



Auchinleck Academy

Technical Department

Higher/Advanced Higher Graphic Communication

Study notes for

**Knowledge
&
Interpretation**

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Introduction Higher Graphics

The Higher course consists of:-

External assessment by examination paper **50%**

External moderation of the Reception Desk Assignment **50%**

The examination paper is 2 hours long and consists of one part:-

Graphics knowledge (*Content of this booklet*)

The graphics knowledge consists of a total of **70** marks.

The Reception Desk Assignment also consists of **70** marks

The following information contained within this booklet contains all the information required to fulfil this aspect of the course.

It is therefore imperative that candidates are fully conversant with the information contained within this booklet.

For the Higher Exam it is suggested that candidates spend approximately 1.5mins per mark allocated. If this is done this will leave approximately 25 minutes left for perusing over the examination paper.

Introduction Advanced Higher Graphics

The Advanced Higher course consists of:-

External assessment by examination paper **40%**

External moderation of two tasks and final Assignment **60%**

Having said this the two tasks (Camera case attachment and the riverside museum tasks are pass or fail units)

The examination paper is 2 hours long and consists of one part:-

Graphics knowledge (*Content of this booklet*)

The graphics knowledge consists of a total of **80** marks.

The Final Assignment consists of **120** marks

The following information contained within this booklet contains all the information required to fulfil this aspect of the course.

It is therefore imperative that candidates are fully conversant with the information contained within this booklet.

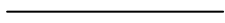
For the Advanced Higher Exam it is suggested that candidates spend approximately 1.5mins per mark allocated. If this is done this will leave approximately 25 minutes left for perusing over the examination paper.

Types of line used



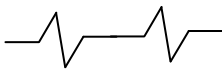
Continuous thick

Used for visible outlines and edges.



Continuous thin

Used for projection, dimensioning, leader lines, hatching and short centre lines.



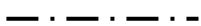
Continuous thin straight with zigzags

Used for limits of partial or interrupted views and sections if the limit is not an axis.



Dashed thin line.

Used for hidden outlines



Chain thin.

Used for centre lines,



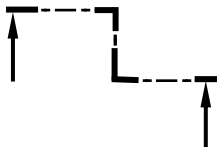
Chain thin double

Used for ghost outlines



Continuous thin irregular

Used as the limit to an interrupted view when an axis is not present.



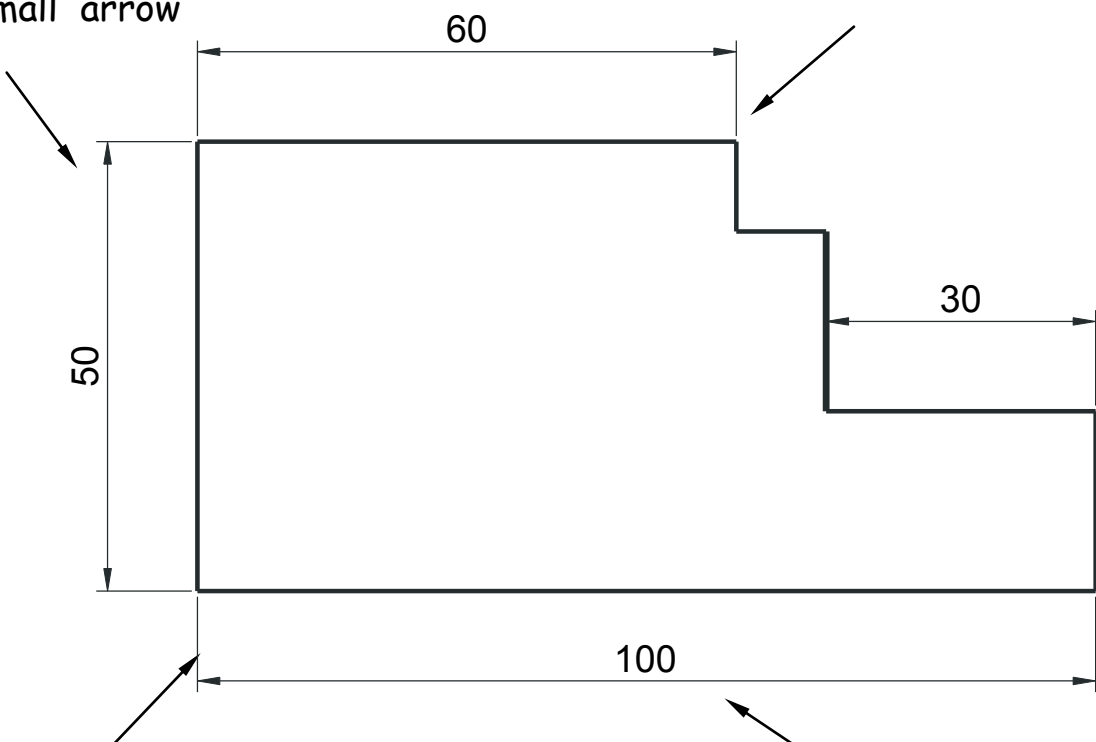
Chain thin thick at both ends and

Used on Cutting planes.

Dimensioning

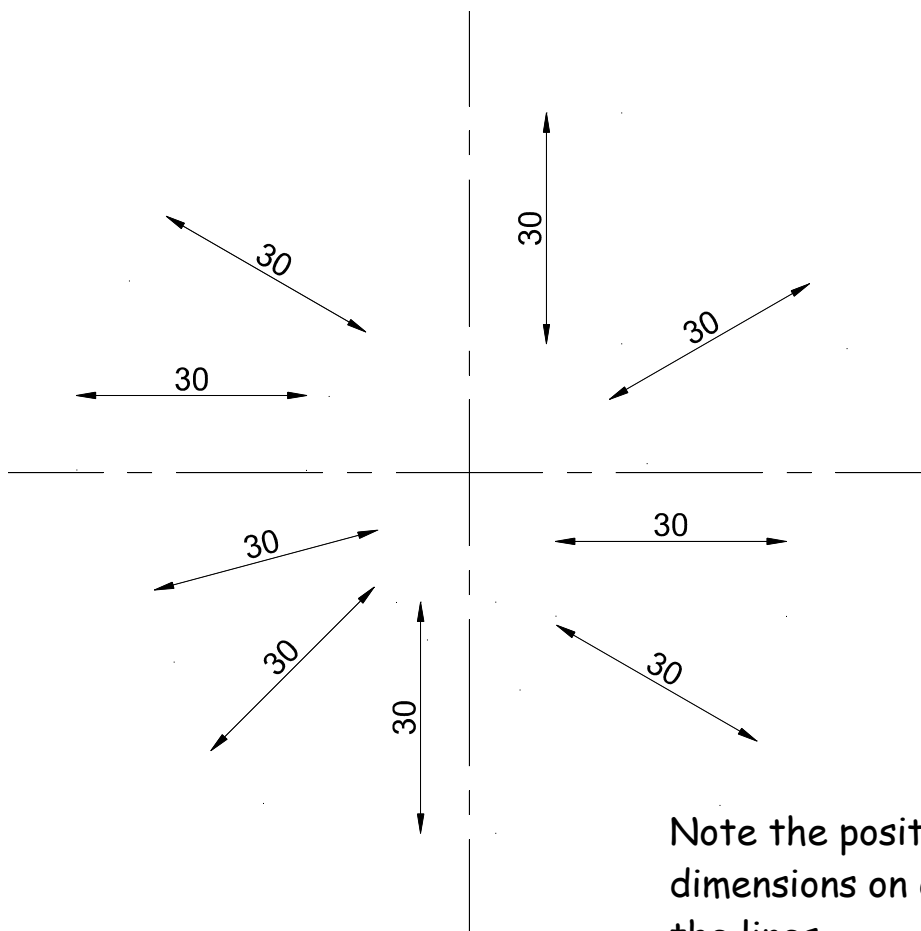
Small gap between Leader and line of drawing

Small arrow

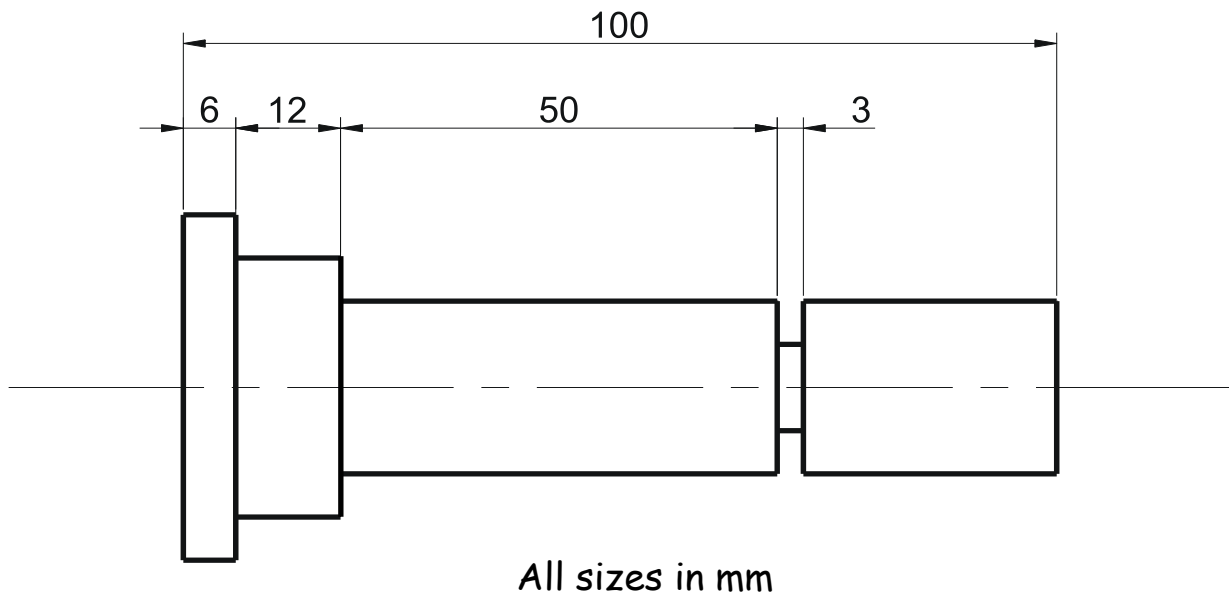


Short extension (Leader)

Dimension



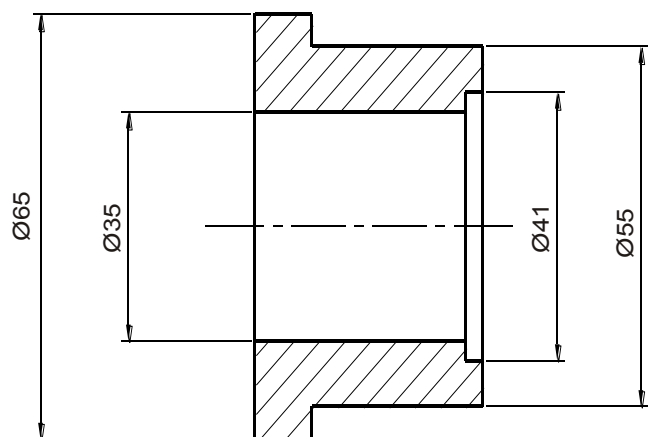
Note the position of the dimensions on each of the lines



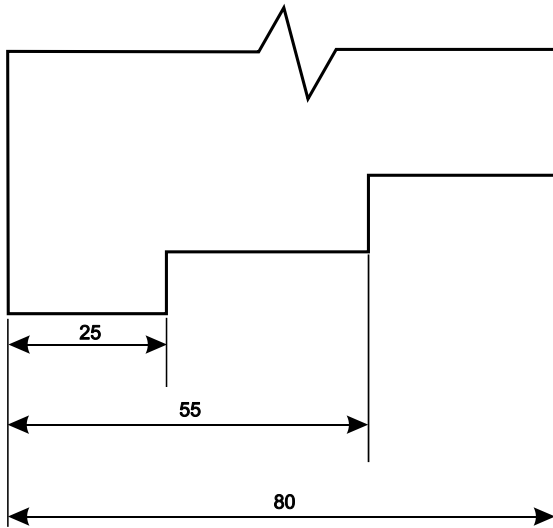
Notice on the above drawing that the largest dimension is placed on the outside of the smaller dimensions. Where there is a limited space for dimensioning, the dimension can be placed above, or in line with, the extension of one of the dimension lines. E.g. the 3mm dimension uses the 50mm dimension leader. It is also important when dimensioning not to include the units of measurement. As can be seen from the drawing above, state on the drawing the unit of measurement. i.e. **(All sizes in mm)**.

The sectioned drawing opposite shows some possibilities for putting a diameter on a drawing. This is by no means the only method.

If the section shown was **Square**, then the following symbol would be used. \square 45

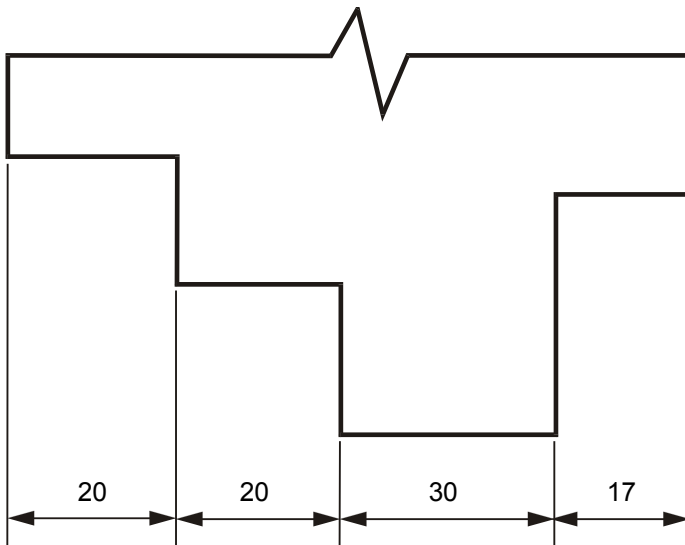


Dimensioning methods



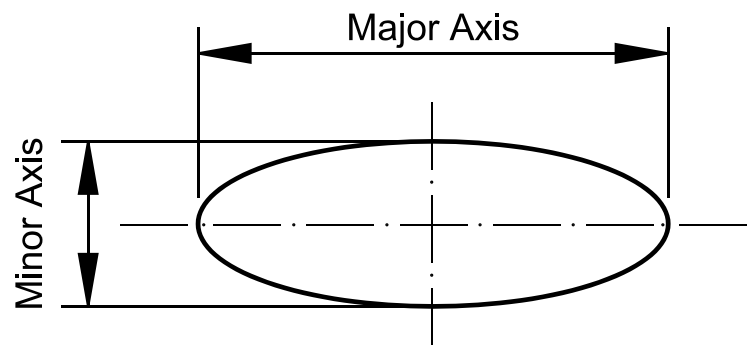
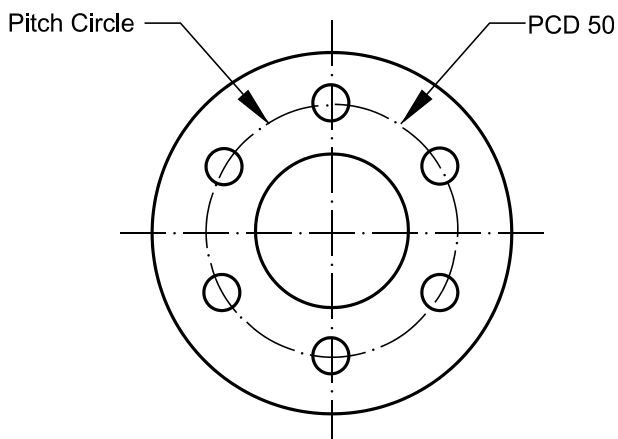
Parallel dimensioning shows dimensions taken from a common datum.

Parallel dimensioning

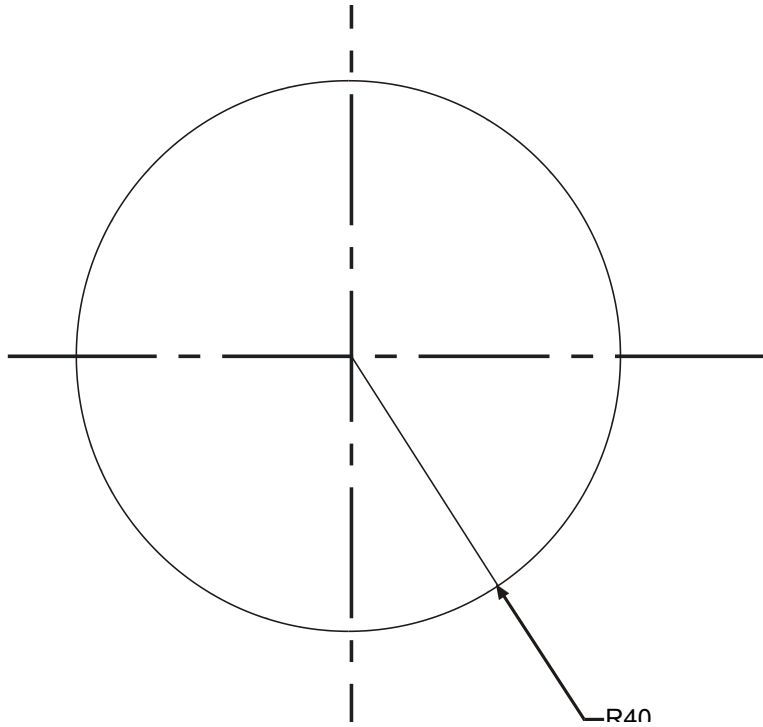
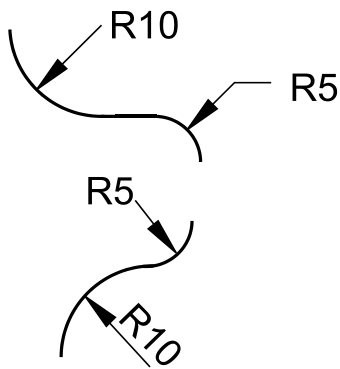


Chain dimensioning should only be used when the accumulation of tolerances will not affect the part.

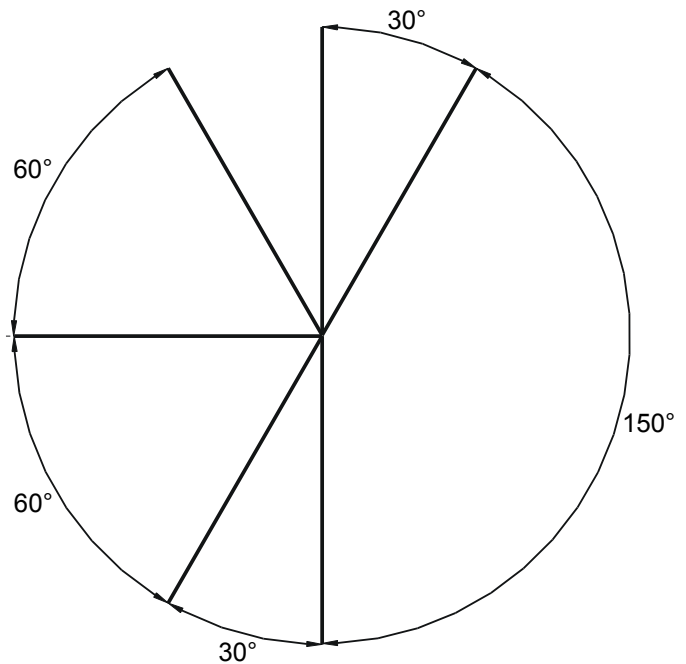
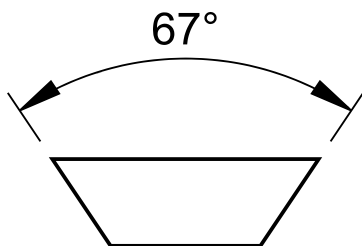
Chain Dimensioning



Radii should be dimensioned by a dimension line that passes through, or is in line with, the centre of the arc. The dimension lines should have one arrow head only, that which touches the arc. The symbol R is placed in front of the dimension.



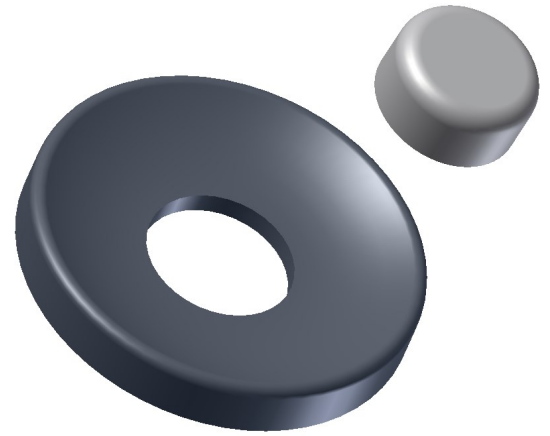
Angular Dimensions



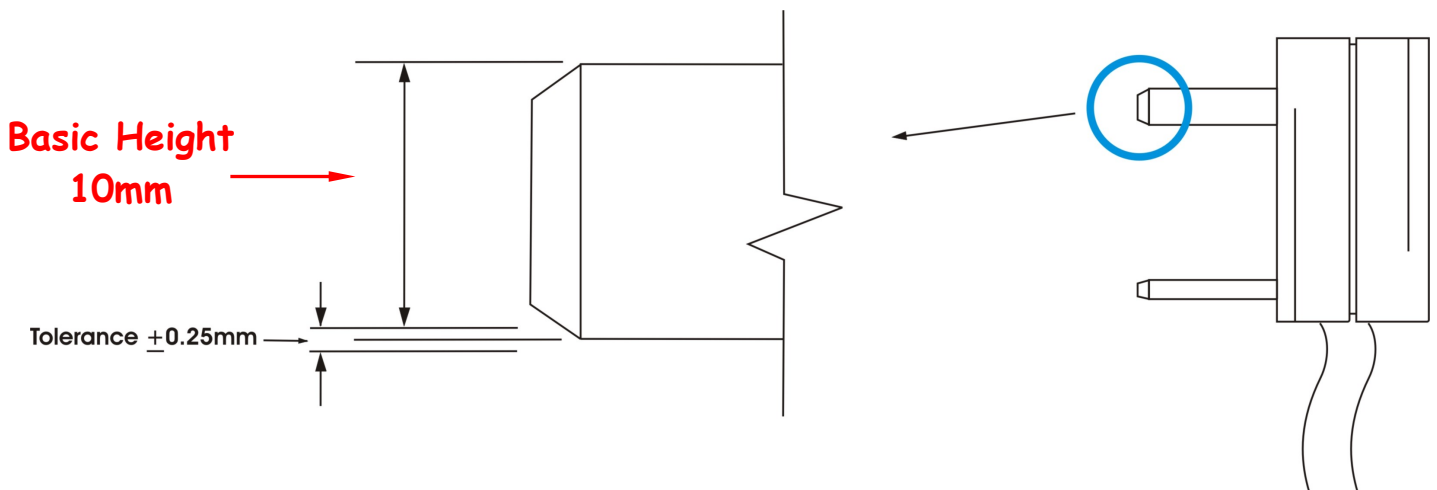
Dimensional Tolerances

When products are manufactured, they, in many cases have to be able to be assembled to other components which make up the complete product. It is very difficult to ensure that the components are the exact size every time, therefore to allow for slight mistakes in manufacturing we use a system called Tolerance. This allows the components to be made within certain sizes which in turn allows for slight mistakes allowing the components to still fit. In the first example given overleaf the component has a tolerance of 0.25mm either way. This means the component can be made within the sizes 19.75mm to 20.25mm. The tolerances vary depending what is being made.

In the example shown opposite (*button for TV remote*) the button has been made with a tolerance of $\pm 0.5\text{mm}$. This means that in the manufacturing process it will have a full 1mm allowance. This does not seem a lot but in manufacturing terms is a substantial allowance.

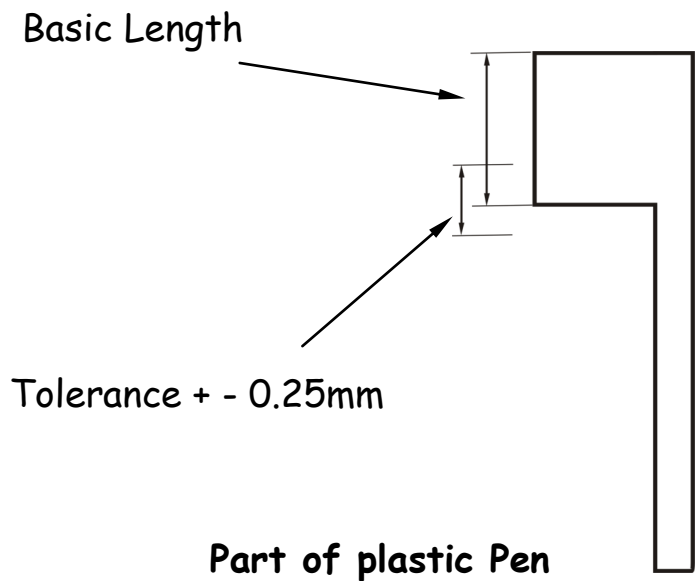


For example, the height of a pin of an electrical plug, has shown below, is 10mm. The company has determined that the size could vary between 9.75mm and 10.25mm and still be able to fit in the slots in the socket. In this case a tolerance of 0.5mm could be applied to this dimension without affecting the function of the part. This size is normally stated as $\pm 0.25\text{mm}$.



When manufacturing or constructing an item it is virtually impossible to achieve precisely the required size of the item. The error permissible in manufacture is called tolerance - this is normally given on the drawing of the item. Tolerances which affect the size of an object or feature on it are referred to as dimensional tolerances. They are also used to tolerance the size of locating features on an item in relation to another. For example, the required length (or basic length) of part of a plastic pen clip shown below is 10mm. This size could vary, between 9.5mm and 10.5mm and still fit in the slot provided for it on the pen.

tolerance of 1mm, normally stated as $\pm 0.5\text{mm}$ could therefore be applied to the dimension without affecting the function of the part. The length of the part of the clip could then be manufactured to any size between 9.5mm and 10.5mm and still be acceptable.

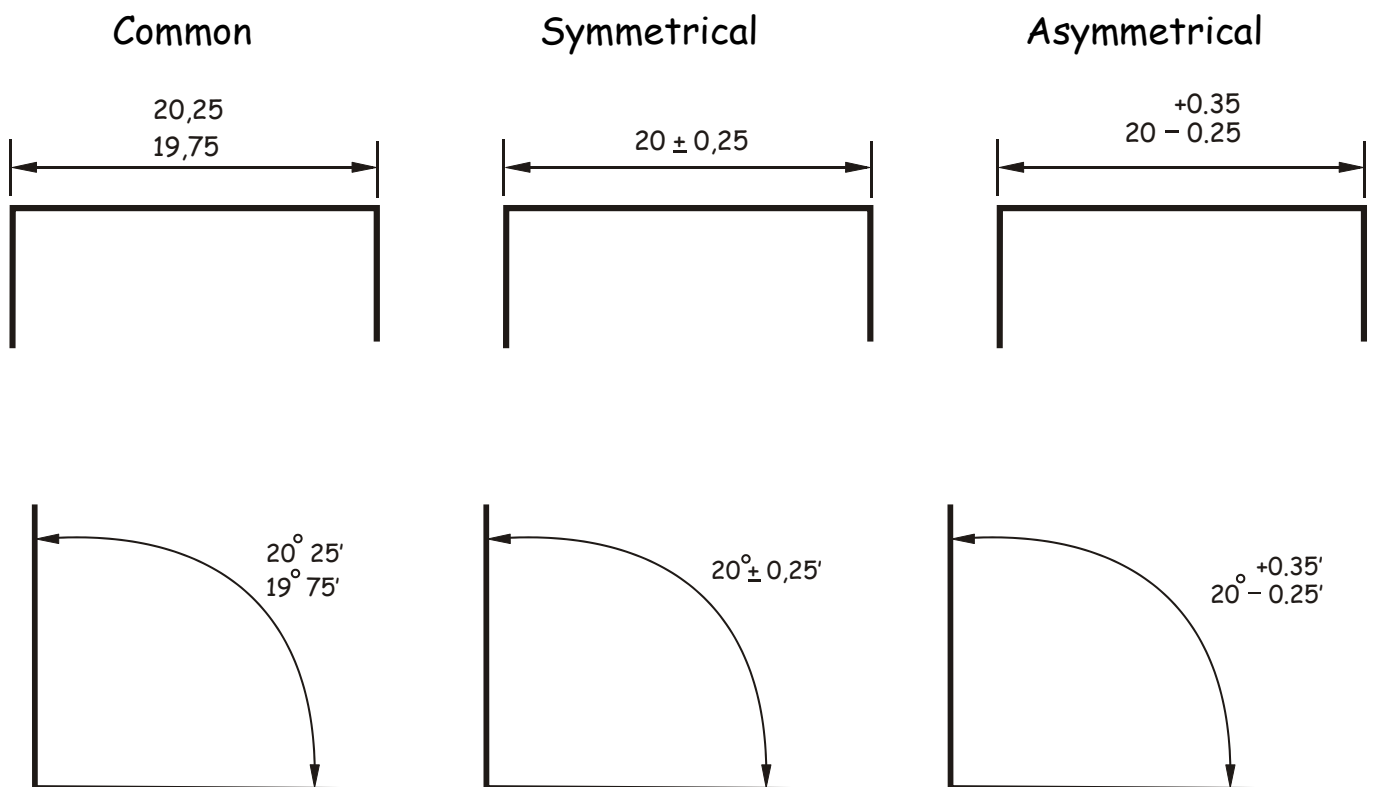


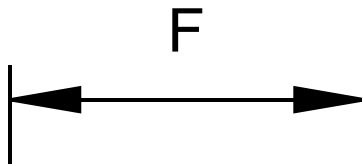
Types of Tolerance

Functional & non functional dimensions

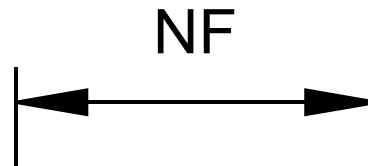
The remote button and the electrical pin of the plug shown on the previous page are examples of a **functional dimension** as they are directly affected by the size of both components. If either was out with the tolerance allowed they would not fit.

Whereas a **non functional dimension** would be the height of the inside button or the length of the pin would not affect the fit of the two components.





