

# Aesthetics & Ergonomics

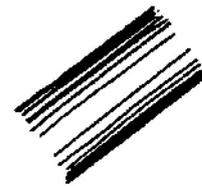
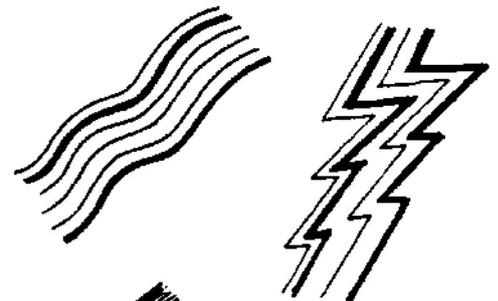
## Aesthetics

Aesthetics is concerned with how things look. This can be influenced by an objects' appearance and its style. The appearance of an object is the feature that people notice first. In some ways appearance can be very personal and is influenced by things like the materials from which the object is made and the type of finish applied to its surface

It is important that products have visual appeal. In a world where many new products function in a similar way, it is often the appearance which sells the product. Aesthetics is a pan of design which is difficult to analyse and describe in words. However there are aspects of appearance which can be considered separately.

### Line

Lines are the basic starting point in our attempts to represent design ideas. We use lines to enclose space and create shapes. Lines can be used to express feelings and emotion. Lines may be thick or thin, solid or broken, straight or curved. By changing the type of line many visual effects can be created. Straight or wavy lines can express rhythm, give the impression of light and shade as well as texture. A feeling of anxiety, depression and calm can be created. Lines can be used to deceive the eye.



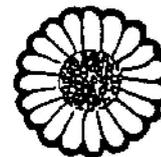
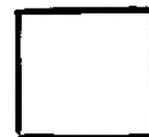
### Shape and Form

These terms are often confused. Shape is created when lines overlap and cross to create an enclosed space. Shapes are two dimensional. Shapes can be used as the starting point for a design, e.g.

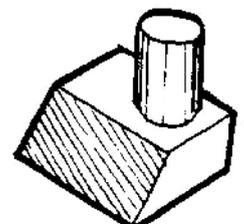
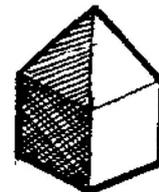
**Geometric shapes - Circles, squares etc.**

**Natural shapes - Sea shells, flowers etc.**

**Man made shapes - Bridge structures etc.**



Form is three dimensional. To describe a form fully it is necessary to give details of its shape, size, proportion, colour and texture. When experimenting with form it is generally best to start with simple geometric forms such as cubes and cylinders. These forms can then be manipulated to create more complex forms.

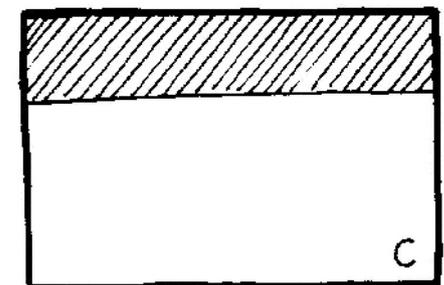
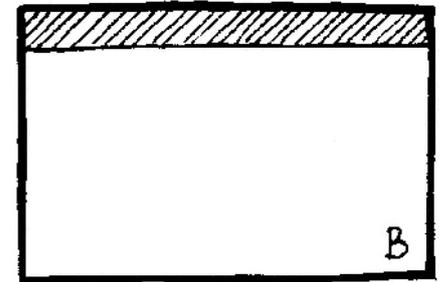
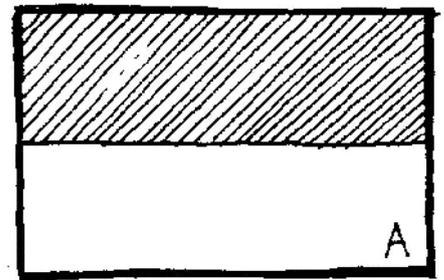


### Size and proportion

The size of an object is found by measuring its length, width, and height. These are known as linear dimensions. Proportion is the relationship between an object's height compared to its width.

