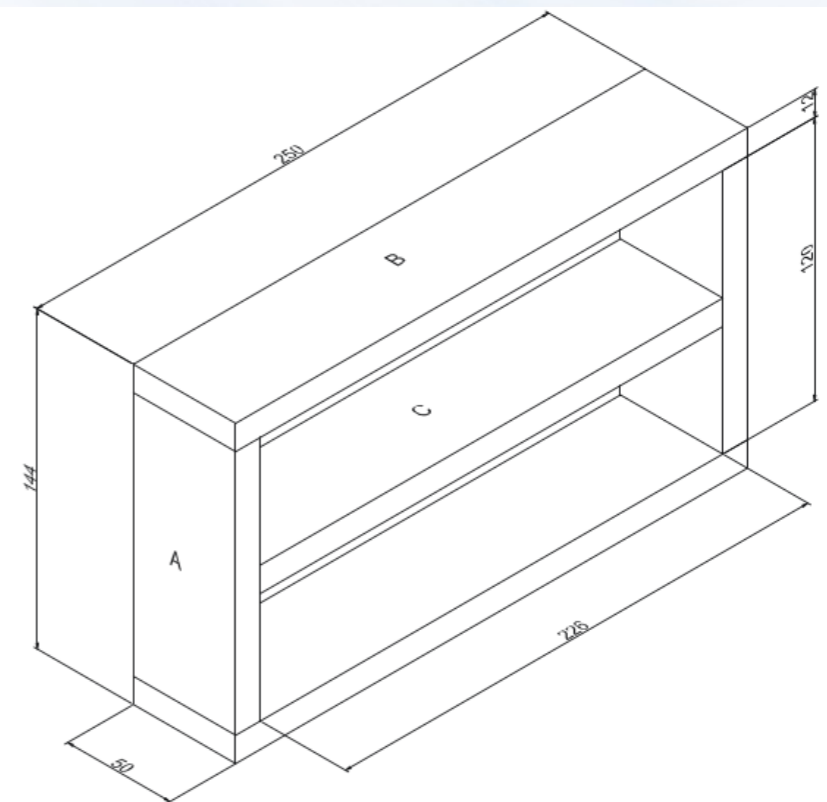
Where appropriate it is ideal to make a scaled down version of the proposed idea. The model could be made from various mediums such as card, modeling clay to miniature versions in wood. By doing this allows a greater insight in to how the product will look with respect to proportion. i.e. ensuring all the parts of the product look good and not out of place with each other.

The WORKING DRAWING shows all the various sizes of the design usually in orthographic format, i.e. three views of the object.

Cutting List (or Parts List)

This is a list of all the parts which will be required to assemble the product.

The drawing below is a finished 3D model of a product which was designed for a client. To enable the materials for that product to be made available, a cutting list has to be made. This is generally done in the form of a table as shown below.



Note:- If this product was to be manufactured and sold to the public it would be convenient for them to have it assembled (made up ready for use), but the reality is, the cost involved for the manufacturer would be far greater as it will take up much more space in the lorries. If it was bought as a FLAT PACK (packed flat in a card board box) the manufacturer would be Able to deliver far more units at any one time thus cutting down on manufacturing costs, delivery costs and the amount of space required to store them. A drawing like the one below and an exploded view of the product will therefore be very helpful as it will allow the customer to see how it all fits together.

Material	Part	Quantity	Width	Thick	Length
Pine	A	2	50	12	120
Pine	B	2	50	12	250
Pine	C	1	50	12	226



THEORY design process

Presentation Drawing

The presentation drawing is a very important aspect of the design process, if the FINAL RENDERED DRAWING is carried out accurately and as real to life as possible, this can be presented to the client for his/her approval before the actual making of the product. It could be that the client is not entirely satisfied with the final product and therefore will be much easier to re-do a drawing than re-make the prototype model.



Sequence of Operations

Your sequence of operations page is really just a list of what you need to do in order to make your prototype. Having said that, however, writing a sequence of operations from start to finish can be difficult and should be broken down into smaller stages. The main stages in any sequence of operations should include the TOOLS, EQUIPMENT, MATERIALS, FIXINGS, TECHNIQUES and PROCESSES required to:

- Prepare and mark out accurately
- Cut, drill and shape
- Assemble a sound prototype free from faults
- Finish to a high standard

The sequence of operations should be broken down into instructions for the individual parts, i.e. the carcass, the doors, drawers etc.



THEORY design process

Evaluate & Test

This is the final stage of the design process and involves writing a report to summarise how well the product satisfied the BRIEF. This is done by comparing the final product to the PRODUCT SPECIFICATION.

Evaluate the MANUFACTURING PLAN and make suggestions and improvements. Could you make adjustments to make the plan more efficient? Evaluate the PROTOTYPE you have made. How could you improve the quality of the model? How could you improve the finish?