A dimension that is **essential** to the function of a component or space.



A dimension that is **not essential** to the function of a component or space.

Scales

Scaling drawings allow us to draw exceptionally large objects such as houses on any size of paper available to us. To enable this to happen we have to scale every size (dimension) by the same factor. i.e. taking the example of the house, every dimension would have to be divided by say 100. By doing this we are scaling **DOWN** the size of the house. We can also draw exceptionally small objects larger, examples of which are, the minute electronic chips which are now part of our every day life. They are so small we could not draw them as they are we have to **SCALE UP** the drawing to be able to draw them.

1:1

When we carryout a drawing using the actual dimensions, this is called '**full size**', or the drawing has been drawn to a scale of **1:1**. For every 1mm drawn, 1mm is represented.

1:2

When we carryout a drawing and reduce all the sizes by a factor of 2, i.e. all dimensions are divided by 2, this is scaling down the drawing. This makes the drawing half its original size. What the 1 & 2 represent are, for every 1mm drawn on paper the actual size of the real object is 2mm.

2:1

We can also increase the size of an object by any factor. In the example shown opposite the sizes have been increased by a factor of 2. This will make the drawing twice its original size. The 2 is stating that for every 1mm actual size of the object, 2mm have been drawn. If we increased the object by **10** the scale would be **10:1**. If we reduced the objects dimensions by twenty the scale would be **1:20**.

We can also increase the size of an object by any factor. In the example shown opposite the sizes have been increased by a factor of 2. This will make the drawing twice its original size. The 2 is stating that for every 1mm actual size of the object, 2mm have been drawn. If we increased the object by **10** the scale would be **10:1**. If we reduced the objects dimensions by twenty the scale would be **1:20**.

With respect to Engineering drawings, there are recommended scales for reduction and enlargement. These are as follows:-

Reduction:- 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:500, and 1:1000

Enlargement:- 2:1, 5:1, 10:1, 20:1, and 50:1.

The size of scale used is mainly dependant on two factors. These factors are the;

Size of paper available

And the size of the object being drawn.

The amount of detail required

E.g. If house was being drawn on a piece of A4 paper opposed to a sheet of A2 paper, the scale used will obviously have to be different or it won't fit onto the page.

Floor Plans

Scales are used a great deal in building drawings. They are used in three main areas, Floor plans, Site plans and Location plans. Each of the three types of drawings have preferred scales. These are as follows:-

Type of Drawing	Floor Plans	Site Plans	Location Plans
Preferred Scales	1:50 or 1:100	1:200 or 1:500	1:1250 or 1:2500



This type of drawing shows the layout of the rooms inside the building and the position of the doors, windows and important fittings like a bath, sink and toilet.

Site Plans

This type of drawing is concerned with one or more buildings which are within the same area and shows these buildings within their own site (or plot) boundary.

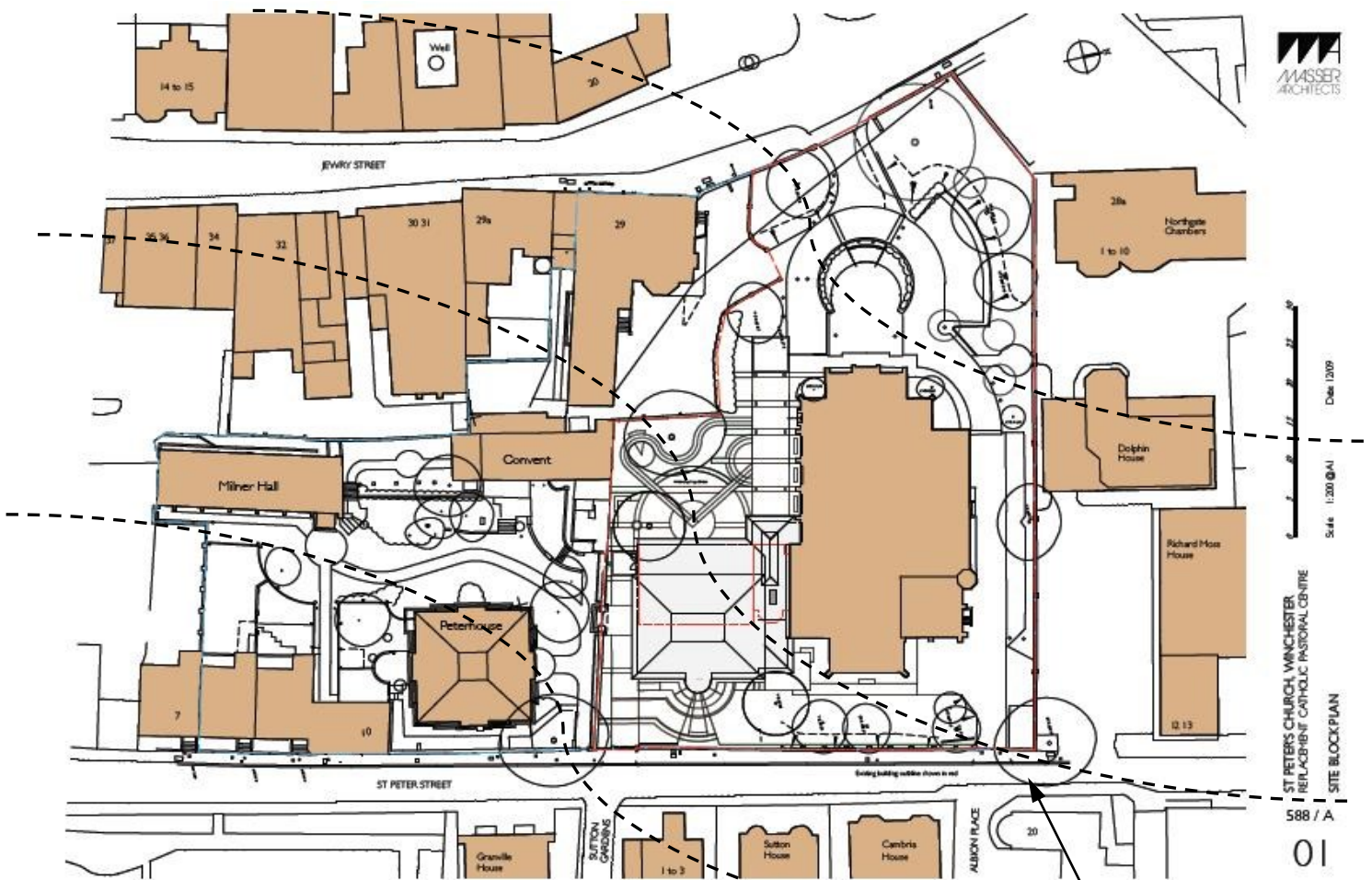
The buildings are shown as outlines and boundaries are marked slightly darker. The scale and the north point are both indicated on the drawing. The site is numbered (usually as plots). Waste pipe runs, manholes and trees are also indicated. Important dimensions are shown.



Block Plans

A **Block Plan** or **Site Location Drawing** shows where the site is located within the local area. It shows roads, outlines of buildings and site boundaries (Garden boundaries).

The block plan below shows where a bungalow is situated within the surrounding area. It is normally drawn to a scale of 1:1250.

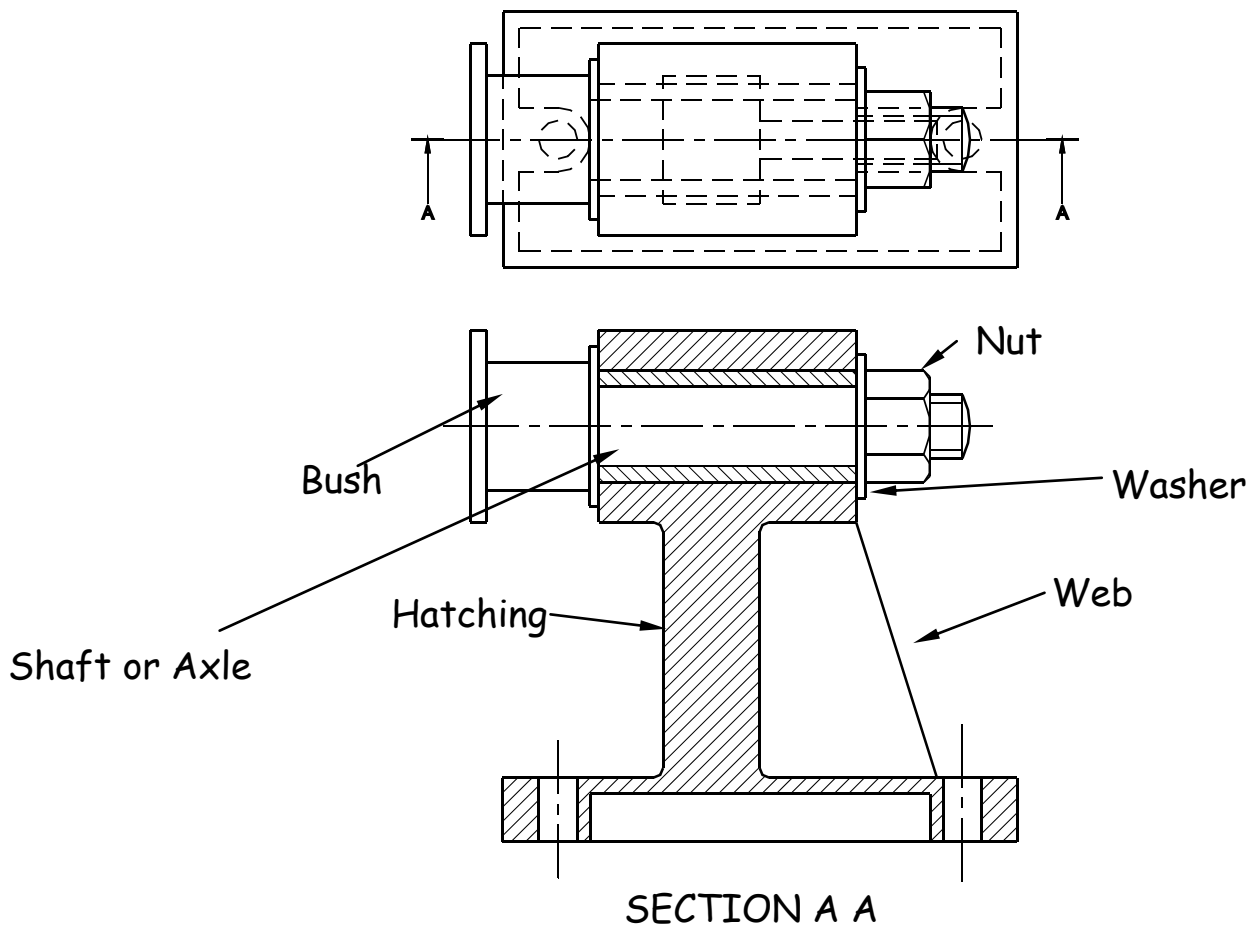


SCALE 1:1250

Ground contour lines

North Point indicator and scale.

Sectioned Drawings



Sectional views are drawn to show more clearly what hidden parts would look like.

The cutting plane is shown as a chain dotted line thickened at the ends and labelled with a letter.

Where parts are cut by the cutting plane they are hatched using a thin line drawn at 45° . These lines should be equally spaced at 4mm. Adjacent parts are hatched in the opposite direction.



offset



Herring bone

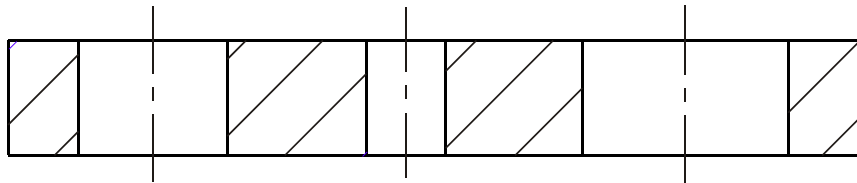
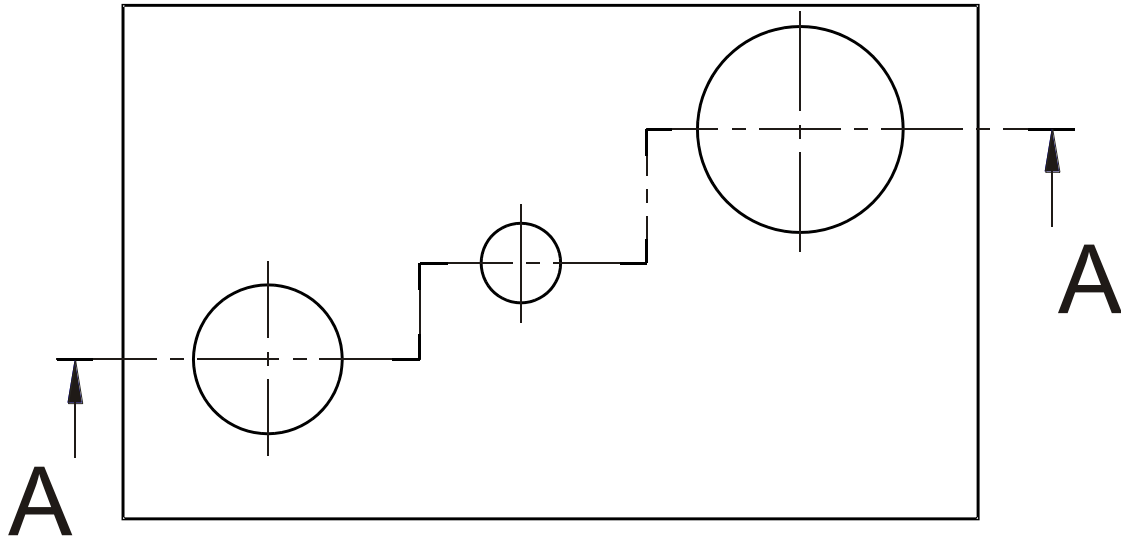
Offset hatching lines between parts. **Do not** produce herring bone pattern.

The following parts are **not** normally sectioned:-

Shafts, ribs, webs, spokes of wheels, nuts and bolts, washers and keys.

Stepped Sections

(Sectional views in more than one plane)



SECTION A A

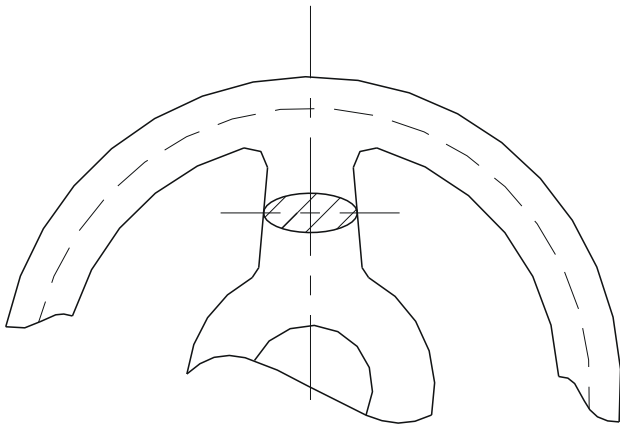
It is convention to draw these views as if the cutting planes were one continuous plane.

Moving a CAD drawing to a DTP package

The Cad file is exported out as a WMF (Windows Meta File) Imported into an illustration package and then exported out as a JPG file. In the DTP it imported into the file currently in use.

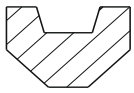
Types of DTP Software packages

MS Publisher, Photoshop, Serif Page Plus, Quark Publishing.

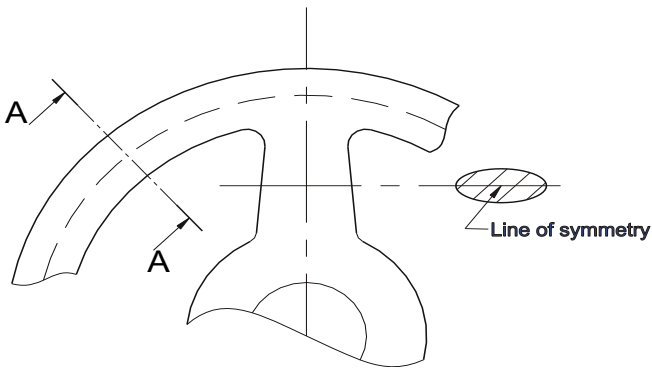


Revolved Section

This type of section, as the name implies, has been turned through 90 degrees to show the reader what the section looks like.

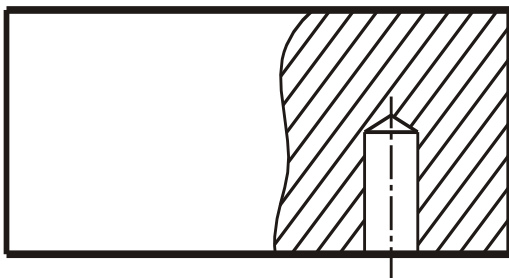


A-A



Removed Sections

A removed section shows the cut section out with the actual drawing as shown in section A-A. The groove shown on top of the cut section A-A is the top of a pulley wheel which would accommodate a belt.

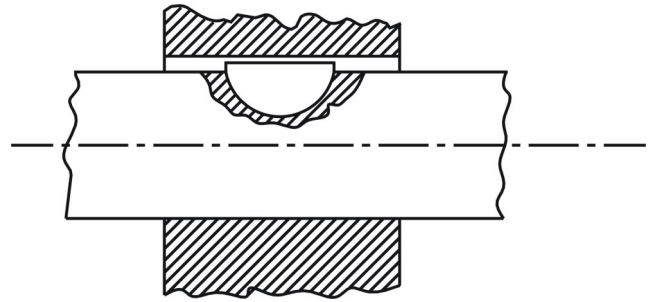


Part Section

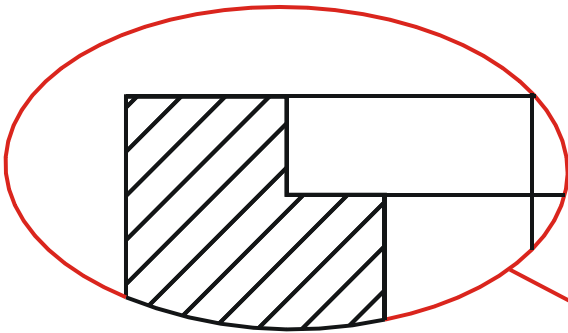
This type of cut section only shows part of the component sectioned. It would most likely be carried out to show hidden detail such as this blind

Sections Continued

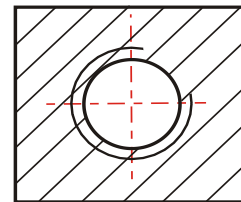
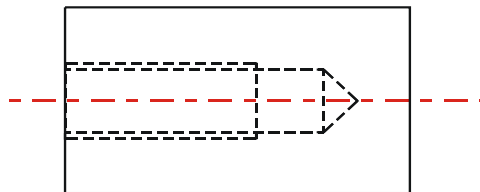
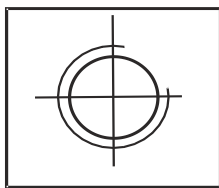
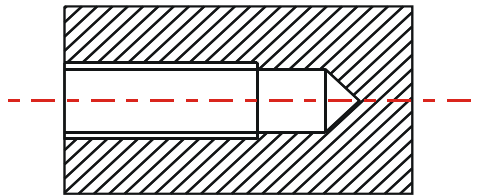
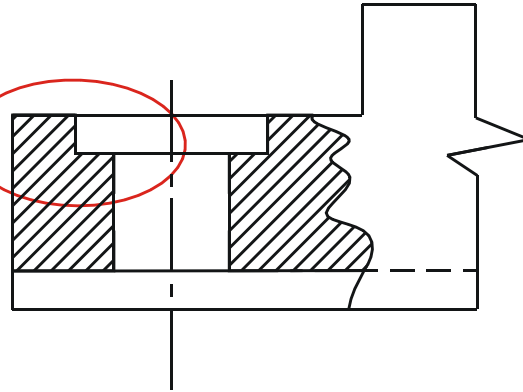
Woodruff Key



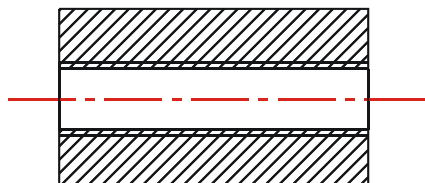
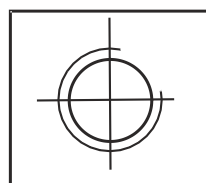
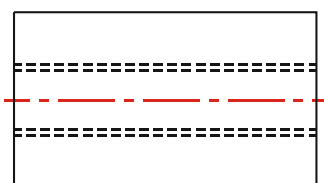
Partial View



Enlarged Partial View

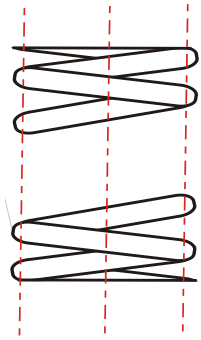


Internal threads (Blind hole)

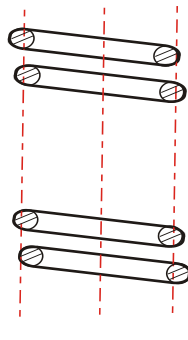


Internal threads (Through hole)

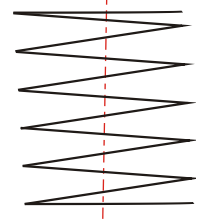
Springs



View



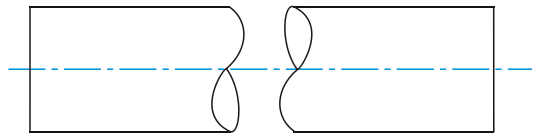
Section



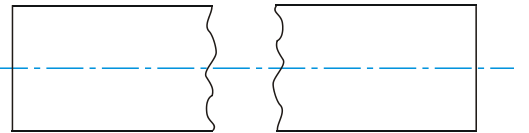
Simplified View

Nuts, Bolts & Shafts

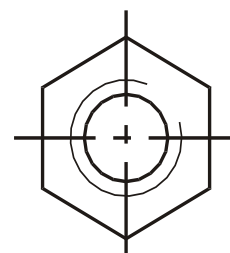
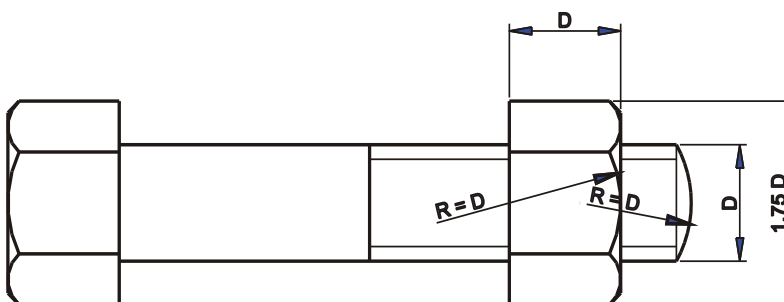
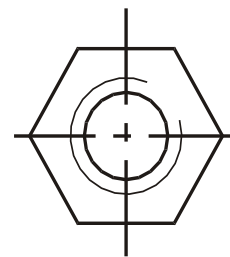
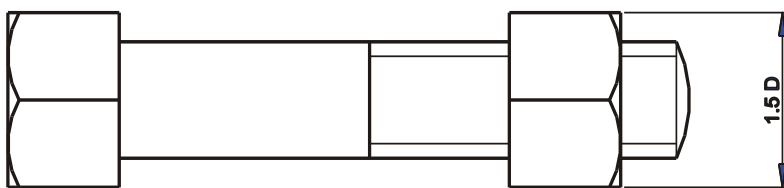
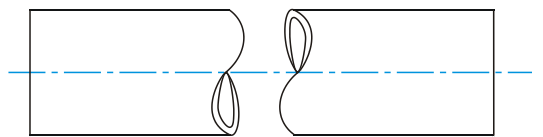
Conventional break lines for a solid shaft

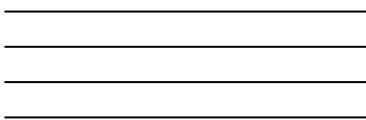
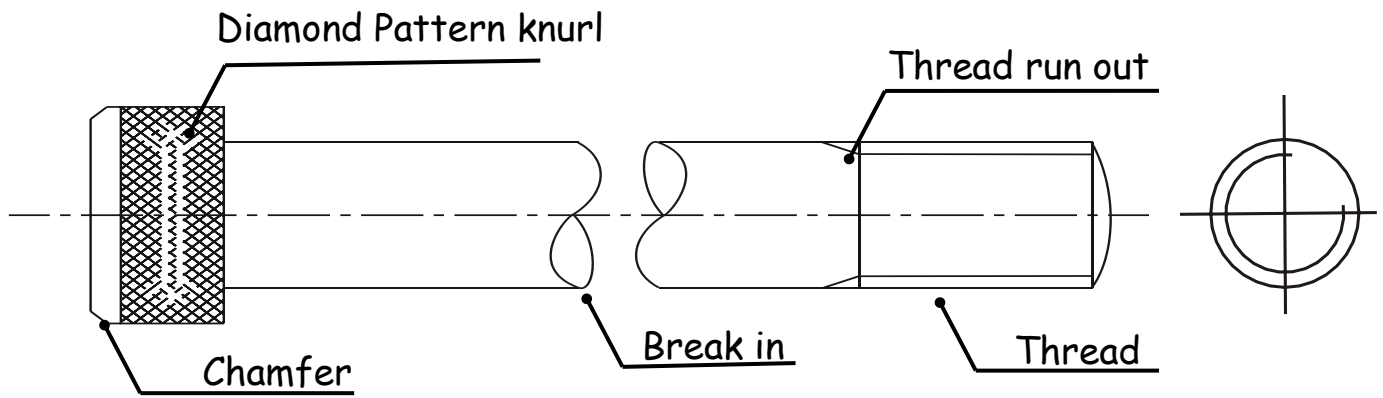


General break lines (continuous irregular used)

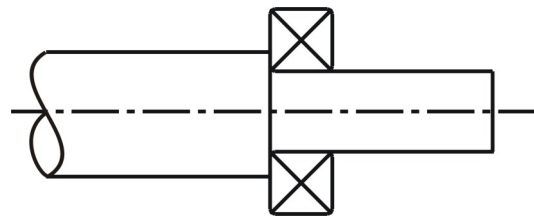


Conventional break lines for a hollow shaft





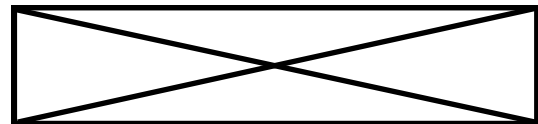
Straight knurl



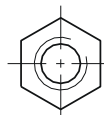
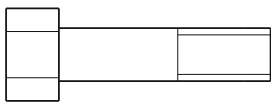
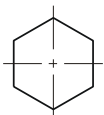
Roller Bearing

Conventional sizes to draw a nut and bolt are shown. Use these sizes if you have to draw the nut or bolt accurately otherwise use the simplified convention shown below.

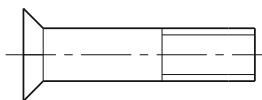
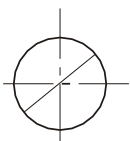
Flat Surface



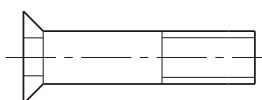
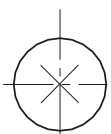
Simplified Fasteners, etc



Hexagon head screw

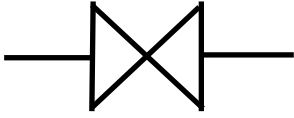


Countersunk screw, slot

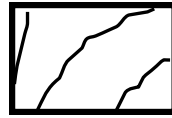


Countersunk screw, cross slot

Construction Symbols



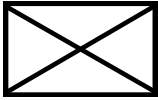
In-line valve (any type)



Softwood, machined



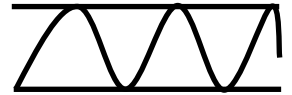
Radiator



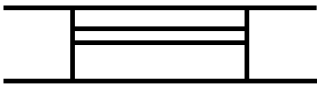
Wood, any type, sawn



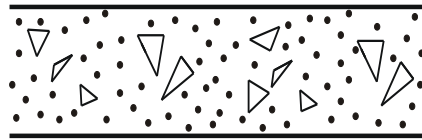
Brickwork



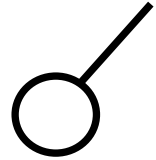
Insulation



Window



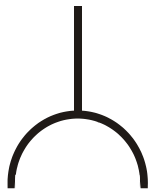
Concrete



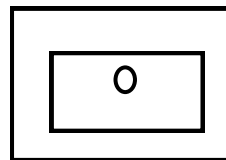
Switch



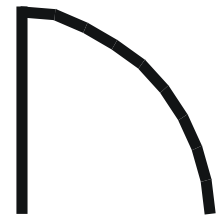
Lamp



Socket



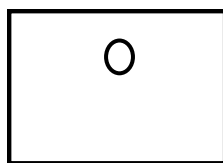
Wash basin



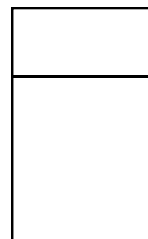
Door



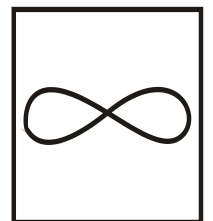
Towel Rail



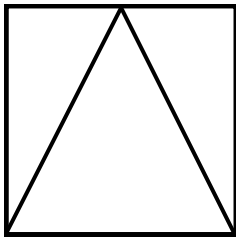
Sink, any type



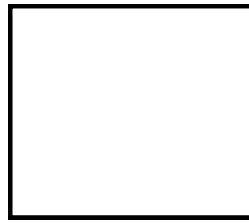
WC



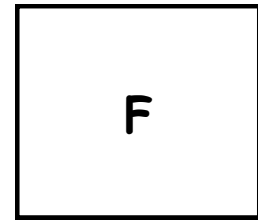
Fan



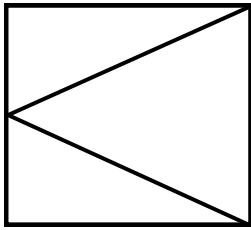
Hinged Window at Top



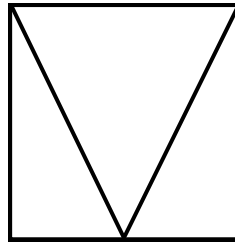
Any type Window



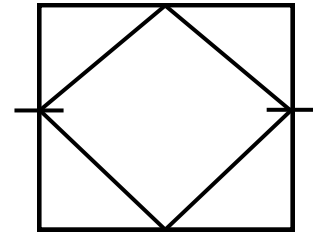
Fixed Window



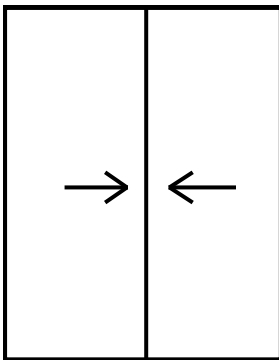
Hinged Window at Side



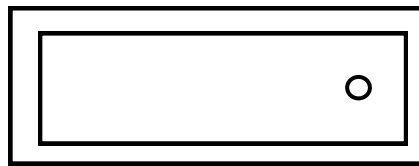
Hinged Window at Bottom



Pivoted, Horizontal axis, i.e. hinged in middle either side.