The Greeks discovered that certain proportions looked much better than others. This idea of proportion which looks right is called the **golden section**. The golden section can be applied to any shape or form but it is best illustrated by looking at a landscape with the horizon placed in a position which gives the landscape balance.

Landscape A and B do not have visual balance whereas C does. In C the proportion of sky to land is just right. This proportion is the golden section and can be seen in architecture, paintings and products alike.

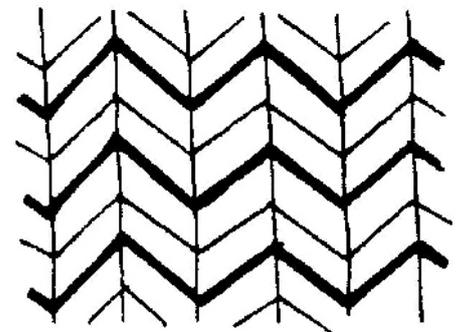


### Symmetry

Symmetry is when a shape or form can be divided down the middle and one half is the mirror image of the other. A shape or form which is not symmetrical is asymmetrical.

### Pattern

Pattern involves the division of area. Pattern helps to create interest to plain surfaces. Patterns can be random or made up from elements which are repeated. Patterns can be used to create rhythm and movement.



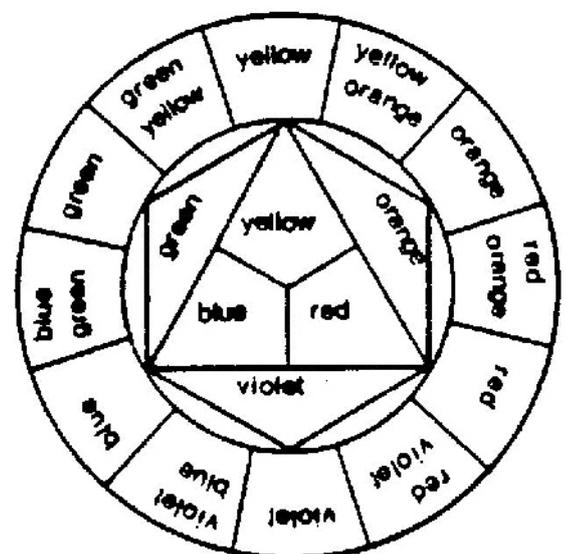
### Colour

Colour has no form, but can complement form. Used badly colour can completely ruin a design. Alternatively, used well colour can make a good design great! Colours can be mixed. Mixing primary colours at the centre of the colour wheel produces secondary colours. These secondary colours can be further mixed to create tertiary colours. Colours close to each other on the colour wheel produce harmony e.g. red and orange. Colours opposite each other on the colour wheel create contrast e.g. red and green. Colour has three properties:-