Evaluate the MANUFACTURE to allow your product to be made commercially. How could you cut costs? How could you save time? How could you mass-produce the product?

Some typical investigation questions used to help structure the evaluation report might include the following:-

- What tests were carried to ensure the product can do the job it was designed for, i.e. if it was a seat does it hold the weight of the person it was designed for?
- Did the product solve the problem?
- What do other people think of the final design?
- Does it look good?
- Does the final product meet the specific details listed in the PRODUCT SPECIFICATION?

In industry at this stage, the DESIGN PROCESS would start all over again making the adjustments you have recommended.



Think of the different generations of iPod and how the product improves each time it is evaluated and developed.

THEORY the marketing mix

The Marketing Mix–The 4 Ps

- P** Product
Anything that can be offered to the market to satisfy the need. Could possibly be part of an existing brand.
- P** Place
Where the product will be sold. This could be internet, mail catalogue, high streets, shopping centers, supermarkets, etc.
- P** Price
The amount of money the consumer pays for the product. This should reflect the image.
- P** Promotion
Any activity that will advertise the product. This could be adverts, in store promotions, posters, etc.



Glossary of Marketing Terms

Consumer Demands	→	demands made by the market encourage products to be designed Social Expectations features the market would expect (e.g. environmentally friendly)
Niche Marketing	→	targeting the product to a very small section of the market
Branding	→	the image that the product reflects
New Products	→	introduction of new products with improved features
Market Segments	→	smaller groups with similar interests (e.g. sex, age, income)
Marketing Mix	→	the 4 Ps; Product, Price, Place, Promotion
Needs	→	important products or features that the market needs
Wants	→	products or features that the market wants as a luxury
Technology Push	→	advances in technology push the product development forward
Market Pull	→	consumer demands pull the product into the market
Consumerism	→	products become more affordable and accessible (e.g. Primark)
Impact of decisions	→	as products become more disposable, how does this impact the environment?

THEORY accessfmm - annotating

Explain about the product (good and bad points using the questions below to help) and why you think this is. e.g. the product is made from plastic as this is a strong, durable material available in a range of colours. Relate your observations to the product's customer/target market. e.g. the product is coloured red, blue, green & yellow this is because bright colours attract the attention of a young target market.

MATERIALS

- What is the product made from? Why?
- What do these materials need to be able to do? e.g. do they need to be waterproof/fireproof/easy to clean/lightweight/flexible/ strong etc?
- Would a different material work better?

AESTHETICS

- What does the product look like?
- Why does it look like this? Consider colour, shape, texture, theme, graphics, fonts etc.

CUSTOMER

- Who is the product designed for? How and where would they use this product?
- How does the product attract the attention of the customer?

MANUFACTURE

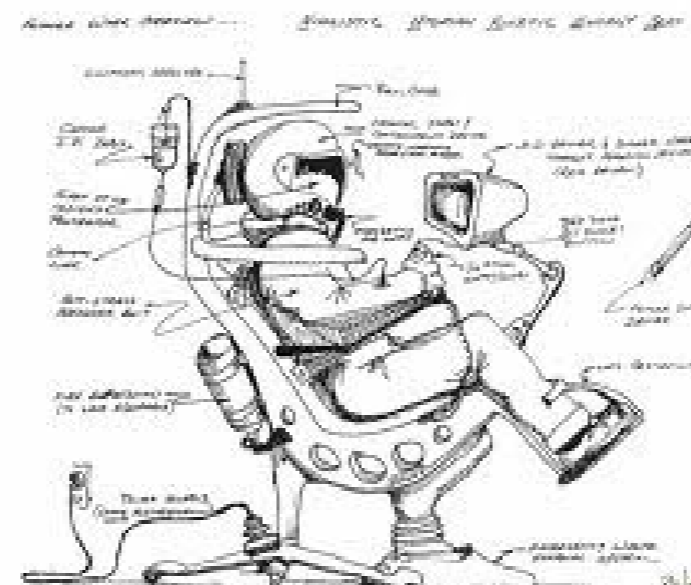
- How was the product made? e.g. one-off, batch, mass, subassembly production?
- How has the scale of production affected the choice of material and production process?

FUNCTION

- What is the product's purpose/job? Does the product do this?
- How easy is the product to use?

SAFETY

- Does the product have any risks? How can these risks be eliminated?
- Does the product meet safety standards?



COST

- How much does the product cost to buy?
- How much does the product cost to make? Why this much?
- Is the product good value for money?

ENVIRONMENT

- How easy it is to recycle the materials the product is made from?
- Are the materials sustainable? From a renewable or nonrenewable source?
- How does the product affect it's surroundings? e.g. radiation from mobile phone.

SIZE

- Why is the product this size?
- Does the product work best at this size? What would happen if the product's size was increased or decreased?
- Has the designer considered ergonomics?