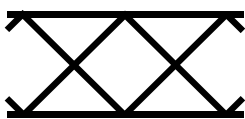
Sliding horizontally



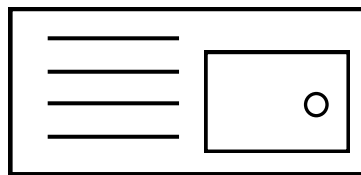
Bath



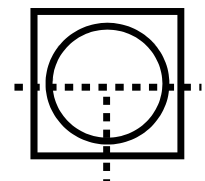
Shower tray



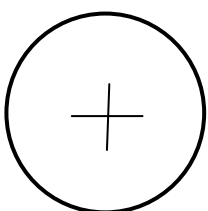
Blockwork



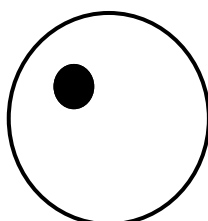
Sink top



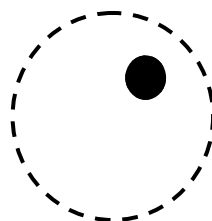
Drainage



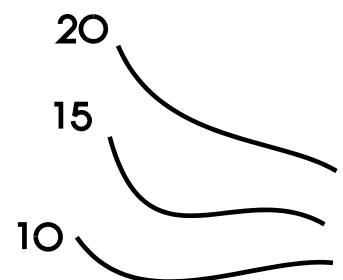
Proposed Tree



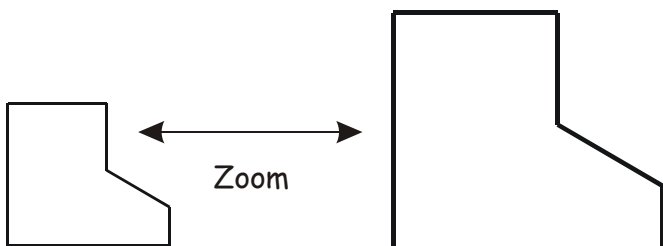
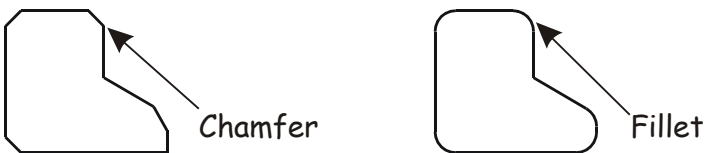
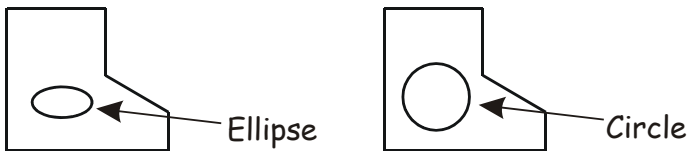
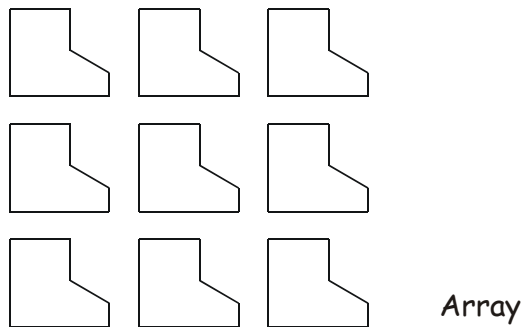
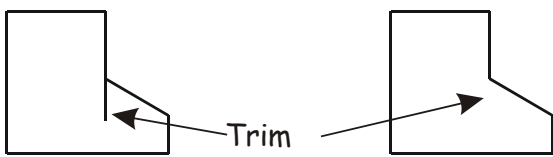
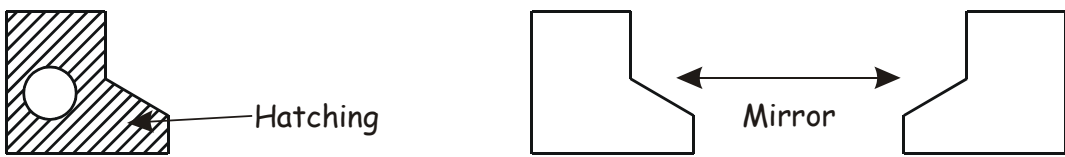
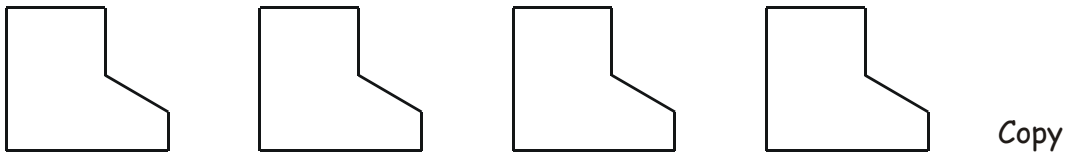
Existing Tree



Existing tree to be removed



Common CAD Commands



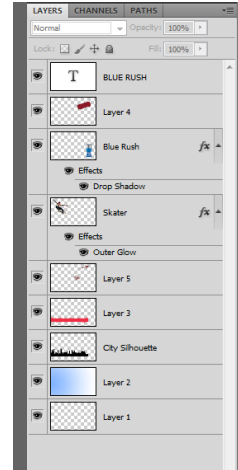
Copy means to copy an object to the clipboard.
Paste means to paste the contents of the clipboard onto the page.
Undo means to reverse the last command.
Move means to move an object to a new position on the page.
Erase means to remove part of a drawing.

Desktop Publishing layering

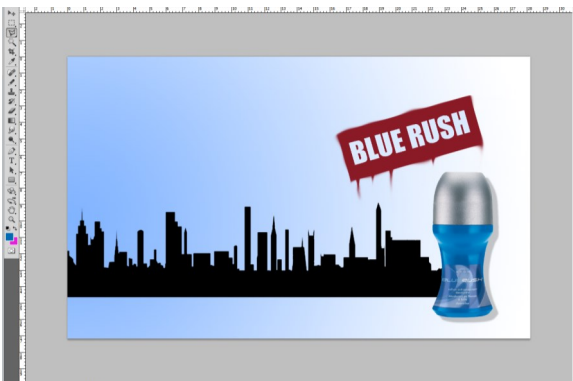
The use of layers in DTP software packages can aid the designer and enhance the quality of his/her graphic in many ways. Shown below is an example of layering.



Final document

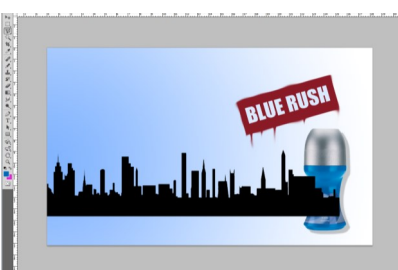


Layering tree



Layering allows graphics and text to be edited separately. They can be turned off and on to aid clarity as shown opposite. The visibility of the spray paint, image of skater and flow text have been turned off to allow easy editing of the silhouette.

Layers can also be brought forward or backward as necessary (Example A). The city silhouette was initially positioned in front of the deodorant bottle. However, it was moved back to improve the clarity of the bottle. The designer can easily duplicate a layer to obtain an identical copy of a graphic or text. This saves time and effort (Example B - deodorant bottle).



Example A



Example B

Advantages of CAG over manual drawing techniques.

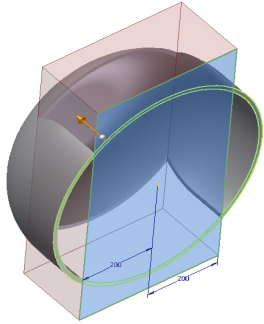
- Drawings are produced quicker and very accurately.
- Drawings are easier to edit/change.
- Libraries of various parts can be created.
- Lead time can be reduced.
- Quality of drawings are improved.
- Convenience of use (Lap top).
- Standardisation.
- Drawings can be easily scaled up or down.
- Use of layers allows different parts to be drawn separately.
- Easier to store drawings.
- Easier to send drawings to another location quickly.
- True 3D modelling made easy.
- New designs from existing designs.

Disadvantages of CAG over manual drawing techniques.

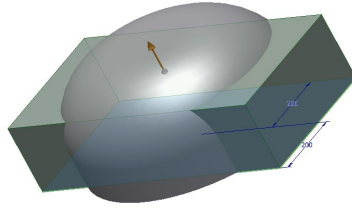
- Overall cost of hardware.
- Overall cost of software.
- Continual need to upgrade systems to stay competitive.
- Risk of catching computer viruses.
- Staff training costs.
- System faults/crashes.
- Data loss security.

3D Modelling Techniques

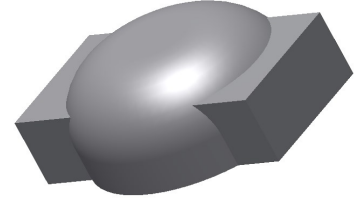
Union



Sketch



Union

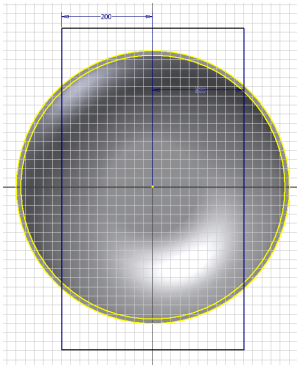


Completed Union

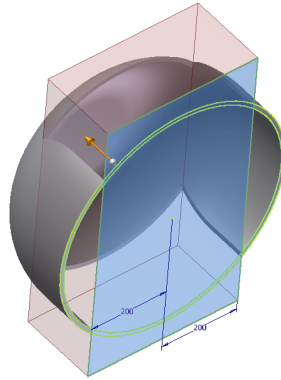
School Bin



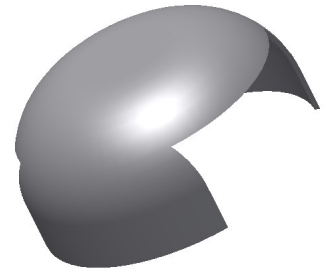
Subtraction



Sketch

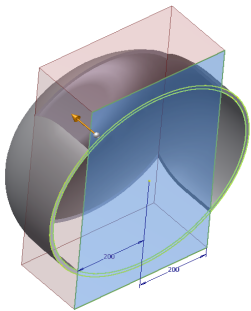


Subtraction - *Extrusion*

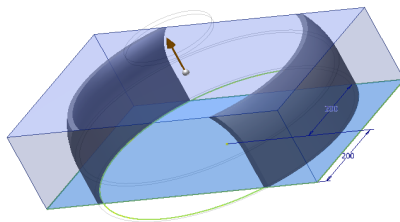


Completed Subtraction

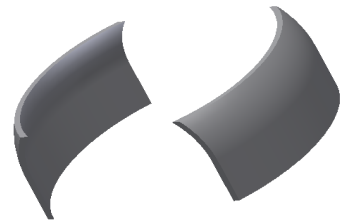
Intersection



Sketch

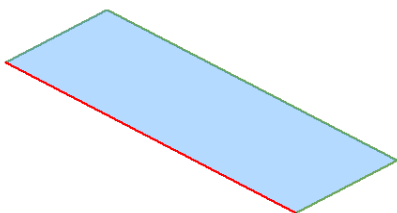


Intersection

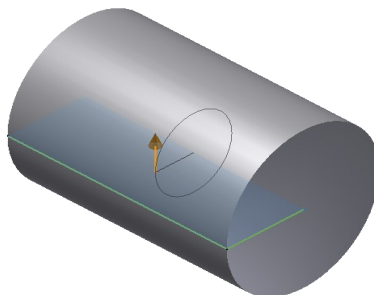


Completed Intersection

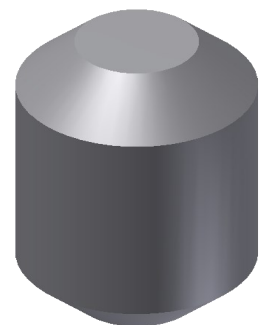
Revolve



Sketch



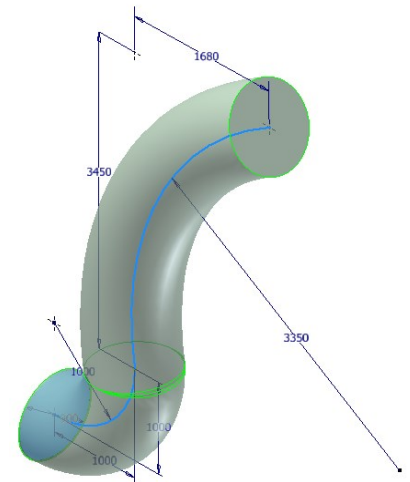
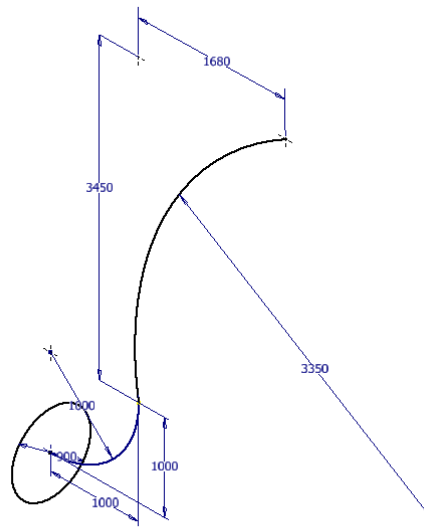
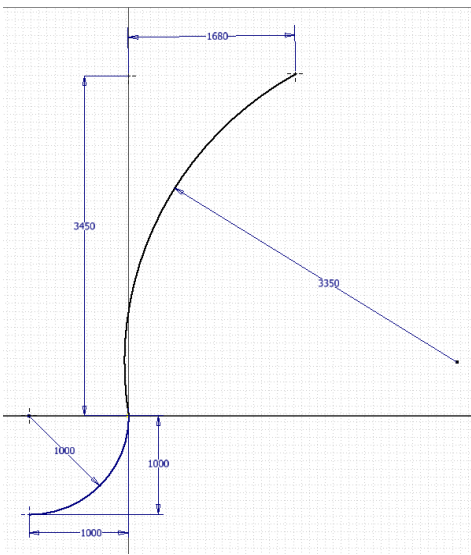
Revolve



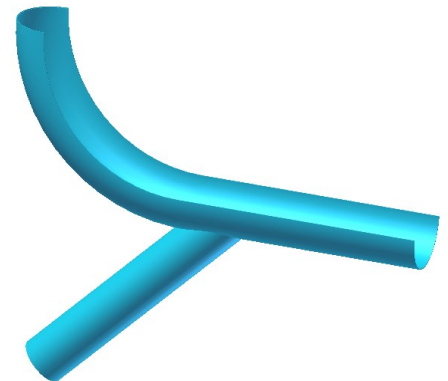
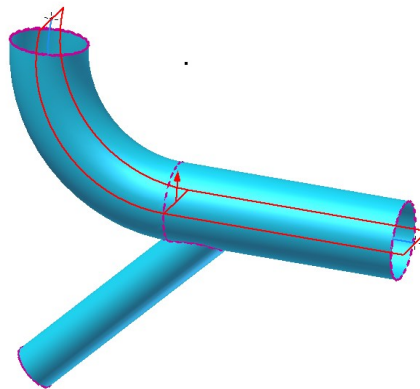
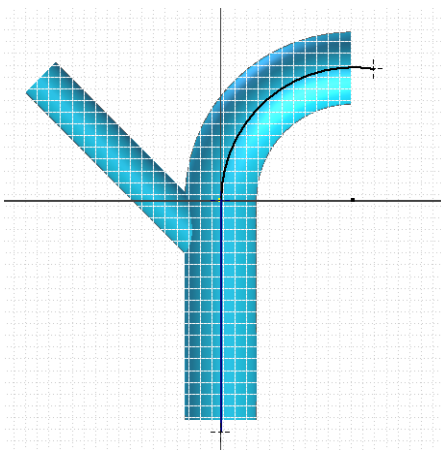
Completed Revolve
with Chamfer

3D Modelling techniques (continued)

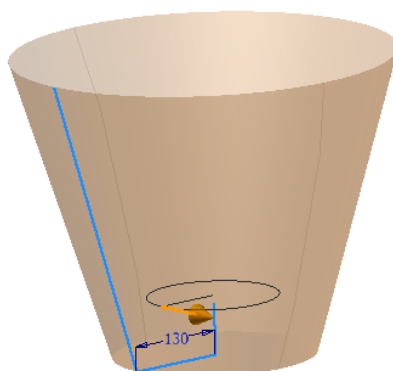
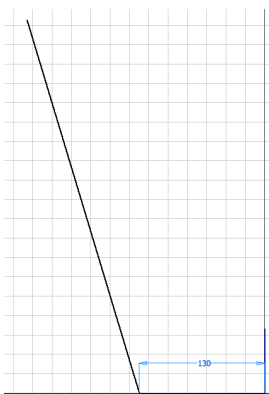
Extrusion along a path



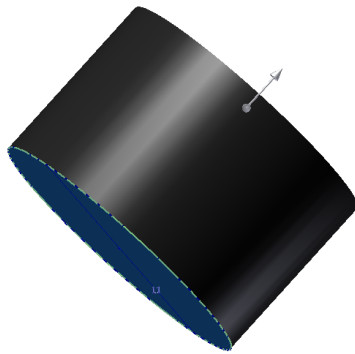
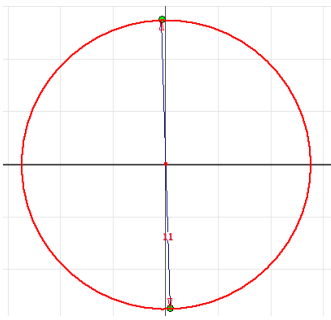
Split



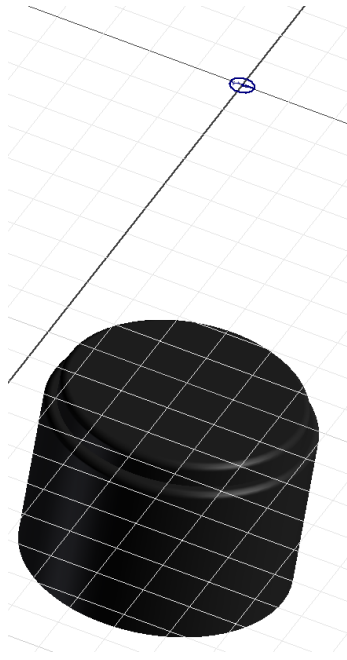
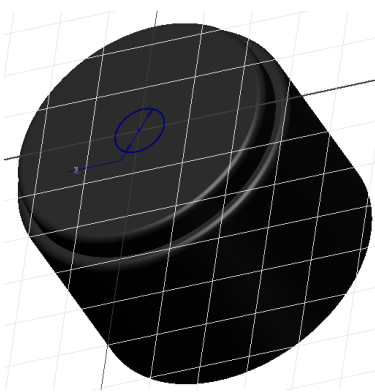
Surface Revolution



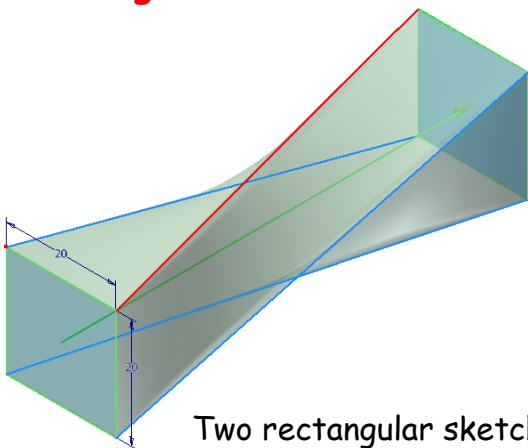
Basic Extrusion



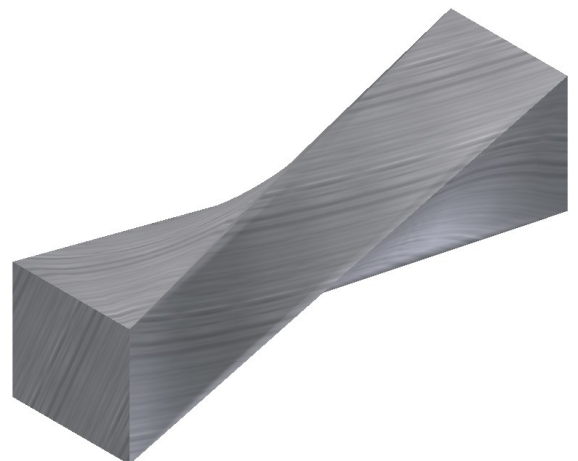
Extrusion between two entities - Loft



Loft using Rails

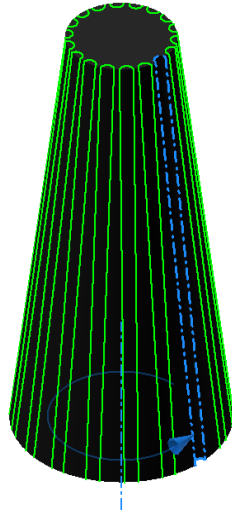


Two rectangular sketches are drawn. Four separate sketches are now drawn on each surface with a diagonal line going to each corner as shown.



The Loft is now drawn using the four rails as the paths.

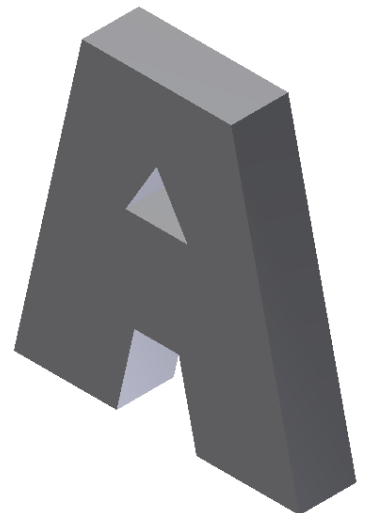
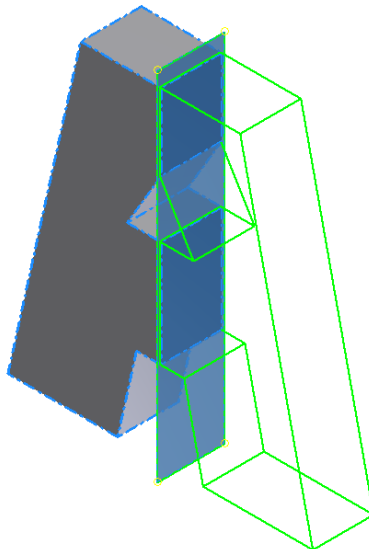
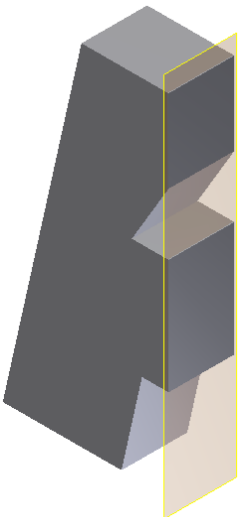
Circular Array



Rectangular Array



Mirror



The 3 P's

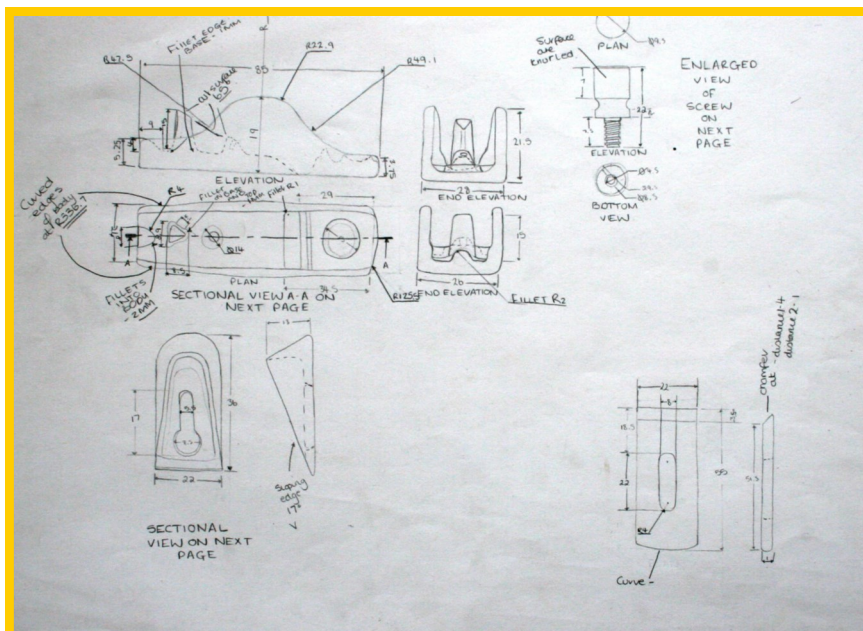
In your thematic presentation you will approach the theme just as a professional designer would, in the world of industry. This is tackled using the **3 P's**.

The first of the P's is the **Preliminary Sketches** usually carried out using freehand. These sketches consist of various drawings including all planning towards production and promotional drawings.

The second of the P's is the **Production Drawings** which consist of all drawings enabling the manufacture of the product being designed. The drawings will be in the form of CAD drawings including orthographic, sectioned, exploded isometric, etc.

The third of the P's is the **Promotional Graphics** and consists of all CAG drawings which promote all aspects of the product being designed. This will include posters, fliers, booklets, etc.