**Intensity** - brightness e.g. bright red or dull red.

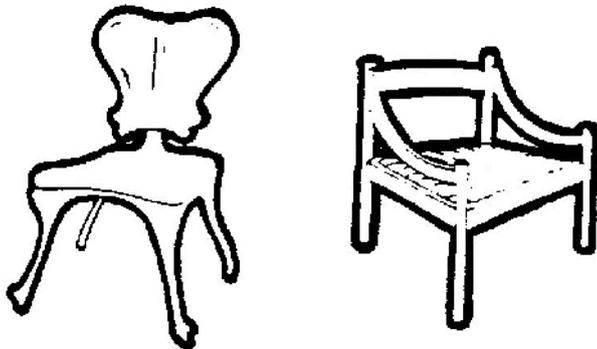
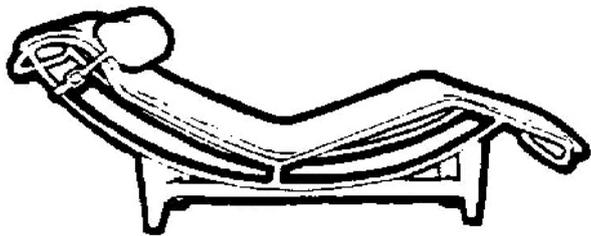
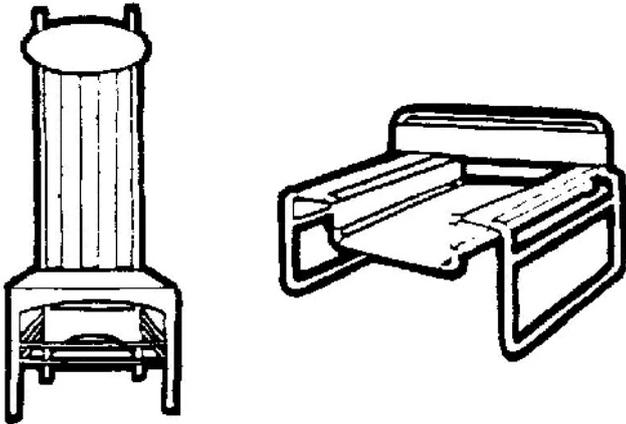
**Temperature** - warm colours e.g. red and orange. Cold colours e.g. blue and green.

**Tone** - the lightness or darkness of a colour. Small quantities of white or black can be added to basic colours to create light and dark shades of a colour.



## Texture and Finish

The surface of an object is the part which is most seen. Texture and finish are used to enhance their appearance and improve function e.g. textured hand grips.



## Style

The style of an object is created by combining tone, colour, texture, form etc. Many designers have a recognisable style which they apply to their work e.g. Charles Rennie McIntosh's Glasgow style.

Style is constantly changing, what is popular today may not be popular in a year or two. The designer has the responsibility of making sure that the style of his or her design will appeal to those who will buy it. Art Nouveau, Victorian and Gothic are well known styles. Each style has its own particular look. Whilst designers have argued for years over the importance of style and function, it is probably true to say that the best designs have a good balance of the two.

When you come to design a product you should try to take account of aesthetics - but remember a design which looks great but doesn't work or is difficult to use is not a good design!

## Ergonomics

Ergonomics is a design factor which is of critical importance. By using ergonomics the designer is taking into consideration the user of the design. To help you consider the user you should use the following checklist:-

Begin by looking closely at how the product will be used, decide on the characteristics of the user and the product and the relationship between them.

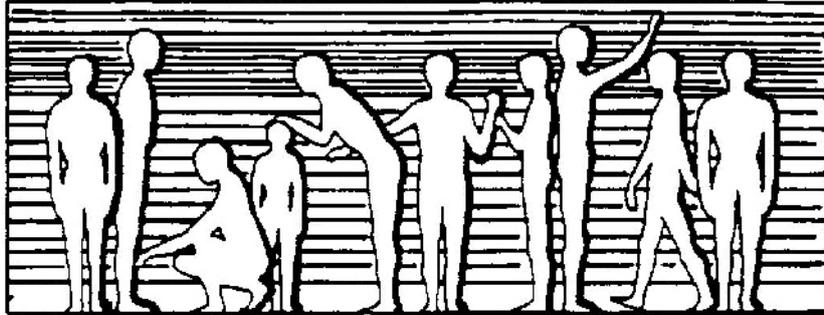
Consider the factors which will ensure health, safety, convenience and comfort of the user.

Compare your design ideas with what you find in 1 and 2 above, i.e. Carry out tests to see if the product is designed well from the ergonomic point of view.