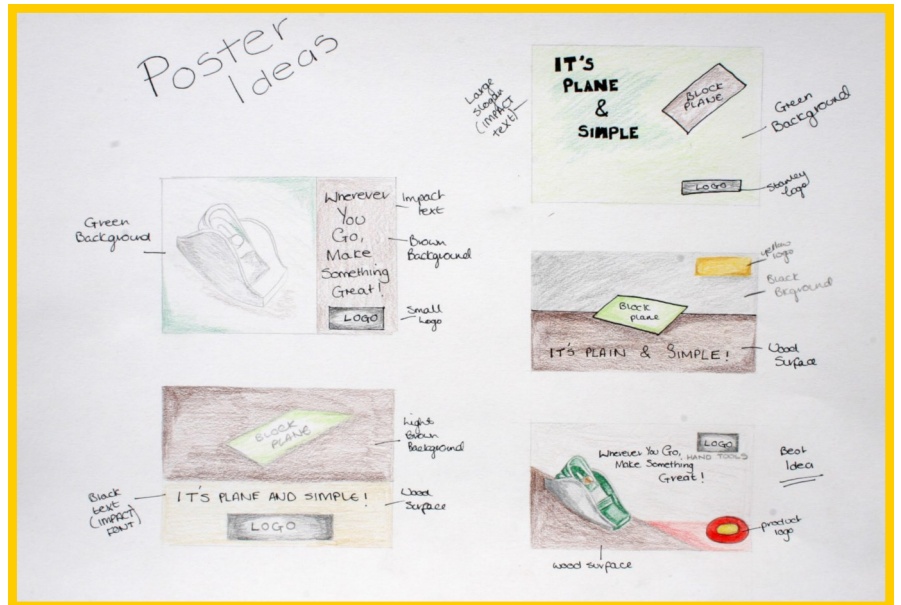
Preliminary Graphics



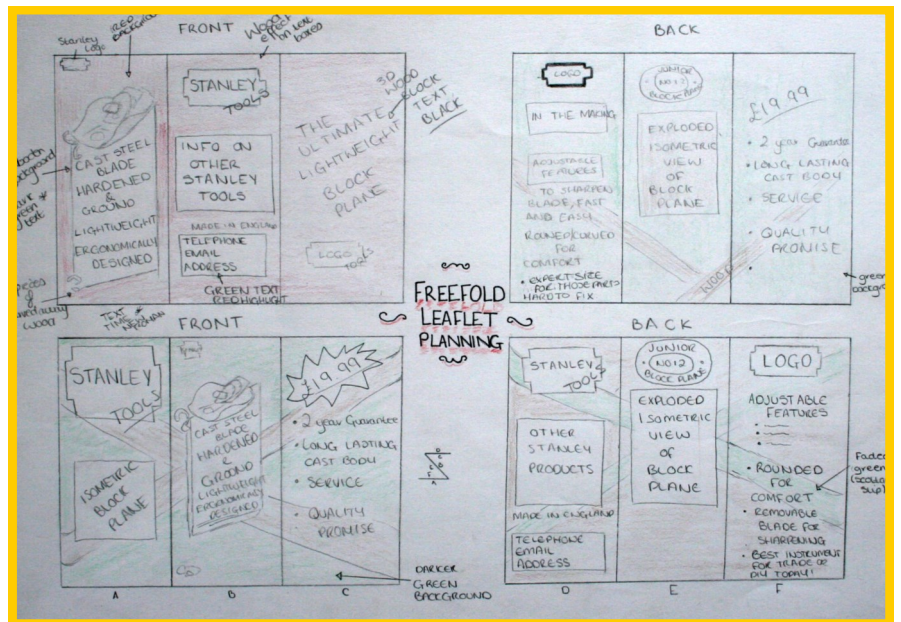
Orthographic freehand sketching

Drawn by Emma Napier 2008

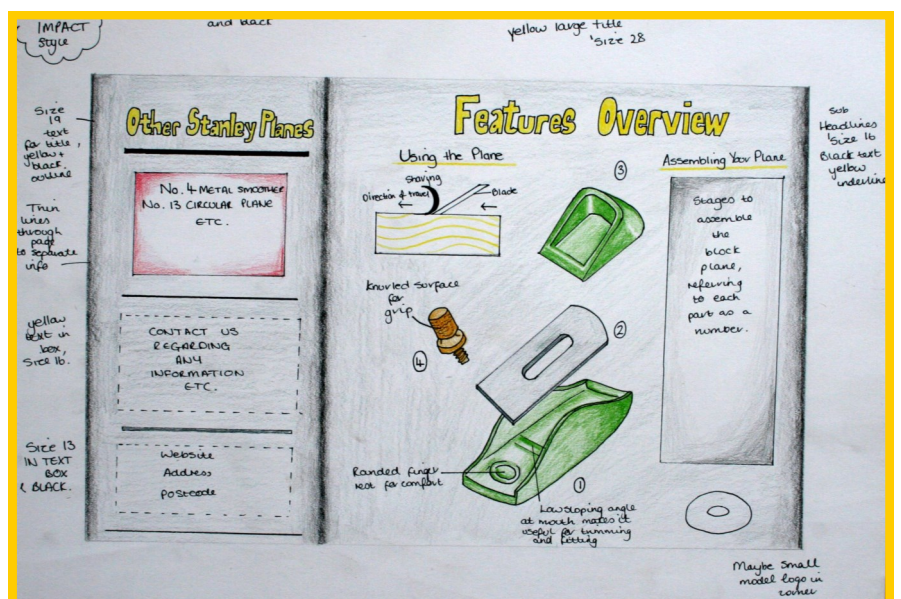
Pictorial freehand sketching



Planning for three fold leaflet

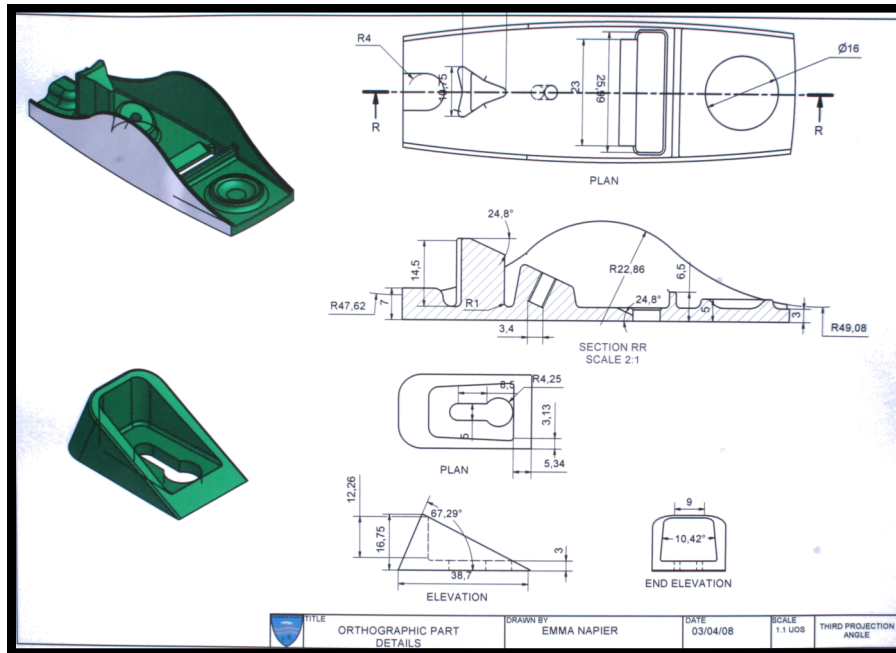


Full size Working Rough for the three fold leaflet

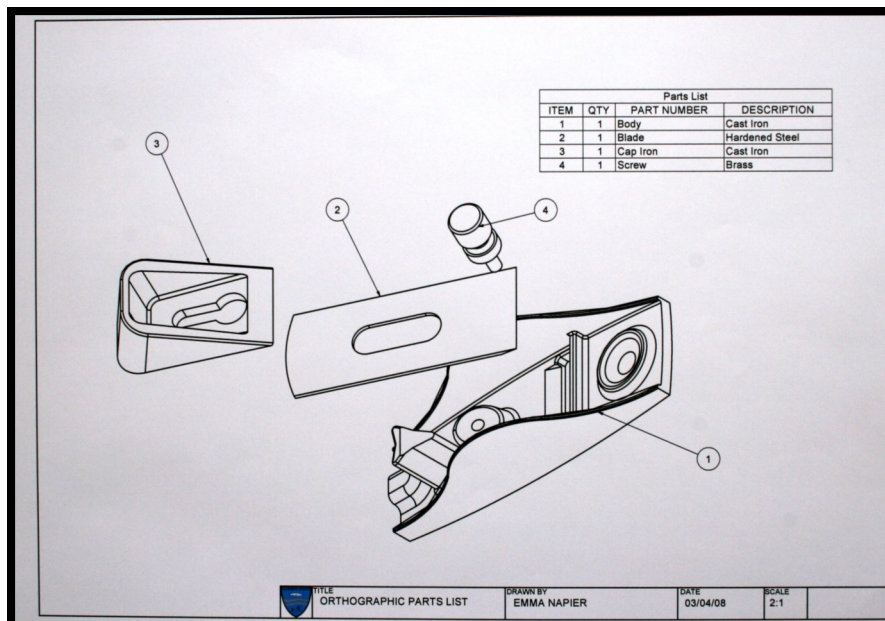


Production Drawings

The production drawings as stated overleaf show all manufacturing sizes to enable manufacture of the product being designed.



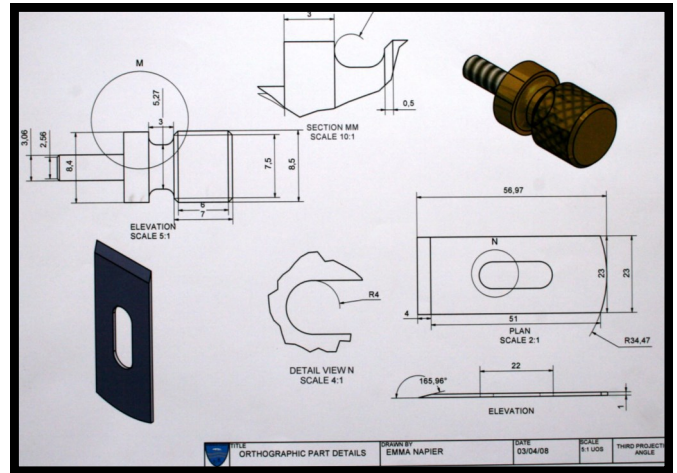
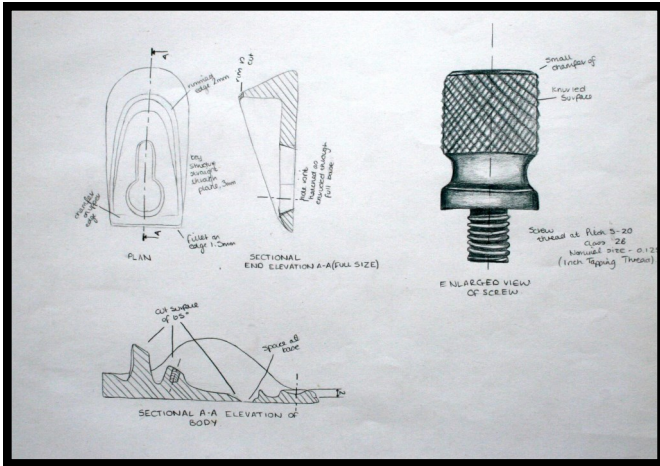
Computer Aided Drawing (Section)



Computer Aided Drawing (Exploded Isometric)

Detailed freehand drawing showing sizes

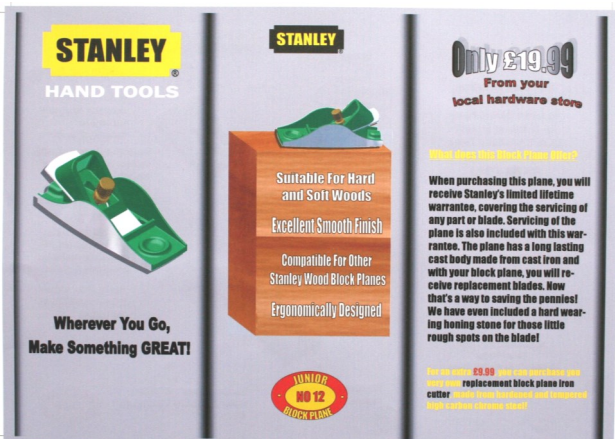
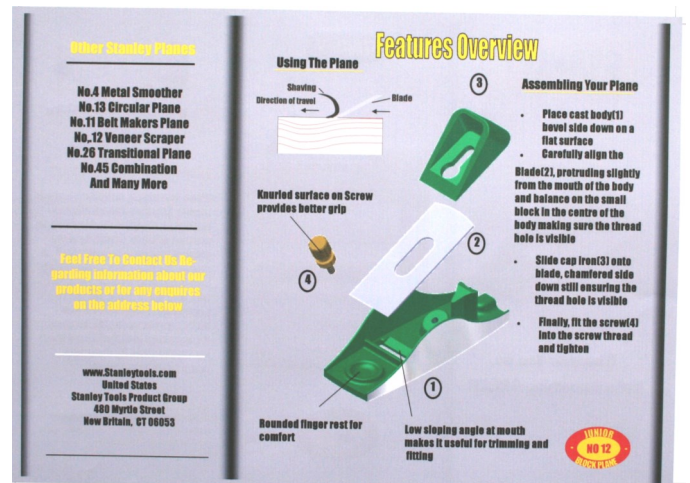
CAD - Detailed orthographic drawing showing various components



Promotional Graphics

The sole purpose of a promotional graphic is to try advertise and tempt potential buyers to buy the product being sold.

This can be done in a number of ways including, flyers, posters, etc



Shown above and to the side are both sides of a three fold leaflet.

The preliminary sketches of the leaflet can be seen on page25.

In the examples shown the background fill colour is not an ideal choice as it does not make the product being sold stand out. (It does not contrast well against background)



Drawn by Emma Napier 2008

Accent Colours

Accent Colours could easily be described as black and white photographs that have had a splash of colour added, i.e. A black and white apple in a photograph being tinted red to make it stick out. Or the lady's top being tinted red etc.

The effect it has on the picture is quite dramatic as it enhances that particular part of the picture.

Examples have been shown below.



Title Blocks

Title blocks are very important when producing CAD drawings as they inform the reader of many aspects of the drawing. A Title Block must always have the following information on display when producing CAD drawings.

Drawing No.

Name

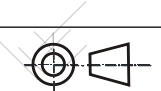
Title of Drawing

Original Scale

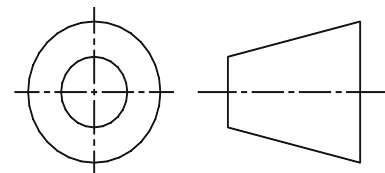
Date

Tolerance

It must also show the third angle projection symbol or whatever method has been used to draw.

			
DRAWING No.	NAME	TITLE	
TOLERANCE	ORIGINAL SCALE	DATE	

Third Angle Projection Symbol



The use of the third angle projection symbol informs the reader of the drawing that it has been carried out using this projection.

Glossary of Common Graphics Terms

This is a guide to **CAG** terms likely to be encountered in the course.

- CAD** Computer-aided drawing.
- DTP** Desk-top publishing.
- CAG** Computer Aided Graphics. A term used which encompasses CAD, DTP and modeling.
- 2D** Two-dimensional drawing in which an item is depicted as a flat object. Example: first and third angle orthographic drawings.
- 2½D** Two-and-a-half-dimensional drawing in which three surfaces of the drawn item can be viewed. For example, isometric, oblique.
- 3D** Three-dimensional drawing or model in which the complete object can be displayed, normally in colour, and manipulated to show views from any chosen direction.
- Alignment** positioning of text in a column or on a page. This can be in the form Left aligned, right, center or justified.
- Animation** "Bring to life". The manipulation of electronic images by means of a computer to create moving images, similar to creating a film, the computer is giving the illusion of moving parts.
- Auto Tracing** This where the application software automatically traces round the outline of an object.
- Automatic Dimensioning** Any system of generating dimension lines in specific locations.
- Acetate** A clear, cellulose sheet which can be used to overlay artwork on which other artwork or remarks can be placed.
- Airbrush** A device, which uses compressed air to propel ink or paint through a variable fine nozzle to create artwork.

Alignment	To arrange text and objects so that they line up with each other horizontally or vertically.
Ampersand	The symbol "&", which means "and".
Application	A word to describe a computer software package which performs a specific task.
Ascender	The part of a letterform which sits above the main body of the text, for example b, d, h, k, l.
Asymmetrical	Letters or objects set in no apparent order or pattern.
Banner	Main headline across the top of a page
Box	A rectangular box around text or a graphic
Baseline	The imaginary line that runs along the base of the body of letters in a line of text.
Bevel	The effect of sloping edges on a two-dimensional object to make it resemble a three-dimensional object.
Bezier (curve)	The mathematical method of drawing curves and for representing text used in computer drawing applications.
Binary	The basis on which computers work. Anything which is made up of two parts for example 1&0, On & Off.
Binding	The process of glueing and covering the pages of a document or book.
Bit Depth	Describes the amount of options (colours) assigned to each dot in a bitmap image.
Bitmap	Describes a computer image made up of screen dots (pixels).

- Bitmapped Font** A computer typeface made up of dots which show on the screen as jagged edges.
- Black Letter** Also known as *Gothic* or *Old English*, a style of handwriting made with broad-nibbed pens.
- Body (text)** The main text part of a document usually smaller than 14 Points in size.
- Boot Disk** A disk, which can be used to start up a computer
- Booting up** The process of starting a computer up.
- BPI (Bits Per Inch)**. The intensity of dots used on a computer to describe an image.
- Bromide** A photographic paper used to create high quality proofs.
- Buffer** An area in computer memory used to store specific information when required, commonly used for printing data.
- Bullet** An ornamental dot or other shape used to mark an item in a list or to add emphasis to a piece of text.
- Byte** A group of eight bits, which also represents one character on a computer.
- Back-up** A term used to describe the processes of making a second copy of drawing files, CAG programs, etc. in case the working copies are damaged.
- Calligraphy** The art of handwriting
- Colour gradient** One colour merging with a different colour
- Capitals** Often shortened to *Caps* and also known as *Uppercase*.
- Caps Lock** The button on a keyboard which allows every letter typed to appear as capitals.
- CD ROM** Abbreviation for *Compact Disk Read Only Memory*.

- Centre-Aligned** Text which is aligned around it's centre point.
- Chapter Head** The title heading that appears on every page of or opening page of a book.
- Character Count** The amount of letters, numbers, punctuation marks etc in a piece of text.
- Character Set** The complete collection of all possible characters for a font.
- Clip Art** Pictures which come with computer software
- Composition** To process of arranging elements such as text and graphics in the most suitable and economical way.
- Condensed Type** A narrower, more compact version of a typeface.
- Copy** The name given to the main text in a publication. Also the command for making a duplicate of selected text or objects.
- Copy fitting** The process of calculating the amount of space that text will take up in a publication and adjusting it to fit.
- Cursor** The pointer or other graphic symbol which shows the current position on the screen.
- Caption** The text which explains an image.
- CAE** Computer-aided engineering.
- Column Rules** vertical lines between columns
- Central Processing Unit (CPU)** At the heart of the computer, it controls all other units.
- Colour fill** Single colour within an enclosed area

- Centre spread** Two adjacent pages which can be found in the middle of a magazine.
- Column guides** non printable guides found in DTP software to allow planning of work
- Crop** to trim excess parts of a screen graphic.
- Colour Gradient** This where a colour starts off dark and and gradiates to a light colour OR gradiates from one colour to another; e.g. say blue to yellow.
- CGA Colour graphics adaptor.** A colour adaptor which provides low resolution up to four colours. (320 h x 200 v pixels at 4 colours)
- Desk-Top Publishing (DTP)** is the creation of a whole publication on computer, preparing it for printing without the normal processes of typing, typesetting, cutting & pasting and laying out. This book let is produced using DTP.
- DPI Dots per inch.** A measurement of resolution of output devices. The more dots per inch the greater the clarity of the graphic.
- Drop Capital** this is a large starting letter which si bigger than the rest of the text. It falls below the baseline.
- Default** The values that are set when no other option is given.
- Descender** Any part of a letterform which sits below the baseline.
- Digital Image** Any image that has been converted into bits for use on a computer.
- Dingbat** A font made up entirely of decorative symbols or images.
- Disk, diskette** A flat magnetised plate used for storing computer data.
- Disk Drive** A device used to spin a disk at high speed over a read / write head.

- Display type** The name given to text which is used for headlines or for catching attention.
- Download** Transferring information from one computer source to another.
- DPI** Dots Per Inch - the term used to describe the resolution of an image, sometimes used to refer to screen images too.
- Drum Plotter** A pen-type plotter in which the paper is rotated on a drum under the pen while the pen also moves across the drum.
- Dump** A colloquialism for transferring what is in the computer's memory to disc or printer or some other output device.
- DXF** Drawing Exchange Format. A system controlling the format of data interchanged between CAG systems. Drawing files held in DXF format will have the suffix DXF.
- EGA** Enhanced graphics adapter. A colour adaptor allowing a variety of high resolution modes (320 h x 200 v at 64 colours to 640 h x 350 v at 16 colours).
- Extrusion** A command whereby an existing 2D (x,y) shape is translated into a 3D shape by addition of the Z depth or length.
- Ellipsis** Three dots in a row used in punctuation to show the deliberate omission of further characters
- Extended type** A wider, expanded version of a typeface.
- Facing Pages** Pages which seem to be facing each other in a publication.
- File** A file is the collection of data of which a drawing is comprised and which has been given a name (filename) by which it can be recognised when stored on disc.
- Flush Left/Right** describes text, which is perfectly aligned on one side.

Folio	Page number
Font	Collective name for every letter, number, symbol, accent, ligature, fraction and punctuation mark for a typeface at a particular size.
Galley	A proof of text before it is arranged on a page.
GUI	Graphic User Interface. The visual way that the user works with a computer, such as Windows™
Gutter	The space between columns.
Flat-bed plotter	A flat table over which a pen moves in both the X and Y planes.
Footer	The space at the bottom of the page where the page number and any other text is placed
Frame	a box used to hold an imported graphic or text so as to allow movement around the page.
Frame grab	The screen image is captured and stored separately and may then be manipulated by software.
Graphics Processor	A special CPU that deals only with the handling of the graphics and screen display. called digitisers.
Grid	All CAG systems provide 'transparent' grids; patterns which appear on the screen as construction aids but do not form part of a drawing.
Handles	The small rectangles that surround a selected shape. Text blocks in DTP software commonly have four handles.
Graphics Tablet	A flat-bed input device with a grid of fine wire below the surface. A puck, stylus or light pen will chase the cursor around the screen as it moves over the surface. Useful for 'tracing over' existing drawings to convert them into computer-stored versions, and for making free-hand sketches dimensionally accurate. With overlaid menus they can be used to input symbols from icons. Graphic tables are also, and more frequently,

- Hairline** The thinnest possible line.
- Halftone** The result of converting a continuous tone image, for example, a photograph into a series of black dots which imitate the tones.
- Hanging Indent** Describes when the first line of a paragraph aligns to the margin, but the following lines are indented.
- Hanging Punctuation** When items such as inverted commas are allowed to be positioned into the margins in order to keep the body of text aligned with the margins.
- Hardcopy** A paper printout from the computer
- Hardware** The mechanical and physical components of a computer system.
- Headline** The title or main introductory text in a publication.
- Highlight in text** Method of making the text stand out, eg colour flash, underlining, bold, italic
- Highlight in I & P** Technique to show light reflection on edges and surfaces and curves
- Hyphenation** The process of allowing a word which will not fit fully on a line to be split with a hyphen. In Desktop Publishing hyphenation can easily be controlled.
- Hard Copy** Simply means any copy of drawings produced as a plot, printout, or photograph, for example.
- Hardware** The physical parts of the computer. Example: the case, disc drives, motherboard, floppy discs, etc.

Header Space The space at the top of the page where the number and any other text is placed

Hidden-line removal A CAD command that removes background lines from 3D wire-frame images. Wire-frame perspective views show every line used to assemble a model. To be able to display and plot views as seen in real life means editing out all the lines and planes which would be concealed by other lines and planes. This is known as hidden-line removal and poses massive calculation problems for the computer.

Housekeeping Embraces all the routines which, although essential to smooth running, do not assist problem solving.

Icon A graphical screen image used to represent a file, programme or folder on a computer screen.

Image Compression The process of reducing a file's storage size without necessarily decreasing its quality.

Imagesetter A machine which produces high quality text and images on paper or film for commercial printing.

Indent Where one or several lines of text are positioned a specific distance from the margins or main text.

Initialising The process of preparing a disk for use on a computer. Also known as formatting.

Import To bring in a copy of a text file or graphics, for example from an external application to the page layout application.

Input A term used to describe information that is being sent to the computer.

Inkjet Printer Computer printer (usually colour), which works by firing tiny dots of charged ink at the paper.

Input device Any piece of hardware used to transfer data to a computer such as a mouse, keyboard or scanner.

- Interface** The way that a computer communicates with a user or other device.
- Italics** Slanted text which resembles handwriting. Often used for emphasis.
- Joystick** An input device which normally moves in two axes. The output from the joystick can be used to control the screen cursor movement.
- Kerning** The removal of excess space between letters to improve the visual impact of text. For example, in the large type used for headlines.
- Landscape** Description of the shape of a document page that is wider than it is high. (See Portrait.)
- Justified Text** Text which has word spacing added so that it aligns to both edges of columns or margins.
- Kerning** The process of adjusting the space between letters. Especially important in headlines.
- Kerning Pairs** Specific pairs of letters which, because of their shape, require to have spacing between them adjusted e.g. Po, Pi, Pe, Ko, Te. between lines of text
- Landscape** Page orientation with the long edge at the bottom.
- Leading** The addition of space between lines of text, so called, because in traditional typesetting, lead was used as a spacer.
- Ligature** Where two or more characters are joined as one.
- Line art** Art work which is made up entirely of black.
- Lowercase** The small letters of the alphabet.

- Laser Printer** A non-contact printing device predominantly used in DTP. Laser printers use a laser beam focused on an electrically charged drum which forces the ink to follow the light pattern and form the characters. It is a fast method of printing which also provides very clear images.
- Layers** CAG software allows drawings to be built up as a series of layers, each layer dedicated to one aspect of the drawing, e.g. construction lines, text, dimensions, hatching, or electrical layout. Layers can be switched in and out and act like clear film overlays which are always in perfect alignment with each other.
- Light pen** A light sensitive device which can be used as an input device. The light pen is used by pointing it at a raster-type display. Not commonly used in desk-top CAG applications.
- Margin** The unprinted space on the sides, top and bottom of a document.
- Mb (Megabyte)** One million bytes, or 1,000 kilobytes.
- Menu** On-screen display of options.
- Modem** (Modulator / Demodulator). A device which connects data into signals, which can be sent along a phone line and back again.
- Monospaced Font** A font in which all of the characters take up the same width.
- Mouse** A device for recording and plotting the movement of the cursor on a computer monitor as well as for undertaking on-screen commands.
- Make-up** An assembly of all the elements of a document. DTP allows this to be done accurately and creatively and makes it easy to modify.

Maths Co-processor Known also as a maths chip, it processes numbers very rapidly using floating-point notation, 100 or more times faster than a standard CPU.

Modeling/Model A CAG model is more than just a three-dimensional screen representation of an object: it is something which the computer can recognise as having three-dimensional 'shape' and which it can interrogate as such. Any screen display or plot is restricted to two-dimensional limitations, however, the shape exists in computer memory as if it were a solid model.

Montage A collection of separate graphics which when combined make up a new picture

Mouse A mobile hand-held interaction device for controlling the cursor position.

Orphan A line of text that begins a paragraph but has been left at the bottom of the previous column or page. To be avoided in page layout.

Optical Scanning A process in which documents are scanned and the incident light from their contents generates signals which are received by the scanning device and transmitted to the computer.

Oblique Text which is slanted, but not italic.

OCR (Optical Character Recognition) The ability to scan pages of text and digitally re-create them as editable text.

Pen plotter A drawing device that uses a pen. Any plotter using detachable pens is a pen plotter. There are two main types, flat-bed and drum.

Peripherals External equipment that can be added or connected to the computer. Examples: printers, graphics tablet.

Pixel Picture element. Video and screen displays are made up of tiny dots called pixels. These dots are arranged in a grid and can be set to give typical grid densities of 320 h x 200 v, 640 h x 200 v and 640 h x 400 v dots per grid.

Portrait Description of the shape of a document page which is higher than it is wide. (See Landscape.)

Proof A test print of a document used for checking for mistakes prior to printing react to a persons input. i.e. A flight simulator, or a games consol.

Paragraph Rules Lines used to separate paragraphs of text.

Paste-up The act of placing text, graphic and picture items on a page.

Pixel (Picture Element) The smallest dot element on a computer screen.

Point The traditional unit of type measurement equal to $\frac{1}{72}$ inch or 12 Picas.

Portrait Page orientation where short sizes are at the bottom.

RAM Random Access Memory. Memory chips which are used temporarily when the computer is running. The more RAM available, the more programmes can be running at the same time.

Registration The correct alignment of one image on top of another in printing.

Reverse Used to describe placing white text on a black or dark background.

ROM Read-Only Memory. Its contents are fixed during manufacture and cannot be changed. It is used to store the permanent programs which form the basic intelligence of the computer.

- Runaround** Technique of setting text to follow the contour of an image or object.
- Rough** Manually produced design layout sketch
- Real time** The term used to describe an event that is executed immediately, rather than an event that will be carried out after a time delay.
- Register Mark** Printers cross-hairs (thin lines) placed outside the page area in order to check that the printed colours are accurate
- Resolution** The sharpness of definition of a digitised image depending on the number of pixels displayed on screen. Normally defined by the number of pixels shown on screen horizontally and vertically, e.g. 320 h x 200 v.
- Rubber Banding** CAG systems provide for a visible flexible connection between the screen cursor and the position from which it last moved. As the cursor moves away from it, the connecting line seems to stretch.
- Screen Dump** When a screen image is sent to a printer to obtain a hard copy, the resulting copy is a screen dump.
- Simulation** This is very similar to animation but with simulation the graphics can be interacted by the user.
- Spine** Bound edge of a publication
- Sans Serif** Meaning "without serifs". Any typeface which does not have bars across the ends of letter strokes.
- Scalable Typeface** Typeface which will enlarge to any size without loss of quality.
- Scroll Bar** The bar at the edge of a window by which the contents can be moved up or down, right or left.

- Serif** Any typeface which has bars crossing the ends of strokes such as this one.
- Small caps** Capitals which match the x-height of a typeface.
- Spread** Two facing pages.
- Snap** A CAG command that locks or 'Snaps' the cursor to the nearest 'snapable' point. This might be points on a screen-displayed grid, or any point naturally arising as a 'lockable' point (a line-end or vertex). Such 'lockable' points can often be forced into a drawing by special commands. The 'snap' facility is a powerful tool for precision work.
- Software** The programs which the computer executes. In addition all data files can be classed as software.
- Solid modeling** The creation of a three-dimensional image on screen, thereafter capable of manipulation to show other views and .
- Surface Modeling** A three-dimensional model in which the surface is defined by connecting elements.
- Tab** A keyboard character which causes the cursor to jump to the next point on a page, or to a specific point on a page set by the user.
- Template** A dummy publication that acts as a model, providing the structure and general layout for another similar publication.
- Tonal scale** A colour gradually becoming lighter or darker
- Tracking** The average amount of space between characters in a word.
- True Type** A font format, which generates a font at any size and at high quality depending on the printer.
- Uppercase** The capital letters of a typeface.
- Utilities** Software programmes for undertaking jobs such as file

- Vector Graphic** A graphic produced using a drawing programme in which the image is described using points, lines and curves. Vectors are generally able to be scaled without apparent loss of quality.
- Thumb Nails** Design sketches of page layouts
- Type Sizes** The standard 'point' system used to describe type sizes is based on 72 points to an inch. (12 points is, therefore, 1/6" high.)
- VDU** Visual Display Unit: an alternative way of describing the monitor. **VGA** Video graphics array (adaptor). A colour adaptor allowing high resolution and a range of colours. (320 h x 200 v at 256 colours to 640 h x 480 V at 16 colours.)
- Widow** One or two words at the end of a paragraph that spill onto the top of the next column or page. To be avoided.
- White Space** Empty spaces on a page, graphic designers use this in publications to create balance on a layout as well as resting the readers eye.
- Window** A window is a rectangular box that can be used to define a space around an object or set of lines. At its simplest, a window can be a frame drawn around a selected area of the screen, to isolate the area within the 'window'.
- Wire-frame model** A three-dimensional image made up as a series of connected lines between all edges and line end-points.
- Weight** Describes the thickness of the strokes of a typeface.
- White Space** The blank areas on a page which are not occupied by text, illustrations or colours.
- Widow** A word or line belonging to a preceding paragraph, which is added to a new page or column.
- Window** The graphic device on screen which organises and allows access to files, folders and applications.
- WYSIWYG** "What You See Is What You Get". The ability of computer monitors to simulate exactly the result of using software on screen.

DTP Terms

Lines

Lines can be long or short, straight or curved. Lines can be horizontal, vertical, or diagonal. They create patterns. Lines can be solid, dashed, thick, thin, or of variable width.

Sometimes a designer uses a line alone to divide or unite elements on a page. Lines can denote direction of movement (as in diagonal lines and arrows) or provide an anchor to hold elements on a page (such as lines at the top, bottom, or sides of a page).

You can use lines in conjunction with other elements. One well-known example, the AT&T logo, is a pattern of thick and thin lines arranged in a circular shape. Go through your own magazines with an eye on lines. I want you to find as many different examples of lines of all kinds used in these pieces. Are the lines used prominently? Are they part of a logo or used in other ways to divide the page or add decoration?

Shapes

Circle, square, and triangle are the three basic shapes. Perhaps the most familiar shape to desktop publishing is the square (and rectangle). Paper is rectangular. Most text blocks are square or rectangular. While you may encounter printed projects cut into other shapes, most circles, triangles, and freeform shapes in desktop published materials are found on the page within the graphics or in the way the elements are placed on the page.

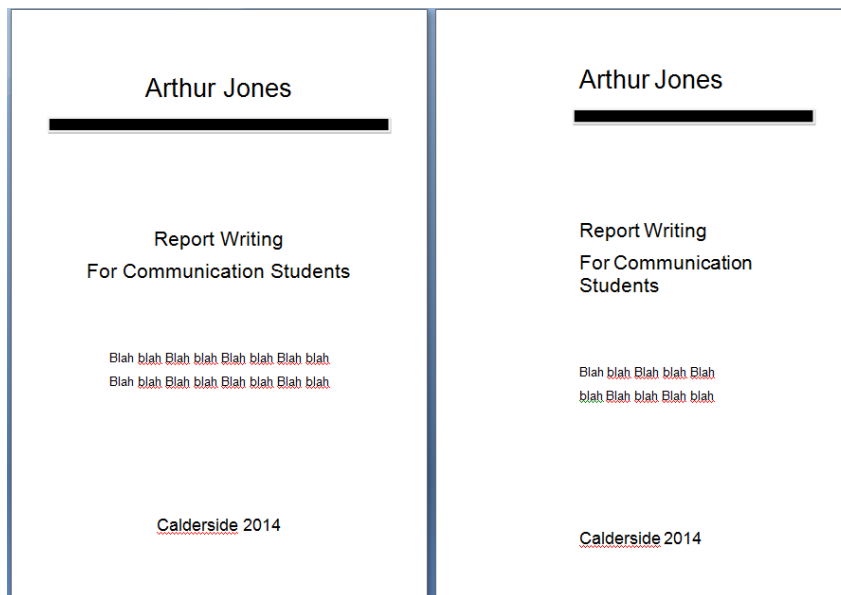
Go through your own magazines looking for a variety of shapes. No doubt you can find many examples of squares and rectangles but keep an eye out for other shapes. Are the examples you find actual graphic elements or can you find examples of lines or text arranged in geometric shapes?

Mass

Mass is size. There is physical size and visual size. Size can be relative. A physically small brochure can have a great deal of mass through the use of heavy text and graphic elements. A physically large brochure can appear smaller, lighter by using text and graphics sparingly.

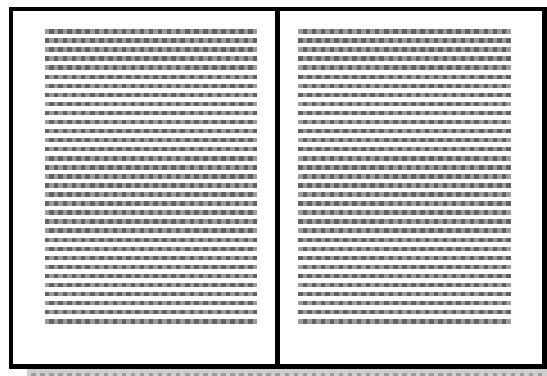
While the paper projects you create have a certain size because of the size and weight of the paper, visual mass -- how light or heavy it appears -- is also an element of the design.

The CUTYOS standard layouts work well and are especially suitable for posters, but sticking rigidly to symmetry can produce rather characterless layout. Of the two report covers below, it seems to me that the asymmetrical layout of the report on the right has a lot more going for it:



So it's always worth experimenting with a less obvious design. Also, be wary of the automatic functions offered by word-processors and DTP software, they certainly have their uses, but they can end up leading you into rather unexciting designs.

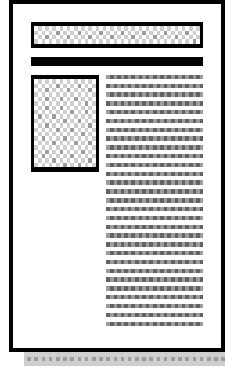
Single column



The big advantage of a single column is, of course, that it's easy to use - so easy in fact that you might as well just use a word-processor rather than a DTP system. It's also fine for large amounts of unbroken text and is therefore very economical.

Problems are that it's easy to end up with lines that are too long to be read comfortably (always avoid lines longer than 2.5 alphabets) and it's not easy to split this up comfortably with heads, subheads and illustrations.

Generally, it works best at, say, A5 size (148 x 210 mm) rather than A4 (210 x 297mm).



While still keeping the economy and ease of development of a single column layout, you can make things livelier and more interesting by going for a single column which is a good deal narrower than the page.

You can use the very wide margin for heads and subheads, small illustrations, panels containing explanations or examples etc. and, with a little bit of imagination you can get something a bit more lively - the bottom example above, for example, is one of the standard templates that comes with the dtp software *Corel Ventura*.

Two columns

A two-column layout is often just as efficient as a single column layout. If you use just one column on a page, then its width is limited by the maximum length of a line to 2.5 alphabets. By using two, narrower, columns you can put more text on a page.

Like a single column, though, it can be limiting and doesn't normally allow much scope for developing a lively design, though grids like this will help:

Go through your own magazines and look at each piece and analyze mass in terms of physical size of the piece and the visual mass. Does it have a heavy, imposing look due to the size or weight of the paper or the density of text and graphics? Is it small and compact or light and airy? Hold the items in your hand to see if they feel light or heavy. Compare the physical size to the visual mass of each piece.

Texture

For desktop publishing, actual texture is the feel of the paper. Is it smooth to the touch or rough? Textures can also be visual. On the Web, especially, backgrounds that simulate familiar fabrics, stone, and other textures are common.

Certain printing and finishing techniques such as thermography and embossing can add both actual and visual textures to a printed piece.

Go through your own magazines looking for as many different types of actual and visual textures as you can find. Can you tell by looking whether a paper will be soft and smooth or rougher? Are the visual textures used in place of actual papers of that texture or do they relate in some way to the purpose of the printed piece (such as a stone texture for a tile company)? See and feel the difference in textures on embossed pieces or other types of raised printing.

Colour

Colour is everywhere. Every single piece in your Class Samples, even if it is black and white, exhibits the element of colour. Colour is used to attract attention. It can be subtle or bold.

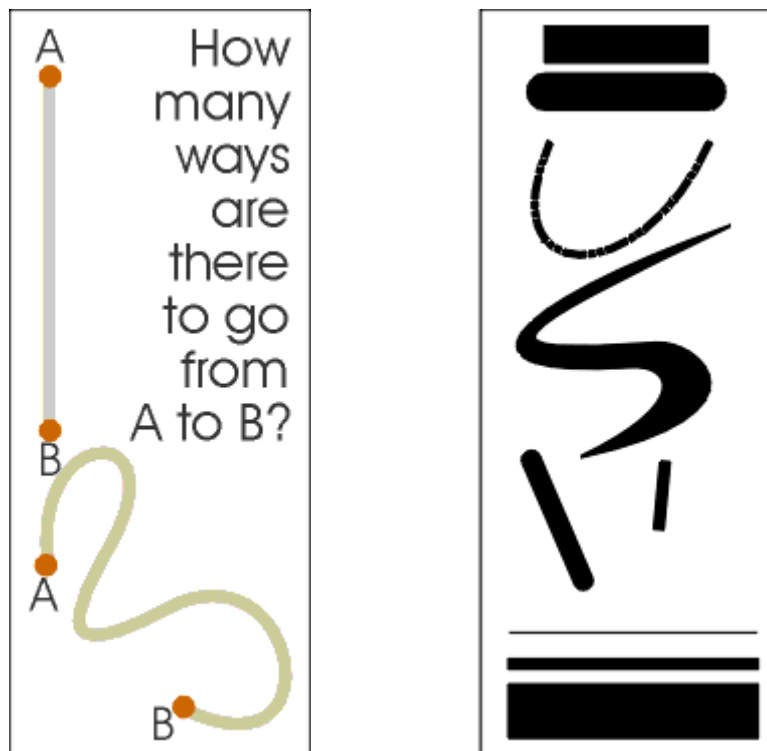
Colour can be found in the paper, the text, or the graphic elements and photos. A monochromatic colour scheme uses a single colour, perhaps in various tints, while other layouts utilize combinations of two, three, or more colours.

1. Colour can be used to elicit specific emotions and reactions. Red is typically thought of as an attention-grabbing, hot colour. Blues are more calming or convey stability. Some colour combinations are used to create a specific identity (corporate colours, school colours) or may be used in conjunction with texture to simulate the look of other objects (the look of plain paper wrapping or neon lights, for example).

Lines

Appearance

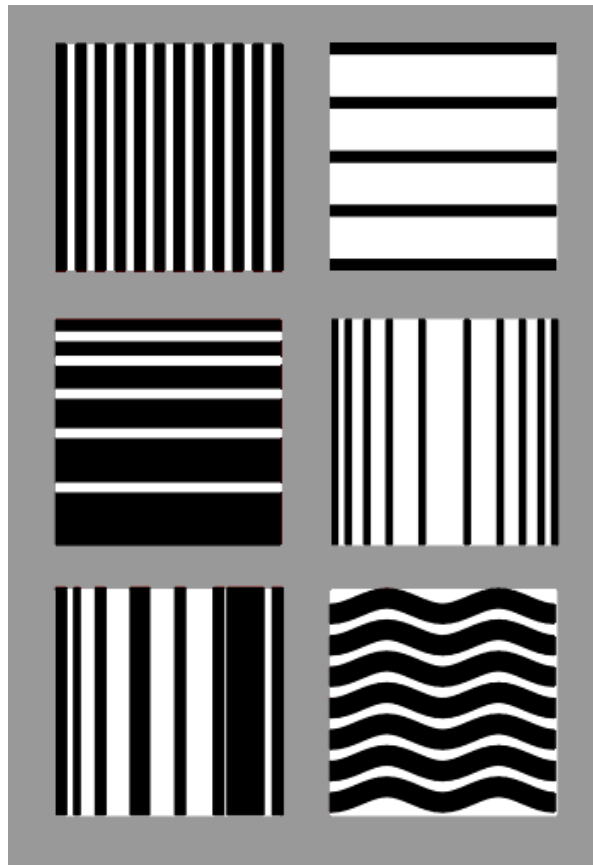
A line is a mark connecting two points. How we get from point A to point B gives the line its distinctive character and appearance. Lines can be long or short, straight or curved. Lines can be horizontal, vertical, or diagonal. Lines can be solid, dashed, thick, thin, or of variable width. The endings of lines can be ragged, blunt, or curved.



Patterns

Lines are often found in pairs or groups. Lines of the same general appearance or lines that are quite different can form a variety of patterns that create textures, suggest movement, or lead the eye — the same as single lines.

If you aren't creating original illustrations or doing logo design, your main concern with this part of the study of lines is being able to recognize these patterns in the illustrations you may select for your work and understand how these patterns may or may not project the image you want for your project. These bits of line patterns illustrate static, dynamic, and random use of lines.



Upper Left: Uniform vertical black and white lines alternate at even intervals. Static. Orderly. Conservative.

Upper Right: Uniform horizontal black lines are widely, but evenly spaced. Static. Stable. Orderly.

Middle Left: Uneven spacing of otherwise uniform lines creates the impression of movement. Dynamic. Orderly progression.

Middle Right: In this example the progression moves in from either side giving the illusion of roundness. Dynamic. Orderly progression. Dimension.

Lower Left: Varying line widths and distances create a random pattern. Dynamic. Chaotic. Disorderly.

Lower Right: While the uniform size and spacing of the lines in the upper examples are static, make the lines into curves and you get movement although it is a controlled movement. Dynamic. Orderly flow.

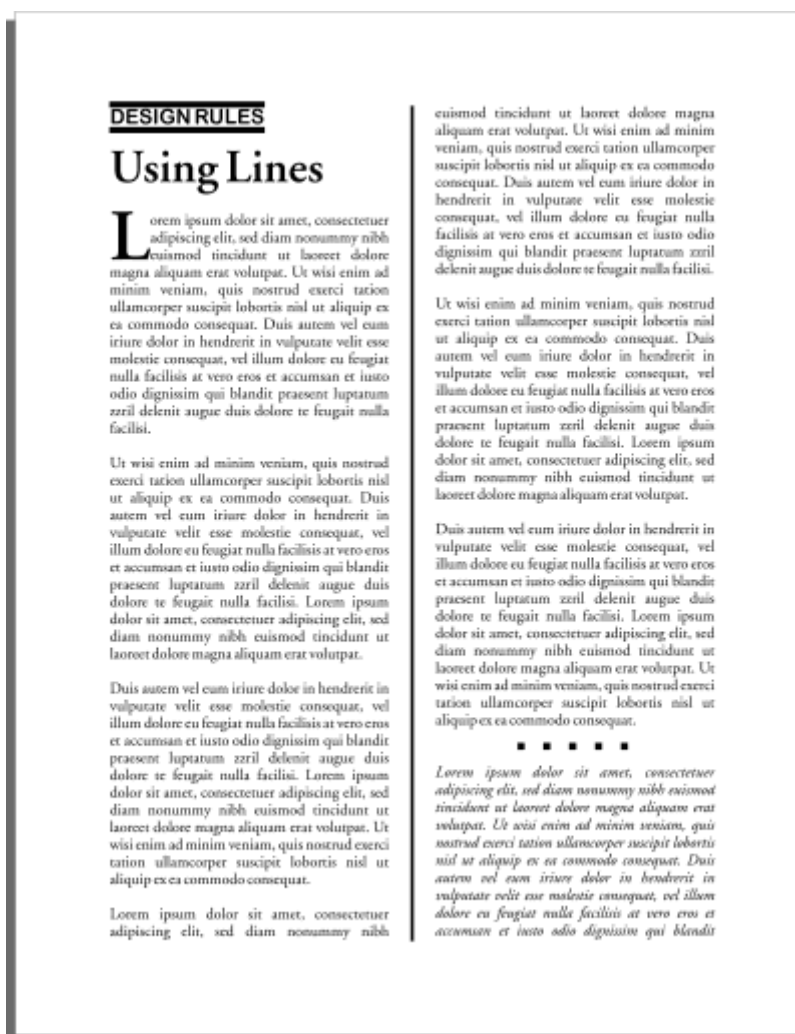
patterns using only black or white lines that illustrate static, dynamic, or random line patterns.

Using Lines

Some ways that you might use lines in your design are to:

- Organize, connect, separate
- Create movement
- Provide texture
- Convey a mood or emotion
- Define shapes
- Provide emphasis
- Provide a framework
-

The examples below demonstrate a few of the ways lines might be used in page layout or illustration. You can probably find examples all around you as well.



In the example on the opposite page, a solid line separates columns of text, a

pair of lines set apart a phrase, and a short dotted line separates a section of text from other parts of the page.

A few simple lines added to a piece of clip art gives a sense of movement to the airplane. Short, choppy, vertical lines create a grooved texture along the edge of the timepiece sketch.



Dashed lines suggest a coupon, whether there is one or not. It causes many of us to take a second look at this ad because the familiar dashed line makes us think "I can save money!"

50% OFF

**All Christmas
Decorations**

**Baileys Big After
Holidays
Blow-out all
merchandise
reduced
20-50%**

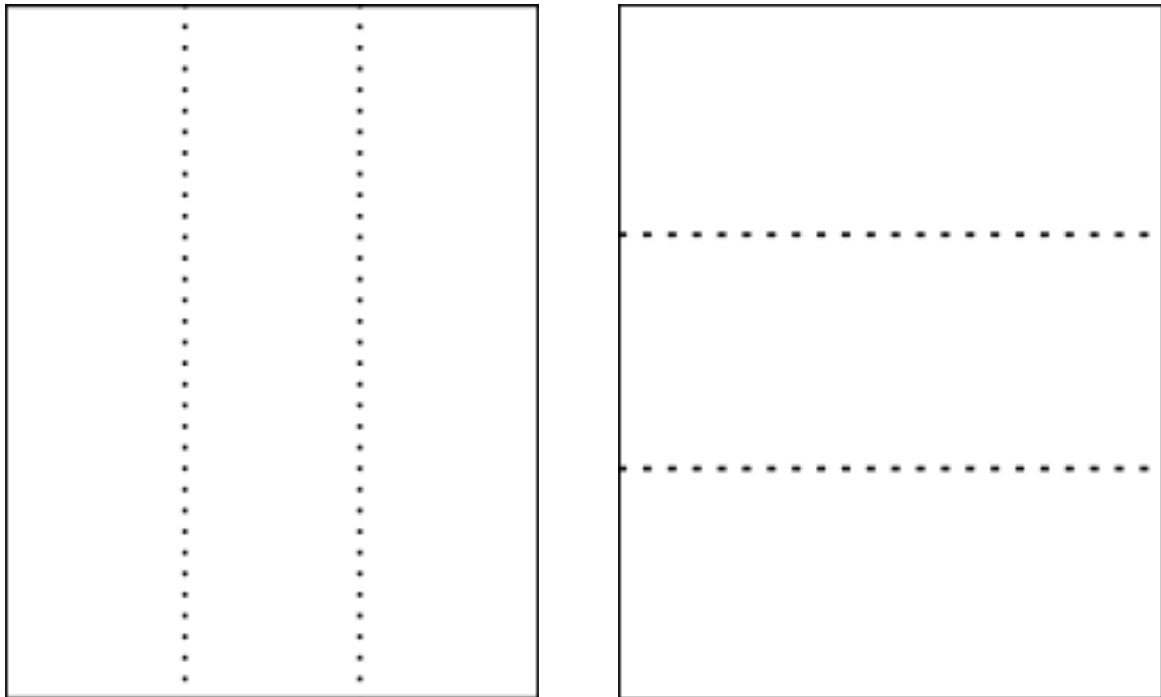
Balance

Rule of Thirds, Visual Centre, Grids

Underlying most of the layouts on the previous pages are three related aspects of page layout.

Thirds

The rule of thirds says that most designs can be made more interesting by visually dividing the page into thirds vertically or horizontally and placing our most important elements within those thirds.



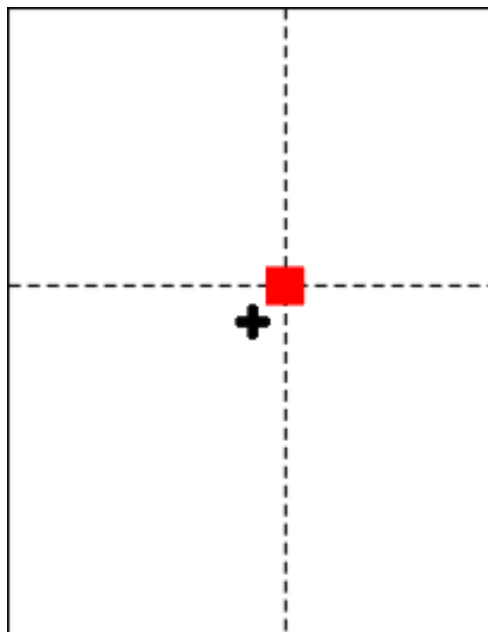
Look at these previous balance examples and see how the rule of thirds is utilized. On the following page the first example a vertically symmetrical layout the headline appears in the upper third of the page, the logo in the middle third, and the supporting descriptive text in the lower third.

Even in this example below the unbalanced asymmetrical design uses the rule of thirds with most of the 'action' in the upper 2/3rd of the layout.



Visual Centre

Placing important elements or the focal point of the design within the visual centre of a piece is another design trick. The visual centre is slightly to the right of and above the actual centre of a page.



See how the focal or centre point of each of these designs actually falls in the visual centre of the page.

Below: It's easy to see the actual centre, it's where the four box corners meet. But the focus is on the earth.

In the example of the calendar below, the months emanate from the year located front and (visual) centre.

Grids

Roughly dividing a page into thirds or finding the visual centre are relatively easy and you don't usually have to be exact to achieve your goals. However, constructing the underlying structure of a piece is a bit more complicated — but essential for most designs. Most balanced designs (and even unbalanced ones) rely on a grid. This invisible structure (visible while working in your page layout program) helps ensure that you place all the elements in the right location to achieve balance as well as to help with continuity and consistency of design.

Grids can be simple or complex depending on the needs of the design and the designer.

Sometimes the use of a grid is obvious.

The example shown below is an asymmetrically balanced design which uses a simple three column grid to ensure that each text column is the same width

and that it is balanced by the nearly empty column on the left. The grid also dictates the margins and ensures that the page number and header appear in the same place on each page.

Below: A 5x5 grid keeps this design in line. The grid is obvious along the bottom (each square equals one grid square in this layout) but it is invisibly keeping all those random letters in order in the middle.

Shapes

Squares

The square denotes honesty and stability. Squares are familiar, trusted shapes. Because the vast majority of the text we read is set in squares and rectangles, it has become familiar, safe, and comfortable.

Squares and rectangles are probably the most common geometric shapes we encounter. A few books, especially those for kids, may be cut in irregular shapes but adult (i.e. 'serious') correspondence comes in squares -- both the physical shape of the books, magazines, newspapers, and the rectangular columns of set text.

Some designers might equate square with boring. It's true that other, unexpected shapes, can grab attention better than the simple square but don't forget the importance of comfort and familiarity. Imagine how difficult it becomes to file everyday correspondence if letterhead came in a variety of triangles or freeform shapes. Try reading an entire book with all the text set in circles. Squares and rectangles definitely have a place in design.

Some ways you can use squares and rectangles:

- To symbolize honesty, stability, equality, comfort, or familiarity. It could also symbolize rigidity or uniformity.
- Related to the first bullet item, use repeating squares to suggest familiar themes (checkerboard pattern to represent a game board, the chequered flag at the end of a race, a tablecloth).
- To highlight, organize, or set apart information using a solid or outlined box.
- Use a square unexpectedly. Set a block of text in a solid or outlined but tiled box — with or without also tilting the text.

Circles

Circles suggest infinity. They are also protective (think of protective encircling arms). They can also denote free movement such as a rolling ball or a more controlled movement such as a spinning globe. The sense of movement is often enhanced through shading or the use of lines.

Outside of logo designs, circles are less common elements of design which

makes them good for grabbing attention, providing emphasis, and breaking up familiar rectangular blocks of text. You could set text in circles or simply use a circle as the background for more traditional blocks of text.

Some ways you can use circles:

- To symbolize infinity and protectiveness. Circles could also suggest something well-rounded or complete. Similar to protectiveness, circles could also imply security.
- Related to the first bullet item, use circles to suggest familiar themes (bullet holes, a stack of cannonballs, a bunch of grapes -- or just about any round fruit or vegetable, a target, the earth).
- To highlight, organize, or set apart information using a solid or outlined circle. Try a freeform circle that looks like it was drawn with a marker or pen to highlight important text.
- Replace the letter O or other 'round' letters in text with a circular shape that suggests that letter. Try an orange in the word Orange or a basketball, baseball, or soccer ball to replace an O or other letter in the nameplate of a sports newsletter.

Triangles

Triangles suggest action. They are dynamic. Triangles may convey either conflict or strength. Triangles can direct movement (up, down, left, right — depending on which way they 'point') but rather than moving themselves, they point the way for the reader.

Triangles are suggestive of many different shapes and ideas. They can represent a religious Trinity, a pyramid, a flag or pennant, an arrow, a beacon.

Some ways you can use triangles:

- To symbolize action or conflict. In a logo, a triangle might be better suited to a growing, dynamic high tech company than the more stable, familiar square, for example.
- Related to the first bullet item, use triangles to suggest familiar themes (flag, pyramid, arrow or pointer). A single or a series of triangles can point the eye to important information or act as an arrow to get readers to turn the page.

- To highlight, organize, or set apart information using a solid or outlined triangle. Use a triangle to suggest progression. Place it behind a 'Top 10' list or the steps to accomplish a specific task.
- Replace the letter A or V in text with a triangular shape that suggests that letter. Try a wedge of pie for the letter A in the phrase Amy's Desserts.

Mass and Size

Defining Mass

As stated in the introduction, mass equals size. Each piece you create has a physical mass. The physical mass or size is the actual dimensions of the piece — height, width, thickness/weight (of paper), and depth (3D objects).

Additionally, each element within the design (graphics, photos, lines, text blocks) have their own mass relative to the whole piece. For example, a photo that is physically 3 inches by 5 inches can appear smaller or larger depending on the physical size of the paper it is printed on and the size and proximity (closeness) of other items on the page.

Some ways to use mass within your designs:

- **to accommodate information, content** Example: To present all the desired or needed information comfortably a designer may create a bi-fold rather than the usual single business card.
- **to accommodate normal size restraints or expectations** Example: The postal service has limitations on the height and width of different types of envelopes. If a designer ignores those requirements it could incur additional mailing costs for the client.
- **to convey a mood or provide emphasis** Example: A place that is physically large (such as an amusement park) or a business that offers a huge assortment of products may use brochures or other marketing pieces that are larger (physical dimensions) or heavier (weight) than normal to carry out the 'bigger' or 'more' theme.
- **to create contrast** Example: A designer might design a full-page magazine ad using a single small image in the middle of the page with lots of white space. The contrast between the size of the page and the size of the

content (image) draws attention to the image and can create a specific mood (depending on other elements) such as conservative, elegant, lonely, or open.

Measuring the Size of Your Design

What is large? What is small? In graphic design and desktop publishing there are many ways to specify size. This part of the class on mass focuses on the mechanics of size and common measurement systems used in desktop publishing..

What you learn here is critical to DTP.

To keep from getting lost, bookmark this page now. You can come back to this page if you get 'lost' in the many pages and supplemental materials covering size and measurements.

Auxiliary Materials: **Size Matters**

This multiple page complex covers the following topics:

Type Sizes

Using Picas in Page Layout,

Paper Sizes ,

Image Sizes

Conversion Tools.

In addition to the main coverage of each topic you'll find that many pages have a *Glossary* section with related terms, or *How-to* pages related to that topic. These pages are not included in the 'page count' for those topics but are important supplemental information. Review them.

It will take several days or even longer to absorb all this information.

Texture

Paper Textures & Finishes

Paper is often something we take for granted. It's just 'there.' Sometimes we have no choice about the type of paper on which our designs are printed. Normally we can't dictate the paper used for ads in newspapers or magazines. Even when we do have a choice, we're limited by budget, printing requirements, or other factors. However, paper can be an important textural element in our desktop published documents.

Some papers just 'feel' better than others. Grab up some paper from around you. Get a newspaper, a magazine, some paper from your printer, and a few different samples from your Class Samples. Close your eyes and touch the different surfaces. Can you identify the general type of paper (newsprint, etc.) simply by touch? Probably so. But also consider how they feel to your touch — smooth, rough, slightly patterned, fuzzy, bumpy, slick, shiny, dull, warm or cold. Familiarize yourself with some of the various surfaces and finishes used in paper. Some may be familiar to you already. Others will be new.

- Antique Finish
- Cast-Coated Paper
- Cockle Finish
- Dull Finish
- Eggshell Finish
- English Finish
- Felt Finish
- Glazed Finish
- Granite Finish
- Laid Finish
- Linen Finish
- Machine Finish
- Machine Glazed
- Matte Finish
- Mottled Finish
- Natural Finish
- Onionskin Paper
- Parchment Paper

Design Concept & Texture

Varying paper surfaces can dramatically or subtly alter the mood you want your designs to convey. An exercise from *Using Design Basics To Get Creative Results* by Bryan L. Peterson uses the example of a piece of jewellery placed against two totally different surfaces — a shiny tile of black Formica vs. a piece of cement.

Translate this same concept to paper and imagine a photograph of a well-preserved vintage automobile printed on extremely smooth, glossy paper or printed on a rough, peppy surface. Neither one is necessarily better or worse. It depends on the mood you want to convey. Increased contrast between the image (and its visual texture) and the actual surface of the paper can create interest in your design.

When selecting paper, choose a texture that is related to the concept of your design and doesn't overwhelm or get in the way of the message. While you can make a bold statement with texture, sometimes a subtle texture that stays 'in the background' is most appropriate. Make sure that your texture works with your choice of type and images so that text does not become unreadable or images unrecognizable.

It may be necessary to use a bolder typeface if your paper is rough or strongly patterned.

Here is an example of paper texture from an assignment.

Unexpected contrast: In a brochure promoting a computer-related service: "The grey colour also evokes a high-tech, sterile mood, although I might expect a glossier surface to go along with that, rather than the sensual feel of the textured stock." — Student ID S011203

My comments: "...the softer texture may indeed have been meant to soften and humanize the high-tech image."

Visual Textures

Everything around us has a texture. Sometimes we can simulate those textures with paper, but more often the textures we create in our designs are visual rather than tactile. However, those visual textures can be just as provocative or full of meaning as actual textures we can touch.

It's extremely easy to find or create visual textures for your designs. There are four basic ways to incorporate visual texture.

Objects within a photograph



Textures: fairly smooth surface of the chalk; rough surface of the cement

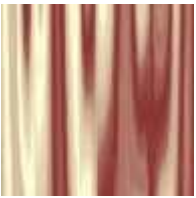


Textures: smooth glass bottles; fabric of the potholders



Textures: worn wooden mallet; grass

Images created with photo-editing software. These textures may mimic actual textures or be imagined textures



Texture: mimics drapes or folds in a satiny fabric



Texture: simulates a rough, rocky surface



Texture: random soft circles create an imaginary texture

Digitized images of actual textures (from scans, digital photos)



Texture: a straw mat



Texture: piece of door mat made from old tires



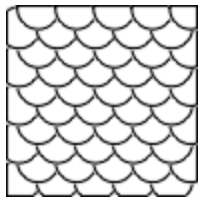
Texture: tree bark

Symbolic textures created with lines or shapes

These patterns suggest various textures and are similar to the use of symbols or icons to represent ideas or objects.



Texture: wavy lines could symbolize water, waves, rolling terrain



Texture: overlapping circles give the look of fish scales



Texture: a grid of lines could simulate plaid or linen fabrics, wire mesh, or other textures

You can enhance or alter the appearance of visual textures depending on the actual texture of the paper used. Keep this interaction in mind when using texture. While you can easily simulate a rough texture on smooth paper, using a 'slick' visual texture on some rough papers changes the visual appearance.

As with paper textures, choose textures that relate to the concept of the piece and are appropriate to the design. Just as some paper textures can interfere with the readability of text, so can visual textures used as backgrounds.

Use caution when placing text over heavy or busy visual textures. Go through your Class Samples with an eye on visual texture.

Colour

Value

Value is present in all design. It is the lightness or darkness of an object, regardless of colour. Value is relative to the background colour and other items on the page.