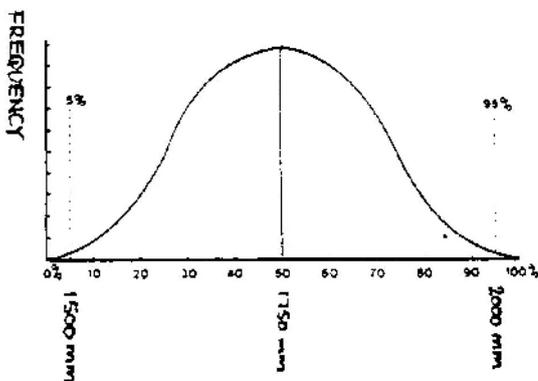
Obviously when designing products for people you must take into account their physical size, weight, reach and movement. In order to do this you will need data relating to human dimensions.

## Anthropometry

Data on human dimensions can be found in tables of anthropometric data. Anthropometric data is available on all aspects of human dimension e.g. height, arm length and distance between the eyes.



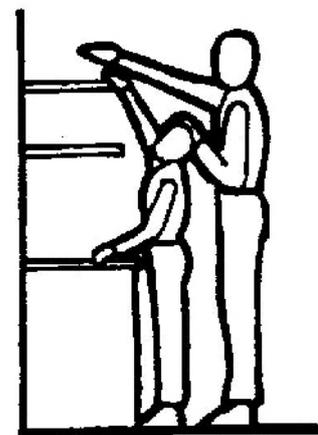
This data is available for men and women and for different age groups. As people are all different sizes it is necessary to select data which is appropriate to the design situation. For example let's consider the height of a doorway. Obviously to find this dimension we must consider the height of people.



The graph shows the range of heights of men and the number of men at each height. You will see that few men are very small i.e. 1500 mm. Few men are very tall i.e. 2000 mm. However there are large numbers of men who are around average height i.e. 1750 mm.

Similar graphs can be drawn to show the distribution of any human dimension, either of men or of women, young or old.

You may think that when choosing the height of a doorway that you would simply choose the size of the tallest man but this is not the case. The chances of the largest person in the world using the doorway are so slim that it is not practical to use this size for a door. In fact when designers require upper dimensions as in the case of the doorway they ignore the upper 5%. The dimension chosen is called the 95th percentile (95th %ile). See the graph. Similarly if the designer requires to consider small individuals they ignore the smallest 5%. The dimension used is called the 5th percentile (5th %ile). See the graph.



If we once again consider the doorway height it should be apparent that the designer will choose the 95th %ile man (the 95th %ile woman's dimension will be smaller). Let's look at another example. Imagine we were trying to find the maximum height that a shelf should be in a supermarket. We are of course looking at an individual's reach here. Obviously it is the smallest individual we should consider, i.e. 5th %ile woman. Setting the shelf at a height suitable for the 5th %ile woman means that the shelf will be within the reach of all other individuals.

Occasionally a compromise dimension is required. In a situation where to choose the 95th %ile would prove inconvenient to the 5th %ile user (or vice versa) the designer will choose a dimension in between. This dimension is called the 50th percentile. A good example of this would be the height of a wall mounted mirror.

When selecting anthropometric data remember:-

Aim to accommodate as many people as possible.

Design for a range of users, not just the average, as this will often exclude half of the users.

Data such as body size cannot be used without thought to the activities to be carried out. e.g. To design a ski stick handle the designer must consider that the user will be wearing a glove.

## Seating

Seats are used for a variety of activities and each activity will require a different design of chair. The design of a chair to be used at a desk will be very different from the design of an easy chair !

Measurements and considerations in chair design are:-

Seat height A suited to work level.