Use value to:

- **Increase/Decrease Contrast**

The greater the difference in value between an object and its background, the greater the contrast



Choose the value that creates the amount of contrast and effect that you want for your design. In the above examples, the lighter value recedes into the light background. The design with the greatest contrast makes the darker object more dominant.

- **Create Movement**

Objects of the same value create a static design with all objects equal in visual importance. Introducing varying values gives the page a more dynamic appearance and creates a 'pecking order' among the objects. Some stand out while others recede.



Mix elements of different values to add visual movement to your design or to create a hierarchy of importance.

- **Lead the Eye**

By creating a pattern of dark to light values, even when the objects are equal in shape and size, it leads the eye in the direction of dark to light.



In the above example, the first set of all dark lines are static. The middle example leads the eye in a downward direction (dark to light).

Reversing the values of the lines leads the eye upward.

Use colour to change the effect of value:

Colour has the power to override the effects of value. In a high contrast black & white design, introducing a single, small bit of colour will change the focus and balance of the design.



The eye is drawn to that spot of colour even if other elements are designed to draw the eye in some other direction or the objects are otherwise equal.

That's the power of colour.

Layout : grids and columns

Grids

Most designers will set up a page grid before they start whacking elements down on a page. Of course, if you're using a computer, it's quite easy to stick stuff on a page and move it around in a fairly random fashion until you've got something you like the look of. Generally speaking, though, that approach is likely to result in some pretty awful pages and, over a lengthy document, may well result in a total hotchpotch which simply confuses the reader.

To determine the grid appropriate for your design is no easy business, but it's worth investing some time in it. Here are a few pointers you might find useful:

- **Number of lines per page** - it's normally helpful if the number of lines you can fit on each page in your chosen font is divisible by the number of grid sections you intend to have. It's well worth devoting some time to flowing some text ('printer's Latin' for example) on to a page and getting a printout in various column widths and different font sizes (if you're working in a college, it's worth asking whether they already have something of that sort). You can easily be surprised - for example:

-

This is 12pt face.

As you can easily see by comparing it with the text alongside both 10pt and 12pt have their baseline on a 12pt body.

This is 12pt face.

As you can easily see by comparing it with the text alongside both 10pt and 12pt have their baseline on a 12pt body.

- You can use the same exercise to work out how many words in a given font can be fitted into a column centimetre of a given column width.
- **Complexity of content** - if your content is to include relatively little art-work, few panels containing comments, quotations and so on, then you may not need a grid at all. If it is to be fairly complex, then it's a good idea to have a number of panels in your grid, even if your basic page is to be a single column of text.

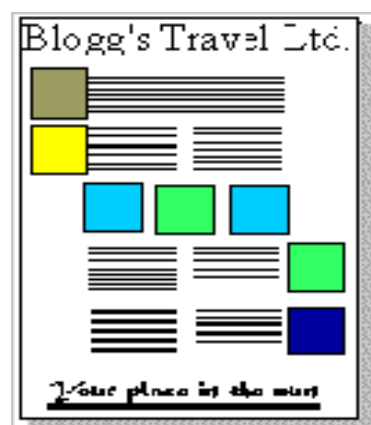
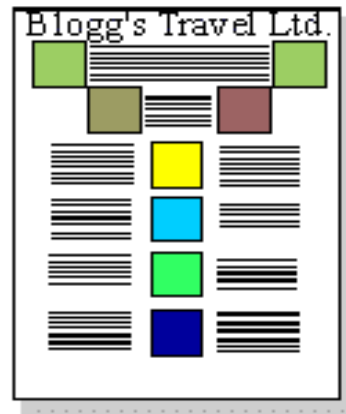
- **Margins** - a function of how much you need to fit on to each page, which of course will vary from one production to another, but the following general rules are often followed:
- **Foredge** (also known as outside margin): should be an average of head (top margin) and foot (bottom margin)
- **Foot** (also known as bottom margin): should always be bigger than the head (top margin), probably at least 50% bigger (this is due to the so-called optical centre - due to an optical illusion, we tend to see the centre of a page as being slightly higher than the actual centre. Thus, if elements are situated exactly equally on either side of the optical centre, we tend to see them as too low down. For that reason, when setting up a page, we normally set up the bottom margin around 50% bigger than the top margin)
- **Back** (also known as inside or gutter margin): the two back margins taken together should be roughly as wide as the foredge (when setting up the back margin, you should bear in mind how your work is to be bound - some bindings 'eat up' a large amount of paper)

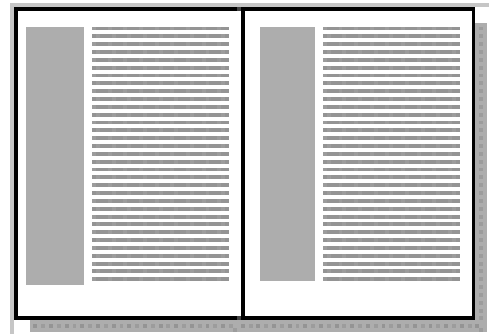
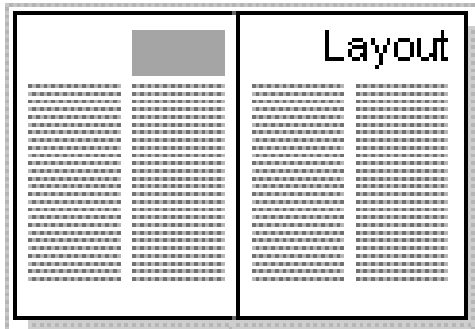
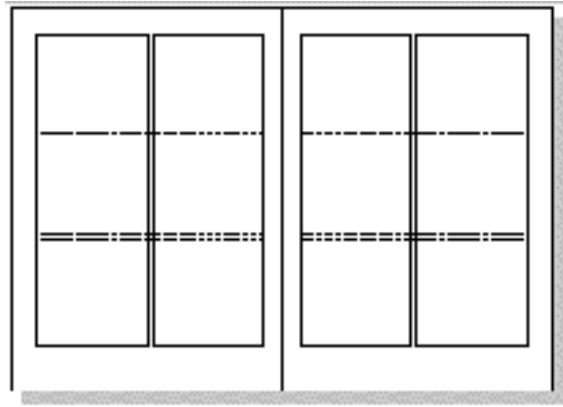
Master pages - most desktop publishing systems will provide you with master pages. It's on those pages that you should set up your grid once you've decided what it should be.

Symmetry versus Asymmetry

It's certainly a good idea to work to grids, but following them slavishly can result in pretty dull design. Similarly, It's not a bad idea to start off with an idea of a symmetrical design, but producing symmetrical pages all the time can end up boring.

You'll sometimes come across the CUTYOS rule for organizing elements on a page. Designs following those rules are produced in the shapes of those letters and look like this:





You can

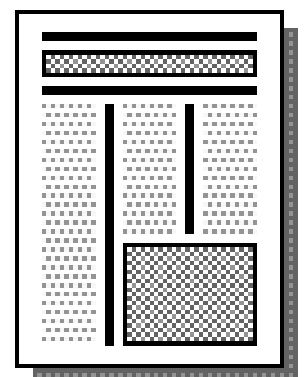
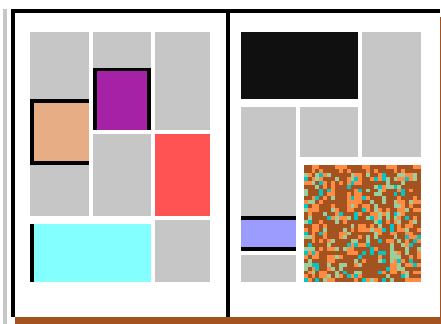
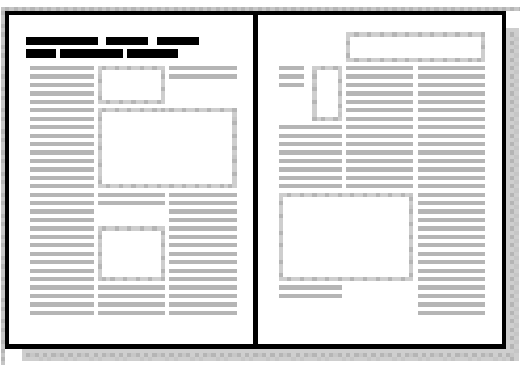
add
interest

some
to a

two-column layout by reducing the height of the columns and reserving the space for headings graphics. It can look a bit odd, though, if there's nothing there, though you can militate against that by having a running head on every page.

You can also add interest by using two columns of differing widths. The problem is that this only really works if the two columns are somehow different in content, for example if the narrow column is providing a running commentary on the wider one.

Three columns



A three column page is excellent for the production of a lively, interesting layout. It is particularly useful where a lot of artwork has to be combined with text.

The relatively narrow columns will probably force you to use a fairly small font and layout can start to get confusing if you're not careful. The use of a fair amount of white space often helps to make the overall layout comprehensible.

Like the two-column layout, this one can quite usefully be mixed with headings spanning the whole page. For example, the bottom example above is one of the standard layouts offered by *Corel Ventura*.

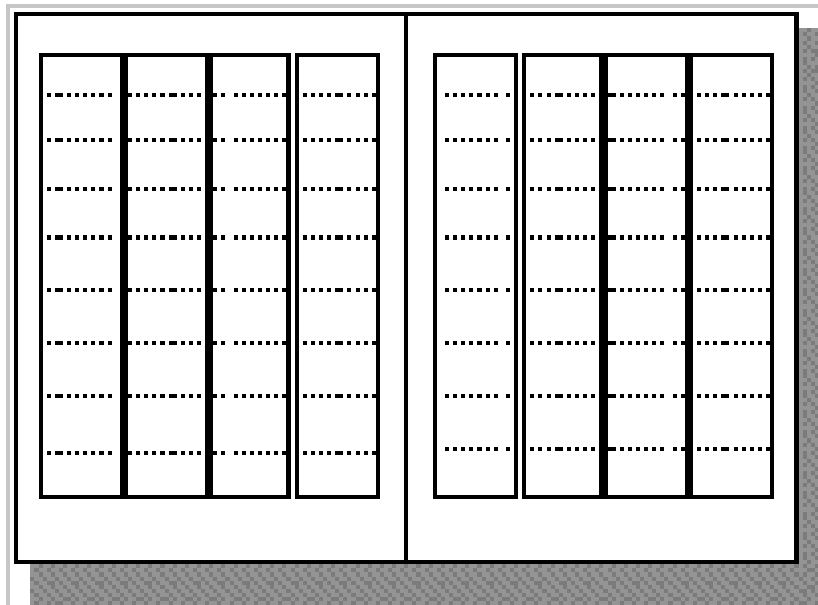
This is a fairly typical grid you might use for three columns:

Four columns



A four column layout can readily be lively and interesting, but it can all too easily turn out to be hopelessly confusing. It works well with lists of things, so it could be good for, say, an index or an encyclopedia.

Here's an example of a fairly typical grid:



The pages above are based on that grid. It can be difficult to use on A4 paper because the columns are getting so narrow that you'll have to use a fairly small font and you may well end up with quite a lot of hyphenation which will make reading difficult.

Nevertheless, if you have the patience to work with it, it can produce interesting designs, especially if, as with three columns, you're willing to use plenty of white space. It can also be readily combined with two-column layout, a combination which works quite well for magazines.

Thumbnail Sketches

Thumbnail sketches are simple idea sketches which will help the designer to obtain an attractive and acceptable final result. The client can see the ideas and then choose the layout which he or she prefers.

Thumbnail sketches serve these three primary purposes; they:

1. Graphically preserve ideas;
2. Visually portray ideas; and
3. Compare two or more ideas visually.

Preparation of these sketches should begin immediately after the desired product has been selected and after completion of the pre-layout planning sheet. Copy selection precedes thumbnails; therefore, one of the responsibilities of the designer is to obtain all the copy that will appear on the final product. The originator of the planned printed product should have this information readily available.

Design Elements and Principles

The principles and elements of good design and page layout include proportion, balance, rhythm, emphasis, colour, lines, shapes, and textures. Additional components may be considered graphic design principles or ways to achieve a well-designed page layout including alignment, white space, contrast, and repetition.

Elements of Design

From an online design class, definitions and graphic depiction of lines, shapes, texture, and other design components.

Element of Design: Lines

From our online Design Basics Course, these lessons define and explore the appearance, patterns, and uses of lines in desktop publishing and graphic design projects.

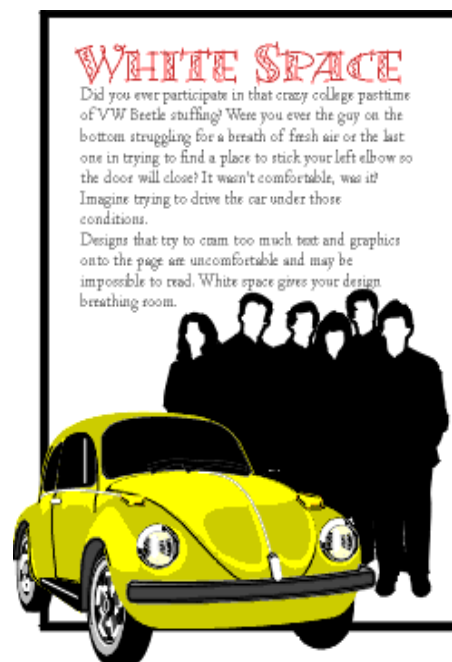
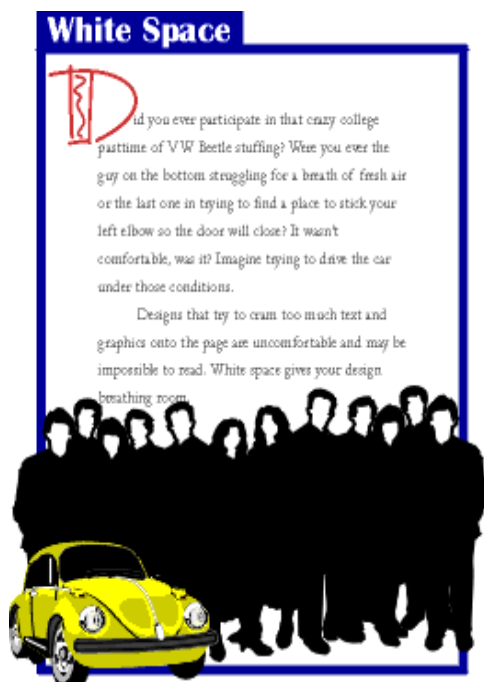
White space doesn't have to be white. The large block of black created by the graphic of people adds a large block of black **white space**. Multiplying the number of people and reducing the size of the car in the second "White Space" example provides additional **contrast** and reinforces the theme of the copy.

Additional leading, larger margins, deeper paragraph indents all add white space or breathing room to the design.

The oversized drop cap is another element of **contrast** and also helps to **balance** the page with the large, dark elements at the bottom of the page. The drop cap style, reversed title, and blue box are consistent with the rest of the series.

In the next series of lessons we will look at each principle of design in more detail and explore ways to incorporate each into your designs. We'll also touch on the ways that your software can simplify some related tasks, such as using style sheets to aid repetition and consistency or using leading and other spacing features to improve proximity, unity, and distribution of white space.

Typography & Page Layout



Design Elements

Shape

Circles, squares, rectangles and triangles are the basic shapes. The most familiar shape is the square (rectangle) used in DTP. The square denotes honesty and stability.

Circles suggest infinity, protection and movement.

Triangles suggest action but they can also convey either conflict or strength.

Mass/Weight

Mass is size. Mass can be physical and visual. 3 factors should be considered in mass.

Function - The size of the printed piece.

Attraction - The contrast of large and small items.

Organisation - The most important items should be the largest.

Texture

Paper type - There are various surfaces and finishes from newsprint, glossy paper, woven, vellum etc.

Visual textures - Photographs of objects (glass paper, glass).

Photo-editing can be used to mimic textures (rough surface using dots).

Scanning the actual materials (straw mat, gravel).

Lines or shapes (wavy lines representing water).

Element of Design: Shape

From our online Design Basics Course, these lessons define geometric, natural, and abstract shapes with emphasis on the meanings and use of basic geometric shapes of square, circle, triangle.

Principles of Design

From notes for a design class, definitions and graphic depiction of balance, contrast, proportion, and other layout considerations.

Alignment - Principle of Design

Alignment is a design principle for page layout and good formatting. See an example including aligning objects on the page and type alignment.

Balance - Principle of Design

Balance, a design principle for page layout, defined and illustrated. Types of balance and how to achieve a balanced page.

Consistency - Principle of Design

Definitions and examples of how to achieve consistency and unity in design and its importance.

Contrast - Principle of Design

How to achieve contrast in your design and page layout and why it's important.

Grids for Desktop Publishing

Learn what a grid is, formats for grids, and how to put together basic and complex grids, leading grids, and layouts. Use grids to provide page-to-page consistency, unify and align page elements, and provide design continuity across related documents.

Proximity - Principle of Design

Grouping like objects and separating unlike elements is using proximity in design to show relationships and importance.

White Space - Principle of Design

Put white space into your design to give it some breathing room and make it less cramped, confusing, or overwhelming.

Frames: You've Been Framed

Effective use of boxes & borders in your desktop documents and Web pages.

Page Layout Principles

From a DTP class, guidelines on white space, consistency, grids, and other principles of good page layout and design.

Principles of Design

Visually, there is very little originality in design — it is usually a rearrangement of an idea observed and recorded previously. No matter how simple the design may be, there are certain principles that must be applied.

Appreciation of their importance will be slowly gained by observation and practice together with good judgement. This will produce satisfactory results without the need for any mathematical calculations.

Principles of design should always be incorporated in any graphic design project to assist its communicating and graphic interest, however in the planning of a basic design, the designer must produce a job to suit the class of work, the copy, and the tastes of the customer.

To develop a *sense of design* use the three 'eyes':

1. *Visual-eyes*: Examine closely all types of printed material, i.e. physically see/look at what everyone else is/has done. (What catches or eludes your attention, and why?)
2. *Critic-eyes*: Separate the good from the bad. (What provokes the ad? What motivates you? Those things that don't catch your eye — why?)
3. *Analy-eyes*: Select the element that makes it a good design.

There are three essential qualities needed to become a competent designer:

Vision. — To be able to detect an idea and then to toss it around in your head (objects, tones, shapes, colours — everything around you).

Imagination. — To be able to use an idea effectively, i.e. brainstorm the idea and bring it to a state where it can work.

Judgement. — To be able to assess the idea's value and correct place and use, i.e. limitations always arise after you come up with an idea.

The Principles of Design are qualities or characteristics inherent in any art form, such as balance, harmony, contrast, variety, and action. These principles must be used in any design if it is to be in any way effective. Not all of them, however, will be used in the one design.

Whatever principles the designer may adopt, the ultimate result must be a design that can be easily read and clearly understood. Careful control of the principles of design is necessary to successfully project an intended image.

Balance

This is the result of an arrangement of one or more elements in the design so that visually, they equal each other. Every object in nature has structural balance, from the symmetry of a flower petal to the chambers of a snail's shell.

The balance needed every time we perform any form of physical movement is automatically maintained by a built-in equilibrium that we take for granted.

Man-made structures, even if not formally equal on all sides, must maintain a balance in relation to a perpendicular surface. Doubtless the Leaning Tower of Pisa will someday fall when a greater portion of its weight shifts off balance. Sound must also be balanced, both in its production and in its reproduction.

Achieving a physical balance is simple: the weight of one object must be counter-balanced by the weight of another on the opposite end of a fulcrum. If, however, the objects are of different materials, the masses may not appear to be balanced. Because steel is heavier than wood, for example, a large piece of wood is needed to balance a small piece of steel.

Physical balance can be measured by use of a balance scale; there is no agreed scientific method, however, for determining the weights of shapes in the arts. Instead, balance is determined by weighing the objects visually.

For graphic design, the visual centre of any typical A4 page of the business world is not the actual physical centre but what is termed the Optical Centre. This visual point of balance can be determined mathematically as being located three-eighths from the top of the page, five-eighths from the bottom.

Mathematical Balance.

For a single sheet design, type and images are easily positioned vertically to ensure an even amount of space on either side of the design to achieve balance. When positioned evenly across the horizontal axis, the elements appear, to the eye, to actually sit lower down on the page.

Regardless of the design style of work that is to be produced, Optical Centre must always be carefully considered during the initial design stages for a printed piece to work successfully.

One of the most fundamental differences in a design is whether balance is symmetrical (centred) or asymmetrical (off-centre). The choice between them profoundly affects the layout and feeling of a design.

The selection of which is the more desirable should be based on which of the two is going to achieve the result you need to get a particular sort of information over to a particular readership.

Symmetrical Balance

Symmetrical (or formal) balance has elements of equal weight as well as tone placed on both sides of an imaginary vertical line on the page and gives the feeling of permanence and stability.

Any symmetrical layout is likely to produce a more static, restful design. However, because a centred layout is so static, it is very easy to make it pleasantly innocuous but boring.

Magazine Analysis/Graphic Design

Design Elements and Principles

When designing any type of graphic it is very important to think of how the graphics is Positioned on the page. The layout of any graphic takes a number of factors into consideration. The factors come under the term Design Elements and Principles. The following text will give a brief explanation on each followed by exemplars of how they are applied

Design Principles

Generally, all the principles of design apply to any piece you may create. How you apply those principles determines how effective your design is in conveying the desired message and how attractive it appears. There is seldom only one correct way to apply each principle.

Balance

Try walking a long distance with a 2 kilo bag of rocks in one hand and a 10 kilo bag of marbles in the other. After awhile you'll be wanting to shift your load around, putting a few marbles in the rock bag to balance your load, make it easier to walk. This is how balance works in design. Visual balance comes from arranging elements on the page so that no one section is heavier than the other. Or, a designer may intentionally throw elements out of balance to create tension or a certain mood.

Symmetry Elements on one side each exactly elements on the other side (vertical or horizontal).

Asymmetry not symmetrical. This allows for greater variety with an odd or mismatched number of different elements.

Proximity/Unity

Observe a group of people in a room. You can often learn a lot about who is listening intently to another person, which are strangers, or who is ignoring who by how close together they sit or stand. In design, proximity or closeness creates a bond between people and between elements on a page. How close together or far apart elements are placed suggests a relationship (or lack of) between otherwise disparate parts. Unity is also achieved by using a third element to connect distant parts.

Alignment

Can you imagine how difficult it would be to find your car in a crowded parking lot if everyone ignored the parking lot stripes and parked in every which direction and angle? Imagine trying to get out of there! Alignment brings order to chaos, in a parking lot and on a piece of paper. How you align type and graphics on a page and in relation to each other can make your layout easier or more difficult to read, foster familiarity, or bring excitement to a stale design.

Repetition/Consistency

What if Stop signs came in pink squares, yellow circles, or green triangles, depending on the changing whims of a town and a few of its residents? Imagine the ensuing traffic jams and accidents. Repeating design elements and consistent use of type and graphics styles within a document shows a reader where to go and helps them navigate your designs and layouts safely.

White Space

Did you ever participate in that crazy pastime of Fiat Panda stuffing? Were you ever the guy on the bottom struggling for a breath of fresh air or the last one in trying to find a place to stick your left elbow so the door will close? It wasn't comfortable, was it? Imagine trying to drive the car under those conditions. Designs that try to cram too much text and graphics onto the page are uncomfortable and may be impossible to read. White space gives your design breathing room.

Contrast

On the basketball court, one pro team looks much like another. But send a few of those players for a stroll down most any major city street and something becomes apparent — those players are much taller than your average guy on the street. That's contrast. In design, big and small elements, black and white text, squares and circles, can all create contrast in design.

The Big Picture


Illustrating Principles of Design

The examples you'll find here demonstrate varying degrees of each of the six principles of design in a before and after format. View them individually and as a whole to see how different principles are applied. How might you do any of these differently?

You can create balance with the three elements (text block, graphic, vertical text) here but in the first example they appear to be just random elements with no **unity** or **balance**. In the second "Balance" example the text block and graphic are resized to bring them closer together and better balance each other.


**B
A
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E**

Try walking a long distance with a 2 pound bag of rocks in one hand and a 10 pound bag of marbles in the other. After awhile you'll be wanting to shift your load around, putting a few marbles in the rock bag to balance your load, make it easier to walk. This is how balance works in design. Visual balance comes from arranging elements on the page so that no one section is heavier than the other. Or, a designer may intentionally throw elements out of balance to create tension or a certain mood.



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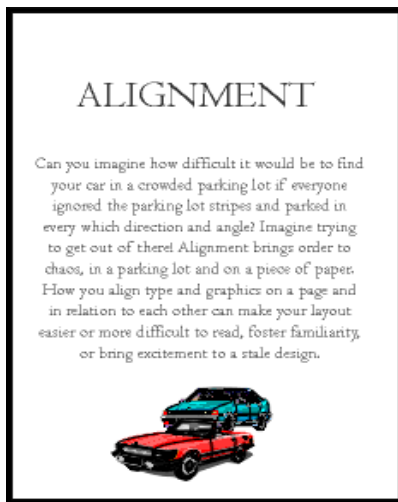


To tie the elements together, move them closer together (resizing helps accomplish this). Notice that the graphic (one of the marbles) slightly overlaps the box enclosing the vertical text, **unifying** the two elements. Reversing the word "balance" out of the blue box also adds more **contrast** to the composition. The increased leading in the text block redistributes the **white space** in a more balanced manner.

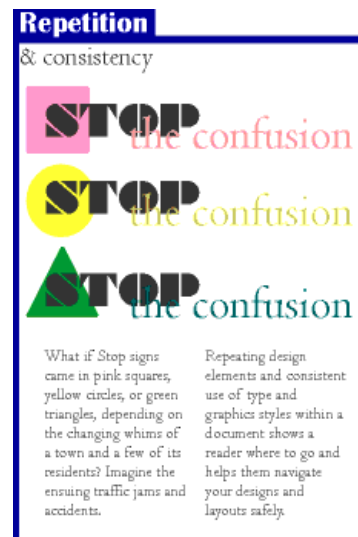
The graphic anchors the bottom of the page, but the four text elements all float on the page with no apparent connection to each other (**proximity/unity**). The change in the headline (font change, reversed out of blue box) along with the subheading pulled in closer provides **balance** with the graphic on the bottom. The spacing between the two paragraphs of text is reduced slightly as well.

There is nothing inherently wrong with centred headlines, text, and graphics. They lend a formal tone to a layout. But, for this series of layouts something a bit more informal is called for. Also, large blocks of centred text are usually harder to read.

In the second "Alignment" example below, text alignment is left-aligned, ragged right, wrapped around the bottom graphic which is aligned more to the right, opposite an added graphic that is aligned to the right to help balance the overall design.



Within the second "Repetition" example, the headline is repeated three times using graphics that tie in with the copy in the text blocks. The repetition of the colours in the shapes and headline text that are in the copy help to reinforce the theme. Overlapping the graphic and text elements unifies the elements of the design.




Another aspect of consistency that can be seen when viewing all 6 of the "after" examples is the blue borders, blue reversed boxes, and the typeface (Britannic Bold) used for the names of all the principles of design. The drop cap used in three examples (Bermuda LP Squiggle) is another element of consistency.

In the first example there isn't enough **contrast** between the headline and text due in part to size but also because the two different serif faces used are too similar (not obvious from the small graphic, trust me, they are different typefaces).

Contrast

On the basketball court, one pro team looks much like another. But send a few of those players for a stroll down most any major city street and something becomes apparent — those players are much taller than your average guy on the street. That is contrast.


In design, big and small elements, black and white text, squares and circles, can all create contrast in design.



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That oversized graphic provides real **contrast** and reinforces the copy (tall basketball players). Dropping the text down to the bottom portion of the page also reinforces the 'towering' aspect of the graphic. The reversed text in the blue box, the blue border, and the drop cap carries through the overall unifying elements found throughout the series. Additionally, the round shape of the drop cap and its colour echo the shape and colour of the basketball in the graphic. The drop cap and the reversed text on the left side plus the left-aligned text help to **balance** the large graphic element.

Design Elements (Summarised)

Shape

Circles, squares, rectangles and triangles are the basic shapes. The most familiar shape is the square (rectangle) used in DTP. The square denotes honesty and stability.

Circles suggest infinity, protection and movement.

Triangles suggest action but they can also convey either conflict or strength.

Mass/Weight

Mass is size. Mass can be physical and visual. 3 factors should be considered in mass.

Function - The size of the printed piece.

Attraction - The contrast of large and small items.

Organisation - The most important items should be the largest.

Texture

Paper type - There are various surfaces and finishes from newsprint, glossy paper, woven, Vellum, etc.

Visual textures - Photographs of objects (glass paper, glass).

Photo-editing can be used to mimic textures (rough surface using dots).

Scanning the actual materials (straw mat, gravel).

Lines or shapes (wavy lines representing water).

Value

Value is the darkness or lightness of an object regardless of colour. Value is relative to the background colour and other items on the page. In a completely black and white design the introduction of a small bit of colour will change the focus and balance of the design.

Size

Is **LARGE** or **SMALL**. 3 factors determine size.

Function - The size required of the design.

Attraction - Contrast large and small elements. Crop images to add interest.

Organisation - The most important element should be the largest - the least important the smallest.

Colour

Colour in nature is represented by mixing the three primary colours, red, blue and **Yellow**. For computer monitors the primary colours are **red, green and blue (RGB)**. In commercial printing digital colour is **Cyan, Magenta, Yellow and Key (Black) CMYK**.

Line

Can be used to divide or unite elements, create movement, provide texture, convey a mood or emotion, define shapes, provide emphasis and provide a framework.

Examples of Promotional Advertisements which use all the design elements and principles in their design.



TERM LIFE

FOR EVERY STAGE OF LIFE YOU ARE COVERED

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INSURANCE PROTECTION ON A LIMITED BUDGET

Learn about our great term life insurance options that can help you protect your loved ones and yourself. Our term life insurance is designed to provide the most protection for the lowest cost. You can choose from 10, 20, or 30-year terms. Our term life insurance is designed to provide the most protection for the lowest cost. You can choose from 10, 20, or 30-year terms.

ADJUSTABLE PREMIUMS

Our term life insurance has adjustable premiums that can be changed at any time. This gives you the flexibility to adjust your coverage to meet your needs. You can choose from 10, 20, or 30-year terms.

PORTABILITY

Our term life insurance is portable, which means you can take it with you if you move. This gives you the flexibility to adjust your coverage to meet your needs. You can choose from 10, 20, or 30-year terms.