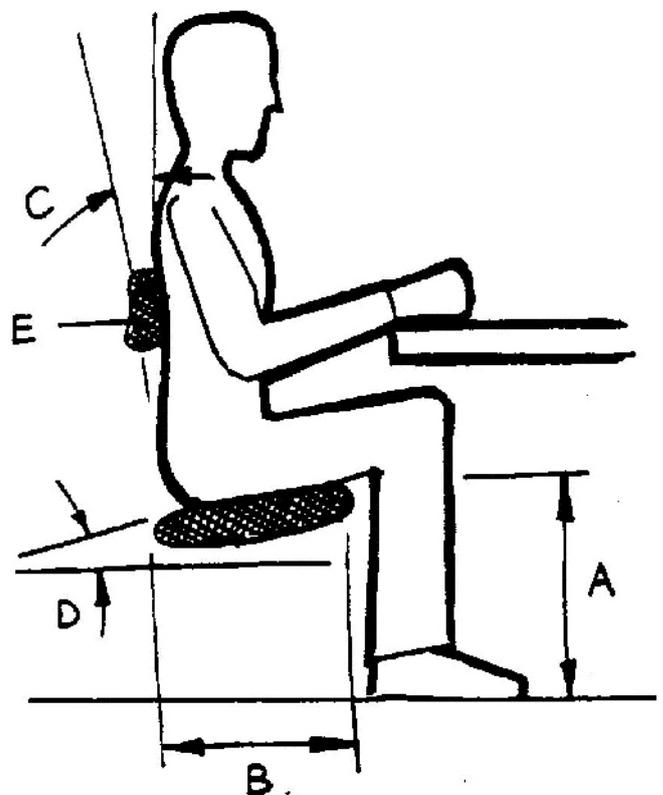
Seat depth B to provide clearance.

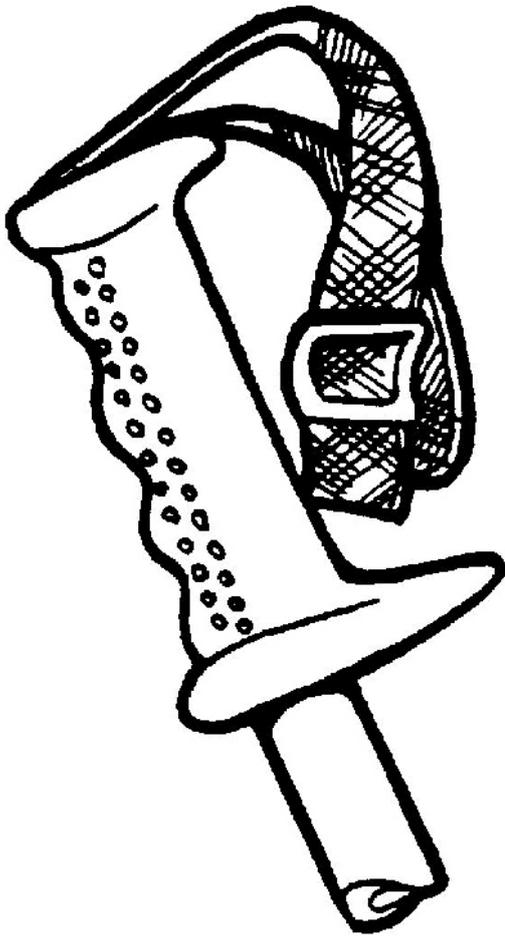
Seat back and angle C should support the natural curve of the spine.

Seat angle D should be horizontal or sloping back.

Back rest E should be adjustable for a work chair and should also allow free movement of the shoulders.

Chair seat should be padded unless it is designed to be used for short periods only.





### Hand Grips

The design of a hand grip will depend on how the grip will be used. If the grip is to be used to lift a heavy weight then the grip should allow the user to wrap their fingers fully round the grip whereas the grip on a door handle must be designed so that the user can easily rotate the handle. A lever is better than a knob especially for people with arthritis.



### Handles

Tool handles or handles to open doors etc should have a diameter of between 18 mm and 50 mm. The best designs are those which will allow maximum contact between the hand and the handle.

When designing a handle remember:

A textured surface improves grip;

Guards and good handle shapes can prevent hands from slipping which can be dangerous;

Plasticine and clay are ideal materials to model handles.

**Note: Sensitive design can make big improvements in the lives of the disabled, left handed, the young and the old.**