CONVERSION

Our term life insurance can be converted into a permanent life insurance policy. This gives you the flexibility to adjust your coverage to meet your needs. You can choose from 10, 20, or 30-year terms.

COMPETITIVE RATES

Our term life insurance has competitive rates that are lower than other term life insurance policies. This gives you the flexibility to adjust your coverage to meet your needs. You can choose from 10, 20, or 30-year terms.

COVERED FOR THE ROAD OF LIFE

Why pay more than you have to? Our term life insurance is designed to provide the most protection for the lowest cost. You can choose from 10, 20, or 30-year terms.

Carvery 2 For £9.99
Monday - Thursday
£6.95 Each
Friday - Sunday on the shoulder of mutton

Buy 2 large glasses get the rest of the bottle free on the shoulder of mutton

that work for your business.

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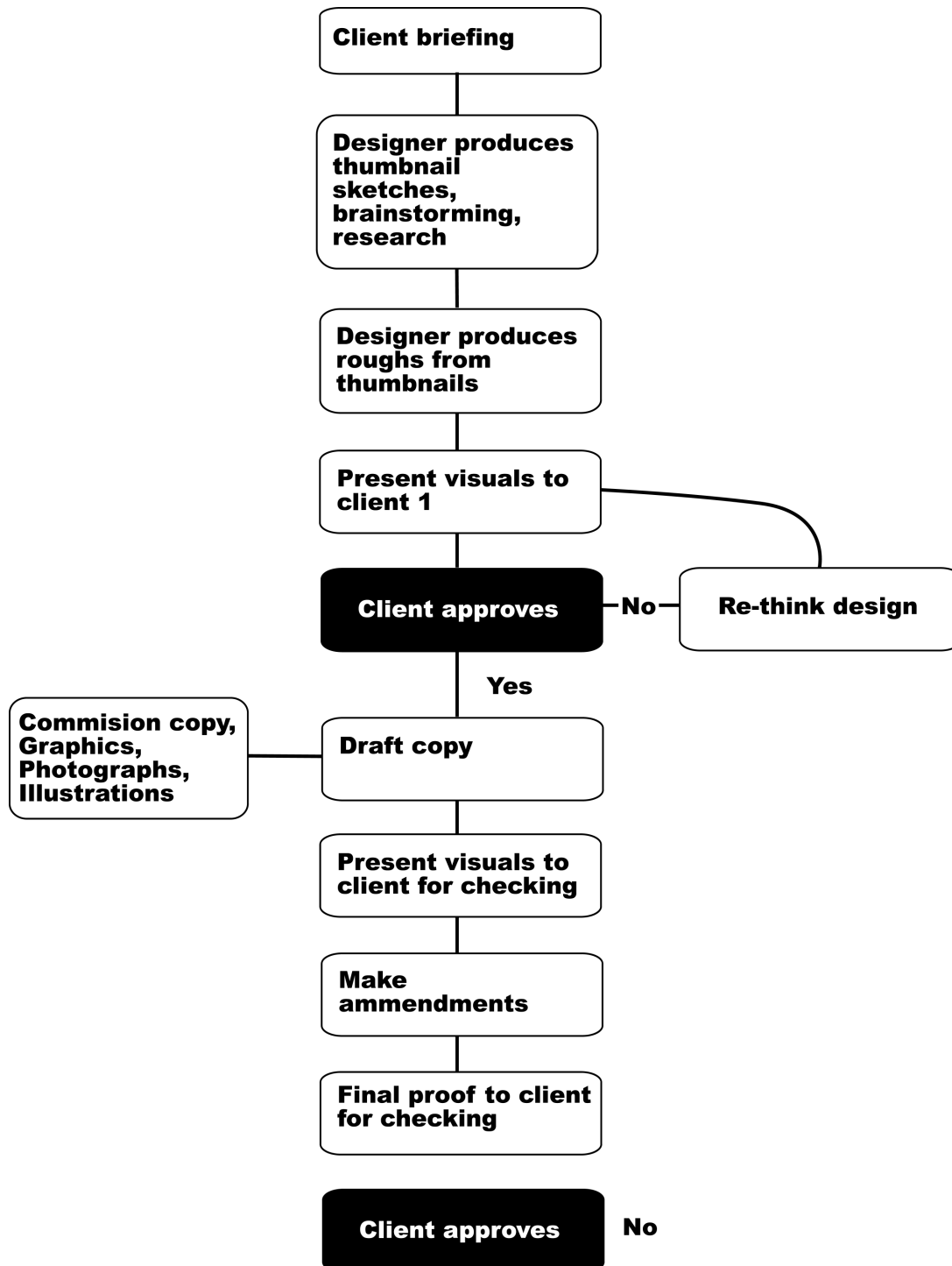
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why not join us for
Father's Day

Bookings now being taken

The Design Process

The diagram below illustrates the stages of designing a professional publication



The process itself may vary depending on the nature of the job, but it should be noted that the client's approval must be sought at every new stage.

Grids 1: Order out of Chaos

What is a Grid and Why Do I Need One?

Think of the grid as a plan -- a plan for your page layout

Many of the pages that you see everyday have a grid. You may not see it but it is there, holding up the design, establishing structure, guiding the page elements.

A grid is an invisible structure used to guide the placement of elements on your page.

Grids don't appear on the printed piece but their influence may be evident in the widths of column texts, the uniformity of space around photographs, or the consistent placement of repeating elements from page to page in a magazine.

They are a series of guidelines that determine the margins of the piece, space between page elements (headlines, body text, photographs, etc.), and let you know where to put things on the blank page.

While it is invisible in the final printed piece, you'll need to be able to see it during page construction.

Before deciding when, why, and how to use a grid you need to know the elements of the grid and how to create it.

While it is invisible in the final printed piece, you'll need to be able to see it during page construction.

In your page layout, you've probably set margins. These margins often show up as light solid or dashed lines on the screen.

These top, bottom, left, and right margins create a box in the middle of your page. Stop there and you have a single unit grid.

Further divide the page into uniform parts and you've created a multiple unit grid. You can create a visible grid to aid in page layout using the guidelines feature of your page layout software or by drawing lines or boxes that you place on a non-printing layer of your publication. Often you can "pull" a guideline from the rulers on the sides of page and place them where you want them.

Margins

Margins define the outside boundary of your page. They frame the content of your pages. Margins may not be equal all around (but are normally consistent from page to page or panel to panel). In most programs you would set the margins when you define the page dimensions (format). You can also adjust the margins "on the fly" by moving the guides on screen (in some programs).

Alleys

When you divide the interior space of your page into uniform parts the white space between units are alleys. Depending on how you've set up your grid the alleys may run horizontally, vertically, or both directions on your page. In some designs this would translate to the white space or "gutter" between columns of text.

Gutter

In a two page or two panel spread, the gutter is the inside margin. It's the space on either side of the fold. In some page layout programs the space between two columns of text is sometimes called the "gutter" as well.

Grid Units

Grid units are the primary locations on your page where you will place text and images. They determine **placement** not necessarily **size**. That is, if you have a graphic image that is larger than your grid unit, it doesn't mean you can't use it. You would use your grid units to help resize the photograph, ideally to fill 1, 2, 3 or more grid units and then to place

Layouts for DTP & Printing

A printed product or job must be well planned. The combination of ideas used in planning and designing the product is called a layout. It can be defined as the arrangement of all the units or elements into a printed, usable format. These units or elements include the heading, sub-heading, text matter, illustrations, and photographs. The preparation of a complete set of layouts will require: thumbnail sketches, rough layout, and a comprehensive layout. A definite plan, predetermined, is very necessary.

Values of good planning

Graphic planning allows the designer to review and revise his or her thoughts. Printed work is often completed in less time and each person who performs a mechanical function leading to the final product knows their job.

Spelling, wording, and the placement of material must be accurate, otherwise the final product will have little value. The specifications of the client for their printed material must be accurately met. This will result in a high-quality final product and the client, commercial printing plant management, and the skilled workers will be satisfied that their work has fulfilled a particular requirement.

Pre-layout planning

A pre-layout planning form should be completed to help formulate the ideas of the person who is going to originate the printed job. Each of the 12 questions that follow should be recorded for reference during the layout preparation:

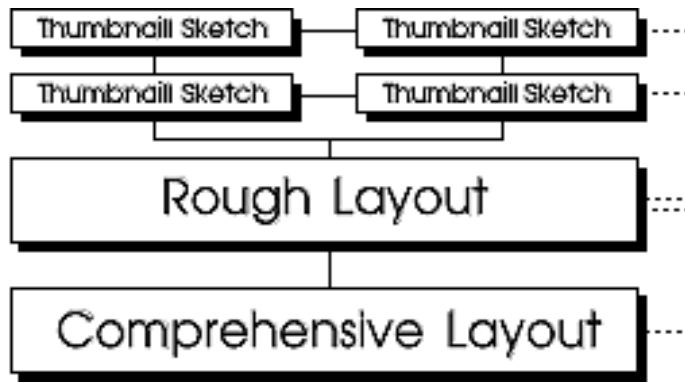
1. *Objective of the product.* What is the purpose of the finished product? Is it to sell? Inform? Reference?
2. *Target group.* Will the printed material be for personal use, for scientists, for teenagers, or for some other group? The design approach would be different for each.
3. *Personality of the product.* Should it be sophisticated, gaudy, dignified, humorous, or have some other quality? The type of paper, typography, and illustrations depend on these decisions.
4. *Style of the finished product.* Will it contain photographs? Will it be strictly typographic, or will it contain cartoons, illustrations, or a combination of both?
5. *Layout format.* Will the product be a booklet, folder, bulletin, brochure, pamphlet, or an entire book?
6. *Approximate trimmed dimensions.* What will be the physical size of the printed product? This will affect which standard paper size can be used.

7. *Approximate number of pages.* Will there be one sheet printed on only one side or on both sides? Will a sheet be printed on both sides and folded? Will there be several pages?
8. *Approximate number of copies.* The number of copies desired often
9. determines the printing process used.
9. *Finishing and Binding requirements.* Will the printed sheets from the press or duplicator need to be trimmed, folded, scored, or bound together by one of several methods?
10. *Layout required.* Does the customer require thumbnail sketches, a rough layout, and a comprehensive layout
11. *Estimated hours for completion.* How long will it take to complete the entire job? The answer to this question will depend on the answers to the ten previous questions, and will assist in making a cost estimate.
12. *Approximate date of completion.* This involves consideration of the time available per day, and the number of hours or days required

Layout Procedure

The sequence followed for preparing graphic layout materials is drawing thumbnail sketches, rough layout, and comprehensive layout. Several *thumbnail sketches* are usually prepared. The selection is made by the person who is ordering.

The *rough layout* is made up of the thumbnail sketch chosen. This layout is generally the same size as the final product and contains all of the copy and illustrations. Alterations can be easily made between the thumbnail sketch to the rough layout, and again between the rough and the comprehensive layout.



The *comprehensive layout* is based upon the general arrangements of the thumbnail sketch and the rough layout. This is a precision layout which permits the customer to see what the final product will look like. The overlay sheet generally attached to the base sheet is used to indicate how the final product should be produced.

Design and Layout considerations

Copy analysis is the first essential when designing a job. Thorough knowledge of the job is needed; then the operation will simply become one of mixing brains with type and/or illustrations.

Thoroughly understand the meaning of the copy before attempting actual work. Study the copy; analyse it. It is time well spent.

To hit upon the correct formula, there are certain considerations that must be kept in mind. They are in the following brief points:

1. Planning is important.
2. Design and layout are essential to obtain a quality finished product.
3. Make it readable. A printed product is designed to give information.
4. A layout is a blue-print, a master plan.
5. Compose the final product in the appropriate media; then arrange to
6. compose it with the actual type, illustrations, and photographs.
6. Simplicity is important.
7. Knowledge of type and typography is necessary.
8. The printers' point system must be understood.
9. Basic design principles must be understood.
1. Knowledge of colour and its effect on people are important.

Grids 2: Consistency and Unity

How does a grid tie elements together?

For the most part, people prefer organized visual information.

Newsletters, magazines, brochures, annual reports, and books often have many visual elements: columns of text, headlines, photos, illustrations, pull-quotes, etc. Grids allow the designer to build page-to-page consistency into these documents.

Readers expect to find page numbers in the same location on each page.

When all the text in a given article -- even when it spans several pages -- has a consistent look, including column width, it enhances readability. Readers often expect to find sidebars, informational text, and other oft-repeated elements in the same place from page to page.

A grid, used consistently on all pages of a multi-page document, makes it easier for the designer to provide the consistent look that readers often expect.

A carefully conceived grid system also allows the designer to introduce variations without forsaking readability or consistency. It also speeds layout because it takes the guesswork and "look back to see what we did before" out of where to place elements from one page to the next.

The following pages are examples of how you might combine text and graphics in a 7-unit vertical grid (such as for a newsletter). Notice how page 1 (Figure 1) and 2 have a consistent (reversed) layout. Text columns are two-grid units wide. One grid unit provides an extra wide column of space separating the main text from the sidebar elements. Page 3 (right hand page of the 2 page spread, Figure 2) is quite different from the first two pages but if you look at the underlying grid structure (Figure 3) you'll see that all three pages use the same grid system.

FIGURE 1: left-hand page of newsletter with 7-unit vertical grid



FIGURE 2: two page spread of newsletter with 7-unit vertical grid

FIGURE 3: two page spread showing the underlying 7-unit vertical grid (blue)

Grids can unify a series of dissimilar documents

There are many ways to establish visual unity throughout a series of related pieces. You probably use your logo on all your marketing pieces. You may have colour-coded brochures for different aspects of your business. Grids are another way to bring unity and cohesiveness to a collection of brochures, sales sheets, display ads, spec sheets, and other elements of your marketing arsenal.

In a series of single, but related pieces (such as a series of posters or information sheets for a single ad campaign or single product line) a common grid can help unify the separate pieces. Let your grid help you place repeating elements in the same place from piece to piece. Let your grid provide a consistent guide for mixing graphics and text.

The informational sheets in Figure 4 have a common style for the headline treatments but don't all use the same number or size of graphics. The 3 unit grid (Figure 5) helps to unify these pieces. This is a fairly simple, straightforward example.

FIGURE 4: 3 informational sheets that share a common 3 unit grid

FIGURE 5: A three-unit grid helps unify a series of information sheets containing varied elements.

One grid, many designs

Grids have been accused of creating boring, static designs. It's not the fault of the grid. Used properly, grids can offer a variety of creative design options. Figure 6, below, shows how a 4x4 (16 unit) grid system takes on different lives using the same four graphic images and varying amounts of text.

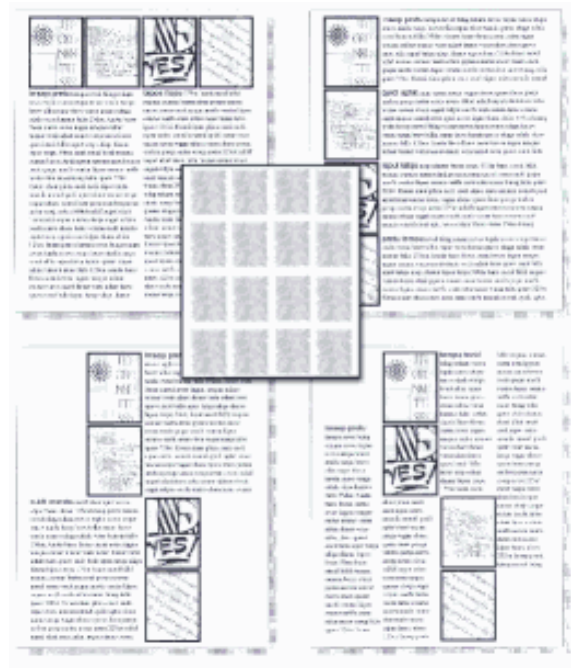


FIGURE 6: Just a few of the arrangement options using the same "boring" grid.

Grids 3: Flexible Options

Are grids too rigid?

Choose a grid based on the content and adjust content based on the grid

The right grid offers the designer flexibility without overwhelming them with possibilities. The right grid also enhances organization and makes it easy for the viewer or reader to understand the content.

There are no right or wrong grids, simply grids that are more suitable for different content and design objectives. Of course that doesn't help you much when you're staring at a blank page and a deadline. Here are some "thinking points" to help you plan your grid and your design.

- **Content or Page Elements.**

Is the publication heavy on text or heavy on graphics? Will there be many headlines, rules, illustrations, pull-quotes?

- **Text.**

Look at both amount of text and how it is broken down -- long articles, lots of short articles, a mix of long and short articles. How many subheads? Will you use eyebrows, decks, initial caps, and other visual cues?

- **Photos and Illustrations.**

Are there similarities in the type of illustrations or size of photos? Can photos be grouped by size or type? Are there a lot of rectangular elements or many irregularly shaped elements?

- **Complexity.**

Generally the larger the number of grid units (and the smaller the individual units) the more design options are available. However, too many options can destroy the underlying unity that the grid provides.

So, which grid is best? Here are some guidelines (remember, I said *guidelines* not rules).

- Lots of text with few graphics -- such as a book with long chapters and few or no illustrations -- can use a simpler grid. 1 - 3 units, perhaps.
- A newsletter, brochure, or magazine with many photographs usually requires a grid with many smaller units to give more possibilities for placing and sizing the photographs.
- Newsletters, because they generally have more text, often use a columnar grid.
- 1, 2, and 3 column grids are common. Each can accommodate lots of text, especially long articles.
- 4 or more columns offer greater flexibility for publications with text, photos, and other graphic elements and a mix of long and short articles.
- Grids based on an even number of grid columns can suffer from too much symmetry if text and graphics are confined to individual or double grid columns throughout.
- Newsletters don't have to be tied to columnar grids. A newsletter consisting of mostly small articles or "news briefs" and photos could use a 6(2x3), 9(3x3), or 12(3x4) unit grid of rectangular or square units quite nicely.

Grids don't have to limit design

Grids *can* feel stifling. But they needn't be.

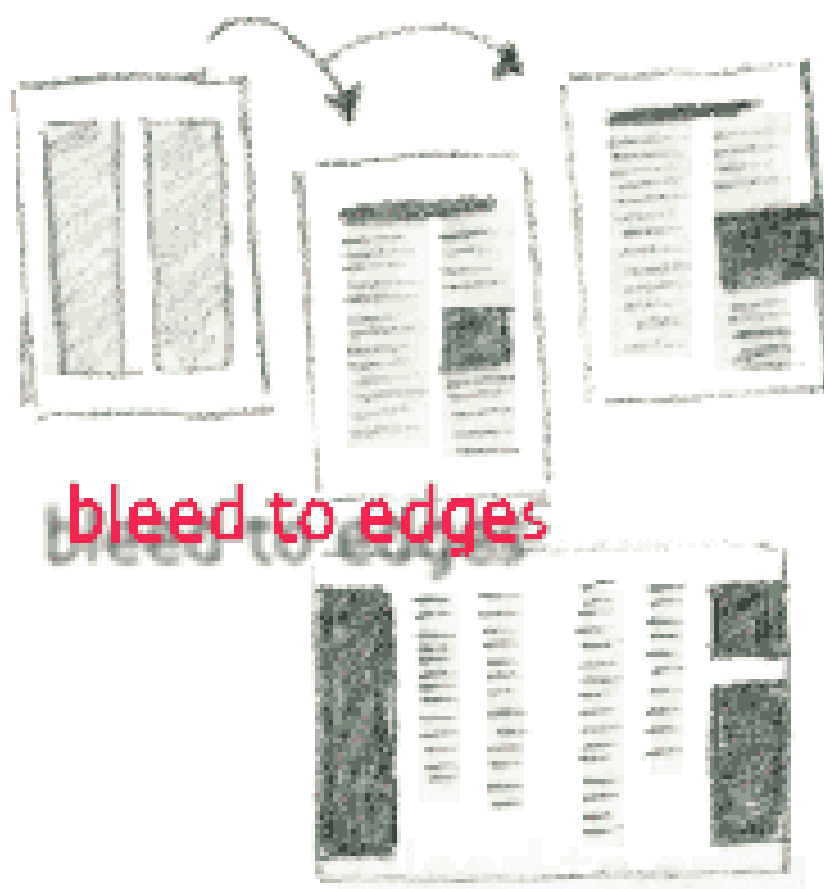
1. Layouts based on grids are not appropriate in all cases.
- 2.
3. Grids should fit the mix of elements rather than forcing elements to fit the grid.

Elements on your page do not have to be confined to individual grid units. In a five-column grid, 5 narrow columns of text can be hard to read. Try two columns of text, each spanning two grid units with an empty grid unit for accents, photos, breathing room, or adjacent caps.

Resize photos to fill 2-3 or more grid units. You don't have to always fill the entire grid unit either. Fill 2 1/2 grid units with a photo, leaving some extra white space.



Gutters and margins are not off-limits. Bleed photos off the edge of the page. You don't have to fill every little grid unit. The odd column in a 5 or 7 column newsletter grid can offer extra "thumb space" along the outer edges. There are many ways to add white space to your designs -- leaving some grid units open is one way.

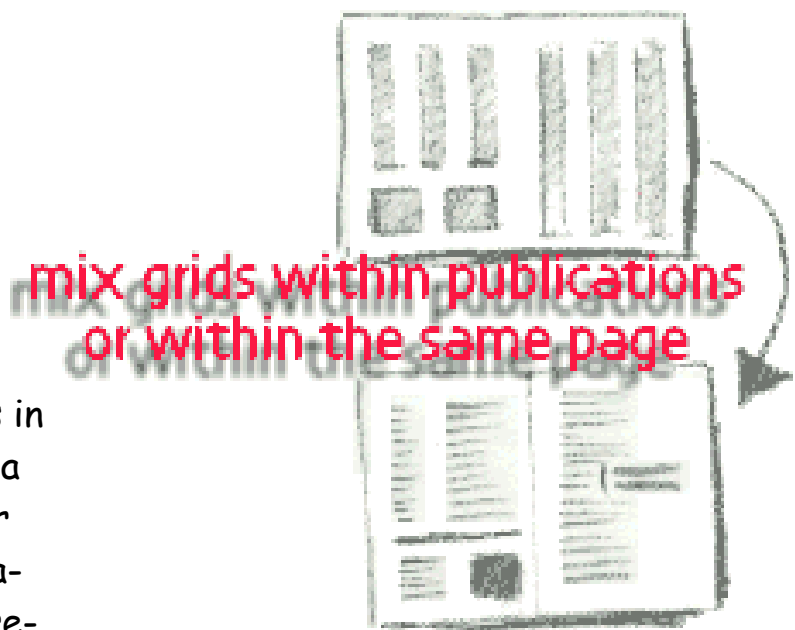


If one grid is good, two could be better

Some publications use mixed grids. A different grid than what is used through much of the publication might be appropriate to present content that varies greatly from the rest of the pages. It is also okay to mix grid systems within the same page.

- A text heavy newsletter might group all photos and illustrations on a single page. The text pages can use a simple grid. The multiple photos might require a more complex arrangement.

- Use two different grids to differentiate sidebar or secondary items from primary articles.

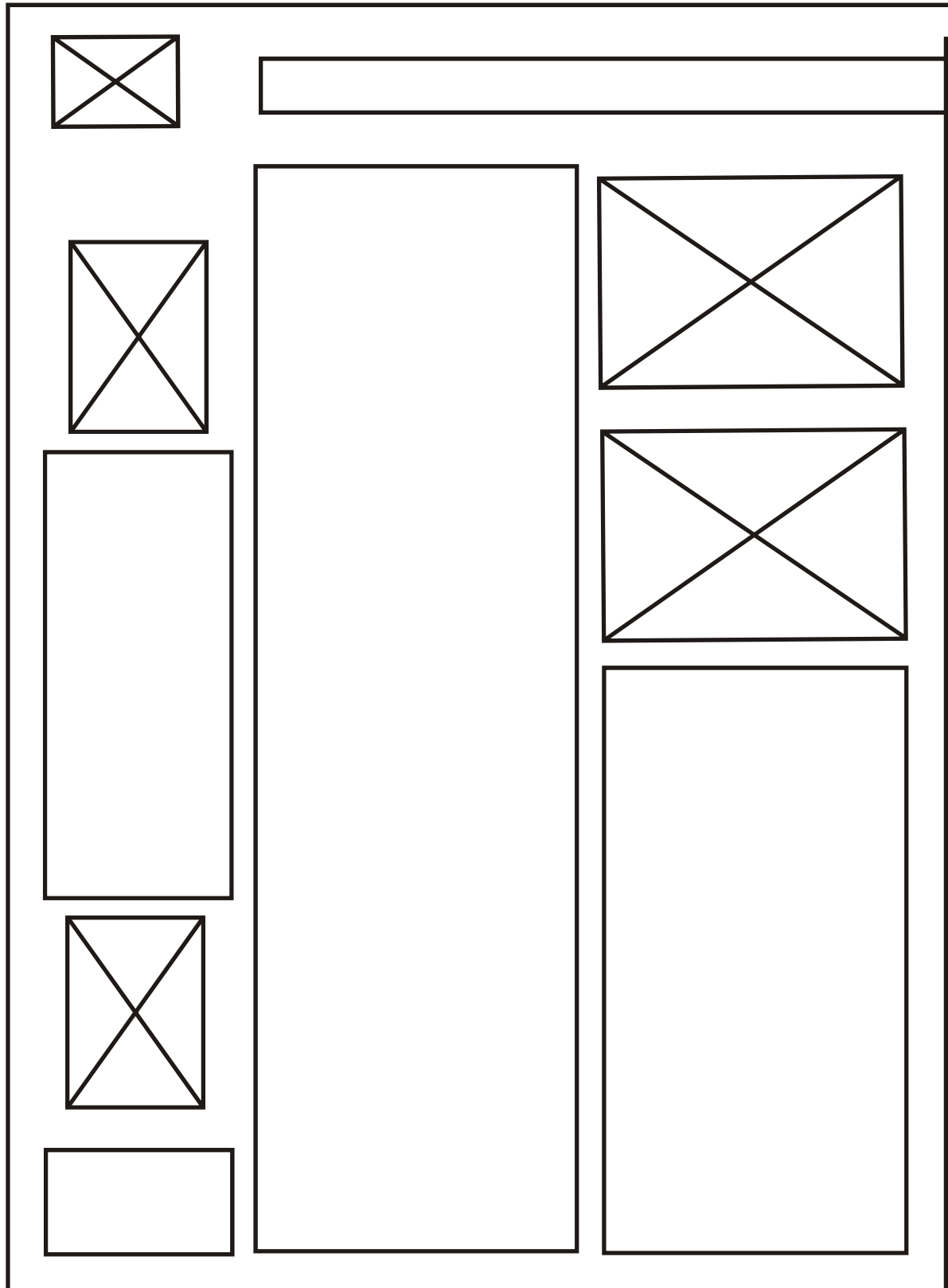


- Mix long and short articles in the same publication using a different grid for each. Or use different grids for feature material and regular recurring departments.

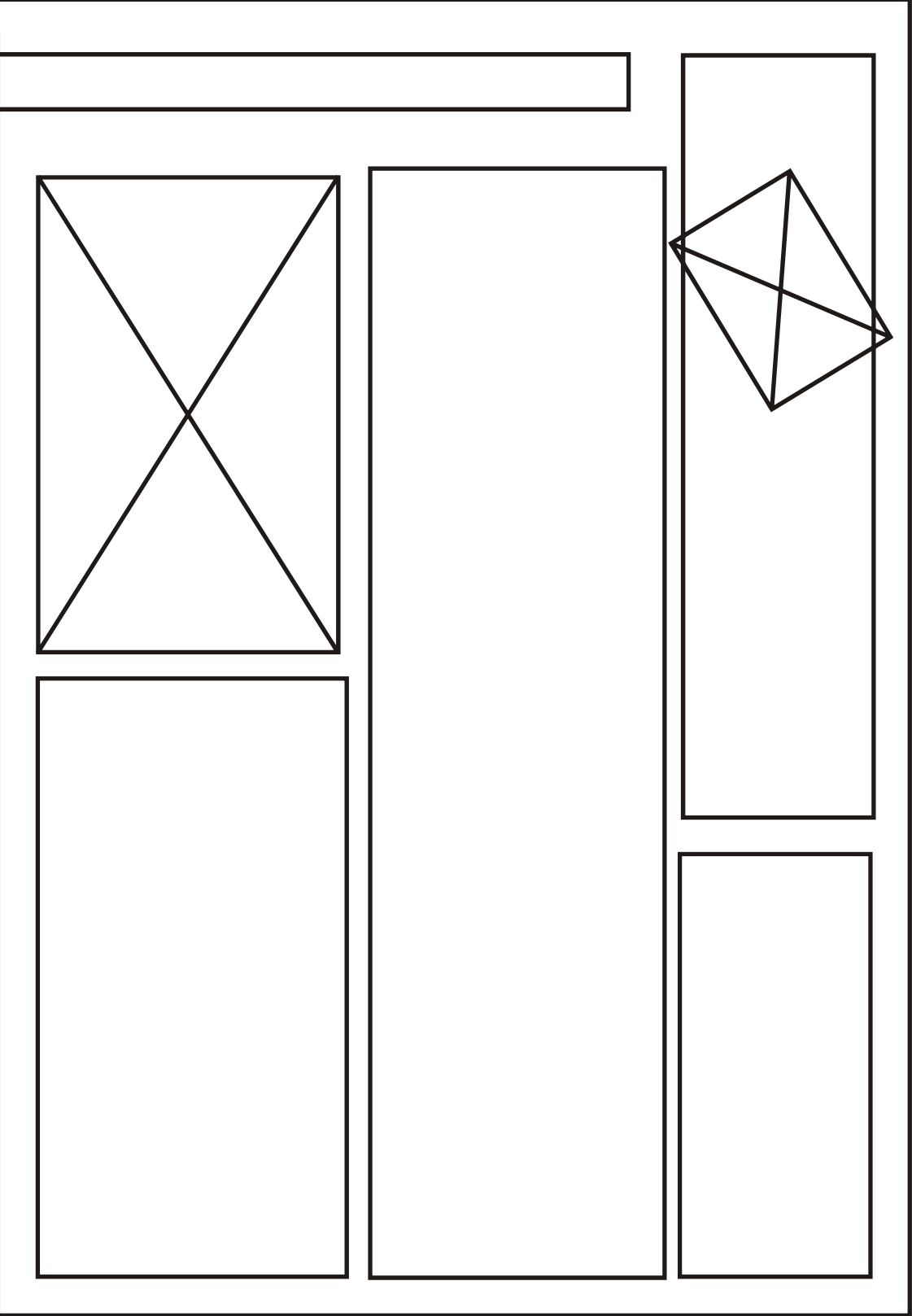
As with any grid system, use it consistently. Let content guide your design and make your grid a partner in your page layout -- not a dictator.

Thumbnails and Roughs

Before a magazine can be produced a detailed layout of the proposed design must first be roughed out using thumbnails as shown below. The example shown uses a three column format.



The solution/final draft to the example below can be seen overleaf.



Typical magazine page layout

Bleed

Header

Headline

Column

Rule

Caption

Margin

Register Mark

Medical Terms Explained

Our Experts

RAO what is it?
Expert Bob Green explains

Recurrent Airway Obstruction (formerly known as chronic obstructive pulmonary disease/COPD) is a problem affecting the lungs and the tube that delivers air into them (the bronchi). The cause is an allergy to fungal spores—when breathed in the horse over-reacts this results in excessive production of mucus with narrowing of the airways, similar to a human having an asthma attack.

Good Management

It is not possible to cure RAO at the moment but even severely affected horses can be completely free of symptoms. Here are a few points to consider:

- Turning out horses 24/7 this means providing fields, pastures and shelter as appropriate.
- Ensure ventilation is perfect as horses spend the entire night in the stable so there has to be sufficient air circulation.
- Good quality bedding (straw or paper) is better than straw as it does not harbour so many spores. Rubber matting is better.

Medication Matters

Medication may be useful to help a distressed horse with a flare-up prior to allergy diagnosis while any ironmental changes are being made. The medication prescribed is often through an injection or given in feed. Sometimes a **polymer** is used to administer powerful anti-inflammatory drugs. Other ways to help your horse are to use homeopathic remedies or acupuncture can help.

Arthritis what is?
Expert Rachel Carlin Explains

Arthritis is the disease of the joints that results in stiffness, pain and lameness. In the horse the more correct terms are:

- Osteoarthritis - OA;
- Or degenerative joint disease—DJD

There are various ways of categorising different types, depending on...

- The age/ use of the animal
- Whether the disease affects high motion joints or low motion joints;

Good Management

Most arthritic horses need movement advice on so parts. Rachel Carlin says "Horses are designed to keep moving when not asleep. And as we now know, gentle movements are often beneficial."

Bob Green agrees, but adds: "Long periods of rest are often counter-productive but may be indicated if there is significant ligament or bone damage. The following will help:

- Arthritic horses also need top top shoeing. This will allow the horse to be

Page No./Folio

Colour fill

Gutter/Alley (white space)

Line Rule (black line)

Heading

Maintained By Experts

Text

Azoturia what is it?

Most commonly known as "wet feet" and "spring up" - the correct name for this condition is exertional rhabdomyolysis. This condition is associated with exercise. Enzymes in the muscle cells rupture, spilling out into the bloodstream resulting in pain, stiffness and lameness. If there is a large number of these enzymes within a blood sample, then muscle damage has occurred. This is most common in young fillies, but can affect any age, type or breed.

Good Management

A veterinary diagnosis is important to determine the most appropriate care and treatment. There are variations of the cause, and severity of the disease which means treatment may well be different for each horse. Always feed a diet that is on a par with the amount of exercise that the horse is receiving. Most importantly always ensure your horse is sound and healthy before you exercise him. Respiratory and orthopaedic issues make horses much more susceptible to exertion.

Medication

"High-strung" horses also appear to be predisposed to spring up. In these cases judicious use of ligandolazine can be useful especially when the horse may be fresh and excitable. Homeopathic methods are also available. The basic medical advice is to treat your horse with a specific diet. High carbohydrate diets can encourage exertion, changing to that of fibre and vegetable oil enriched feed. Supplementing electrolytes into the diet and will increase levels of sodium as a horse can sweat up to 10 litres in an hour losing 4g of sodium in every litre.

Exercise

Whilst the condition is triggered by exercise, controlled exertion is central to successful management. Detailed exercise plans will vary depending on the use of the horse and the number of episodes of exertion it has suffered. Consistency counts. It is reassuring about the future for horses prone to the condition. Consistency is what counts here. If you've got the feet right, the turnout right and the exercise regime right, then you can do what you like with a horse prone to spring up.

Tilly's Top Tips!



- Always ensure your horse bedding is clean and dry.
- If your horse has an outdoor paddock make sure it has a shelter.
- After hatching with your horse clean and brush him to prevent mud fever (an infection of the lower limbs).
- Encouraging your horse to sit from the ground will allow the respiratory system.
- Always ensure your horse is fed the correct diet.

Useful Contacts

- Robb and Sue Veterinary Clinic 01693 355239
- Top Spec 0370 240 6896 www.topspec.com
- Trinity consultants 01243 556493 www.trinity.co.uk

Page 9

Reverse (Text)

Tilt

Margin

ance)

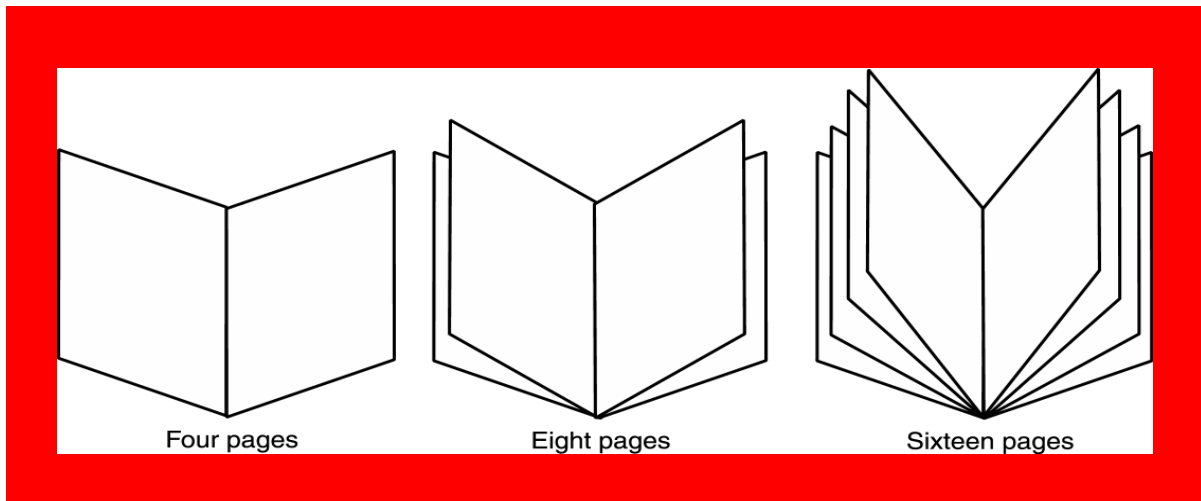
Sub Heading

Footer

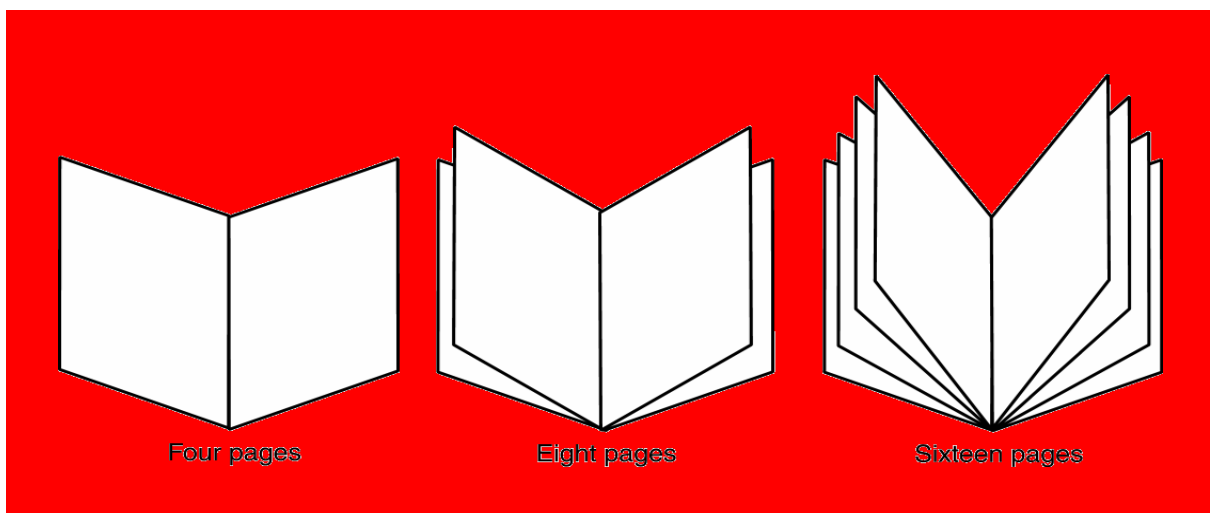
Crop Mark

The layout below has a white background which takes away from the main image. To take this white background away we simply apply the **Transparency** tool

Without Transparency tool applied



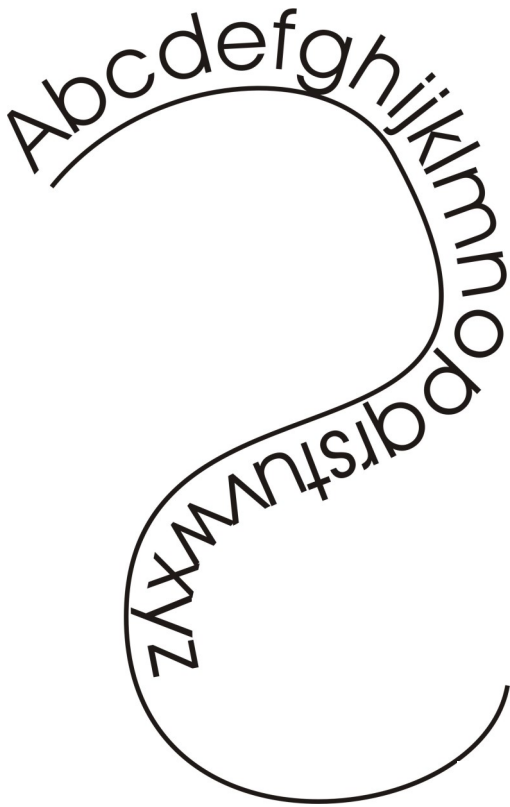
With Transparency tool applied



The above booklets shown are examples of multi page formats. Whereas the three and two fold leaflets are examples of a single page layout.

Flow Text along a path

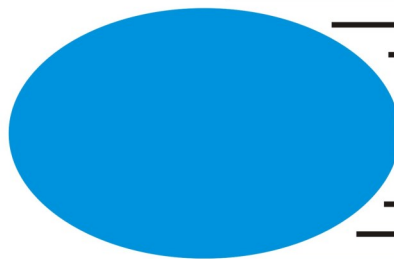
Abcdefghijklmnopqrstuvwxyz



←
Flow Text along a path

Text Wrap round an object

Text →



Drop Shadow

Typography & Page Layout

Type Terms

A typeface may be named for its original designer (Baskerville, Bodoni, Garamond, Goudy); for its use (Times Roman was designed for the *London Times*; Century and Avant Garde were designed for *Century* and *Avant Garde* magazines); for its characteristics (Excelsior and Paragon were designed for high legibility); or for its designer's fancy (Perpetua, Souvenir, Centaur). Typefaces are also given generic names as well as brand names, e.g. different type-founder's call Times Roman different names, e.g. Times New Roman, Geneva, and English.

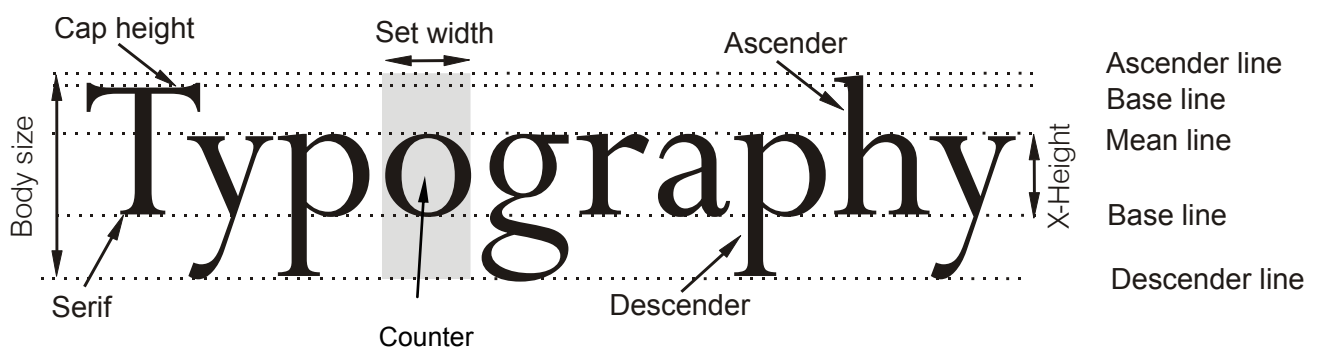
Typefounders' versions of the same typeface differ only slightly from each other. Even so you can, for example, seldom interchange one typefounder's 10-pt Baskerville with another's, to try to do so would result in a noticeable mismatch with the original setting.

To identify type or recognise a wrong font, you must know what the variables are, because differences amongst the thousands of typefaces available today can be minute. Since an untrained eye cannot distinguish even gross differences, you should become familiar with the fundamental features of type that are labelled in the following diagram:

Serif and Sans Serif

Serif fonts tend to create a formal, serious look. The serif is a decorative feature at the ends of letters, numbers, etc. **See example below**

Sans Serif fonts lack the decorative features and are generally bland in appearance. The text used in this booklet is Comic Sans which is a Sans Serif font.



Basic anatomy of type

- ***x-height*** The height of the lower case letters such as `x', `a', `e'.
- ***Ascender*** The stroke of a letter which rises above the Mean line as `k', `l', `h'.
- ***Descender*** The stroke of a letter which hangs below the Base line such as `p', `y', `g'.
- ***Mean line*** The imaginary line which determines the height of lowercase letters; ascenders rise above the mean line.
- ***Base line*** The imaginary line on which all characters rest; descenders hang below the base line.
- ***Body size*** Size of the type being used; measured from the end of the ascender to the end of the descender.
- ***Serif*** Small strokes and cross-lines at the ends of major lines.
- ***Set width*** Width, in units, allowed for each letter which varies between letters and typefaces.
- ***Cap Line*** The height of capital letters. Depending on type design, capitals may be taller/shorter or same height as ascenders.

Type Categories

All typefaces that are to be used in the appropriate print media must be purchased under a number of specific criteria. It is important to know whether a favoured type design has the necessary flexibility to be used for a wide range of design and publication needs.

To this end, you must be aware that not all typefaces that are used have the same number of variations, or for that matter are available on the output device that you wish to use.

Font

Many of the more popular typefaces used today are available in three different alternatives: *Commercial font*, *Expert font* and *Pi font*.

A *Commercial* type font contains the usual range of characters that are needed for most forms of typesetting, i.e. one complete assortment of alphabet letters comprised of capitals and lower case, numerals, punctuation, special characters, and symbols.

A type font is only available in one specific typeface design. Therefore, a typeface such as 10-pt Times Roman is considered to be *one* font and 10-pt Times Bold is *another*.

Commercial font

Purchasing the same font from two different type foundries may yield the addition or deletion of certain special characters.

In Desktop Publishing, extra care must be taken when working across two or more platforms because certain characters from the *same font and type foundry*, accessible on the PC platform, are not available to the AppleMac.

Currently, *Expert fonts* are limited to those fonts which are the most popular typefaces. These fonts contain special characters such as `ligatures', `small caps' and `swash' letters that are not normally used, or needed, in the everyday world of commercial typesetting. For certain classes of bookwork and high-class typesetting purposes, their inclusion forms an invaluable addition to the finished result.

Expert Font

Alternate Character Font

Swash Character Font

It is unfortunate that in many cases, the actual number of characters that type foundries include into some of their expert fonts is small, necessitating the purchase of additional fonts to service particular typesetting needs.

Pi fonts usually contain a collection of special characters such as mathematical, monetary or decorative symbols, etc.

Pi Font — Zapf Dingbats

If you have a special need for certain characters, most manufacturers will make a pi font to fit your need using standard characters or even develop new one to suit you. *Symbol*, *Carta*, and *Zapf Dingbats* are examples of common pi fonts.

Series

Irrespective of the style of font you use, if the design is readily available in a range of sizes, e.g. 10-, 12-, 14-, 18-pt, etc. and has the same name, then it is regarded as being a *series*.

The actual range of sizes available in a font is dependent upon a number of interdependent factors such as:

- Application software, e.g. QuarkXPress vs Microsoft Word vs Freehand.
- Utility software, e.g. Adobe Type Manager.
- Font format, e.g. Type 1, Type 3, TrueType.

The type of output device being used, e.g. a *PostScript* laser printer has an infinitely larger series for its fonts than does a *non-PostScript* laser printer.

Even today, there are still a remaining few dedicated typesetting systems still in use that are restricted to size increments of 1-pt and also, cannot set type above 36pt.

Point Size

In the Technical Department we continually tell you that everything we measure is in millimetres, this true for everything except typeface.

Typeface is measured in **Points**.

Typeface is not normally presented smaller than **8 point**.

The size of text usually used by newspapers, books, magazines, etc. is between 10 and 14 point. The size of point being used here is 12 point. Headline text is generally sized at 16-36 point, anything over this size is usually found on posters etc. The heading at the top of this page is 18 point.

The text printed below is a typical page from a typeface catalogue. This unusual sentence contains all the letters of the alphabet. The typeface used here is **Times New Roman**.

12 the quick brown fox jumps over the lazy dog. 1234567890

18 the quick brown fox jumps over the lazy dog 1234

24 the quick brown fox jumps over the lazy

36 the quick brown fox jumps over

48 the quick brown fox

Family of Text

The last variable in the flexibility (and popularity) of a typeface design is whether or not the design has a range of variants. If a number of fonts have the same name and general characteristics of face, e.g. Times Roman, Times Bold, Times Roman Italic, etc. then they are known as a *Family*.

Font Family

The majority of fonts in common use have at least four variants, i.e. normal, italic, bold, and bold italic. The popular type design used above (Helvetica), has a family of over 50 variants, whereas many decorative and script style fonts such as Algerian, Arnold Boecklin Giddyup and Pepita, do not have a range of different variations and are usually restricted to a single font.

When nominating a typeface, the order of description can be thus:

- Type Size: **10 point**
- Type Body: **12 point**
- Type Family: **Helvetica**
- Type Weight: **Bold**
- Type Width: **Extended**
- Type Modification: **Outline**

Typesetting

J u s t i f i c a t i o n

Typing or setting text lines to the same length so that they line up on the left *and* the right is known as 'justification'. The information that you are now reading have been typeset using this method. The practice originated with Mediaeval scribes who ruled margins and text lines so as to speed writing and fit as many characters on a line as possible.

Later, metal type required even copy blocks to allow 'lock up' into page form.

The opposite of justified text is ragged text.

Justification is accomplished by filling a line until the last possible word or syllable fits and then dividing the remaining space by the number of word spaces. The result is placed at each word space.

Word spaces are variable in width, expanding or contracting as needed to space the line out to its justification width.

Margins are the imaginary vertical demarcations for text or tabular columns.

Overall or primary margins are established by the line length function or the cumulative total of secondary margins (tab or text columns).

Space between lines

To improve the ease with which text can be read, i.e., legibility, the amount of extra space placed between each line in a setting must be varied according to the line length and character of the type face being used. For example, a light type with a small x-height, or a medium type with a large x-height, would need to be treated quite differently.

A suggestion in this matter is to have space equal to the depth of the lower case 't' between the lines. Most settings will always benefit with the addition of extra line space. A good rule-of-thumb is to add an extra 20% line space to the type face size being used.

Generally, the longer the line, the more space that is required. This is certainly the case when deciding the line spacing of sans serif type faces and for paragraphs set in a bold face. Capitals need more space between lines than lower case. The x-height, type face, weight, and leading make the type easy or very hard to read; consequently, decisions regarding type face and line spacing are very important in all forms of printing.

Space between words

To further improve on legibility, word spacing can also be controlled, but again too much or too little space can affect the ease with which the paragraph can be read. As you might expect, word spacing is affected by the style of type face chosen together with the particular situation for its use. Condensed type faces do not require as much space as expanded faces, and small type sizes read better with a little extra word spacing. As a general guide, the ideal word space represents the width of the lower case 'e' in the type face being used.

Wordspacingmustbecontrolledtoensurethatthereisneither-toomuch,nortoolittlespace.Oneresultofbadwordspacingisthatthereaderwillquicklybecometiredanddisinterestedinthecontentandwillfinditdifficulttoconcentrate.

Too little word space

Word spacing must be controlled to ensure that there is neither too much, nor too little space. One result of bad word spacing is that the reader will quickly become tired and disinterested in the content and will find it difficult to concentrate.

Too much word space

With the taste for narrow spacing still growing, some authorities suggest that the ideal word space is the width of the lower case 'i' in the type being used. For this width to be practical however, there is a need to reduce the set-width of the font being used.

Display

Display setting is the highest form of punctuation, this is where spacing of groups is applied. For example, if a job was set in solid composition, a comma would indicate a slight pause; a full point a longer pause; a fresh paragraph a new thought; a new chapter an entire change of thought.

In display composition punctuation marks are dropped at ends of lines only — but to serve the purpose, space is placed between lines or groups to the same replacement value of a comma, full point, etc.

Keep to a minimum the number of groups in a job, as the fewer groups in a job, the easier readability is achieved. Most jobs require no more than three groups.

To express these ideas in a simple way, we place space between lines or groups of equal in value to the degree of punctuation that would be otherwise used if the setting were solid, i.e. small space for comma, large space for full point, etc. The space is much more discernible than the punctuation mark.

In addition, in display we emphasise items according to their importance by the use of larger or bolder type faces. It is a good idea to refrain from excessive space which causes detachment of units, as too many points of interest in a printed piece cause difficulty in reading.

However carefully the arrangement of solidly set text matter may have been planned, with reference to type size and measure for example, and however carefully that matter is subsequently set, it can almost always be made even more readable by sensible leading.

The amount of leading in a given piece of text setting is usually decided by one or more of the following:

- The nature of the work;
- The design of the particular type face;
- The body size of the type;
- The x-height of the type;
- The weight and colour of the type; and,
- The measure to which the type is set.

Letter spacing of italic and roman.

Most program applications automatically take this into account. However, even this might not be sufficient and letter spacing will need to be done.

In setting lower case type, you will find that the letters are designed to fit together properly in any combination, giving the word a compact shape. When letter spacing is introduced, it weakens the shape of the word and reduces legibility. So avoid letter spacing lower case letters. Words set in all caps, on the other hand, often have inconsistent letter spacing which must be corrected.

Letter spacing should be used properly.

Avoid a large amount of letter spacing with condensed letters. These letter styles are specifically designed to be set close together and will appear strange and unappealing if set too far apart.

Since reducing the amount of space between the letters may not be desirable, we must consider the space between closer letters in order to make them consistent with the letters that are further apart.

The peculiarities of the capital letters make them broadly divisible into three groups with regard to the requirements of letter spacing. These groupings will assist you in deciding which letters may/may not require extra space.

Grouping for spacing of capital letters.

Remember, as you increase letter spacing, you may also have to increase the word spacing so words do not run together.

Vertical setting of lines

Occasionally, display lines are set vertically. If it is appropriate to treat an unimportant line or lines in this way (important lines should not be treated so) it makes for easier comprehension and a much cleaner and therefore stronger pattern if the line is set normally and then placed on one or other of its ends and not set with the letters the right way up, and one below the other, e.g. Hotel signs.

Apart from these advantages, the normal line setting placed on one or other of its ends, that is, with the feet of the letters facing left to right, will practically always occupy less depth, and where M's and W's occur, less width, than the setting with letters placed the normal way up one below the other.

Type arrangement

There are five basic ways that lines of type can be arranged for a given piece of composition they are: Justified, Range Left, Centred, Range Right, and Asymmetrical.

Justified

Justified is the most familiar method of type arrangement, especially for books, magazines, and newspapers. The lines of type are kept all the same length so that the lines are flush left and right. In order to make the lines equal, the word spacing is adjusted so that each line fills the entire measure.

Character in types has to do with the impression made by the individual forms, their proportions, and the intangible something in them that makes the letters of each word hang together to form.

Justified setting

Advantages

- This arrangement is best suited for sustained reading comfort.
- The pages assume a quiet look and do not distract the reader.
- It allows the reader to concentrate on the content rather than the design.

-

Disadvantages

- If the line measure is too narrow there could be a risk of poor word spacing.
- Words may be poorly hyphenated at the end of lines.

Range Left

This arrangement is the second most widely used method for composition; most poetry and typewritten copy appears this way. The type is set with even word spacing and each of the lines will vary in length.

Space between groups

In display composition, correct spacing between groups can affect the appearance and readability of type matter. In this situation, the wishes of the person designing the job will govern the amount of space to be used.

Variety is a very important principle in spacing, just as much as type face selection or type sizes. Uniform space between groups in display setting leads to monotony and as a consequence, an uninteresting appearance.

In spite of the necessity for variety in spacing between groups, it must be achieved only after due consideration of how varying amounts of space are to be placed.

Space is used to separate one thought or section of copy from another, therefore the amount of space should be varied according to how isolated one thought is from another.

The readability of a piece of printed matter can be assisted or marred by the placing of the space between lines or groups.

Character in types has to do with the impression made by the individual forms, their proportions, and the intangible something in them that makes the letters of each word hang together to form.

Align left setting

Advantages

- The even word spacing creates a uniform overall texture.
- It is ideal for setting type in narrow columns.
- Hyphenation of words is at a minimum.
- The risk of *rivers of white* flowing down the page is eliminated.
- Lines can run either long or short, hyphenated words are virtually unnecessary.
- The ragged edge of the right adds visual interest to the page.

•

Disadvantages

- If lines are set the same approximate length it can be a disturbing factor in the design.

It is important that the ragged edge should create a pleasing silhouette, convex rather than concave.

Centred

In this arrangement, the lines of type are centred on the page. When using centred type the length of the lines must be varied enough to create an interesting silhouette. To control the shape, a minimum and maximum line length should be indicated.

Character in types has to do with the impression made by the individual forms, their proportions, and the intangible something in them that makes the letters of each word hang together to form.

Align centre setting

Advantages

- The even word spacing creates a uniform overall texture.
- Hyphenation of words is eliminated.
-

Disadvantages

- Reading centred lines is tiring, therefore it is better suited to small amounts of copy.

Range Right

In this instance the lines are aligned at the right so that the left side is ragged.

Character in types has to do with the impression made by the individual forms, their proportions, and the intangible something in them that makes the letters of each word hang together to form.

Align right setting

Advantages

- Since this form of type arrangement is infrequently used, it can create an interesting layout.
- The even word spacing creates a uniform overall texture.
- Ideal for setting type in narrow columns.
- Hyphenation of words is reduced to a minimum.
-

Disadvantages

- Visually, it is an interesting layout, however this setting demands more concentration on behalf of the reader.
- The reader is accustomed to reading from left to right, a ragged left edge increases reading difficulty.
- Reading lines set range right is tiring, therefore it is better suited to small

Asymmetrical

In this arrangement, the lines have no predictable pattern in length or placement. The simplest method of controlling this effect is to have the copy set with specified line-breaks and then arrange the lines yourself in mechanicals. There are no rules and probably no two typesetters would break the lines in the same place.

Character in types has to do with the impression made by the individual forms, their proportions, and the intangible something in them that makes the letters of each word hang together to form an agreeable whole.

Asymmetrical setting

Advantages

- Since this arrangement is not frequently used, it can create an interesting layout.
- It maintains even word spacing.

Disadvantages

- Visually it is an interesting layout, however this arrangement demands more concentration on behalf of the reader.

Reading lines set asymmetrically is tiring, therefore it is better suited to small amounts of copy.

Classification of Type

An important factor in the composition of a piece of printing is the selection of the correct typefaces. Choosing the right typeface makes clear the sense of the message, and imparts that atmosphere or environment which enables it to be more easily understood.

The number of typefaces in use today runs into the thousands and as such presents difficulty in selecting the appropriate design for a particular job. Because there are so many type designs to choose from, it is easier to first choose a general type style or *classification* to suit your graphic design, and then, look for a particular typeface that relates to that classification.

Although there are well over 32 unique type classifications, the simplest form, as follows, places type into seven *broad* classifications:

Roman (Serif)

Serif is an all-inclusive term for characters that have a line crossing the free end of a stroke. This style face, said to have been invented by the Romans, is also commonly referred to as 'roman'. It is the one most often used and also one of the most legible styles. The style is very comfortable and familiar to all readers and is therefore used in the bulk of reading material.

`Tranjan Letter' shapes based on ancient Roman lettering

The Serif typeface is then further classified into Humanist, Garalde, Transitional and Didone, according to their stress and serif-form as follows:

ROMAN

Humanist Faces:

Stemple Schneidler, Centaur, Italia, ITC Berkeley

Garalde Faces:

Bembo, Garamond, Plantin.

Transitional Faces:

Times New Roman, Lucida, Baskerville.

Didone Faces:

Bodoni, Walbaum, Americana.

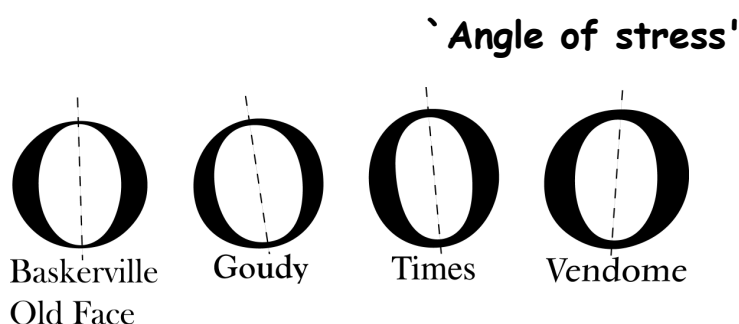
Humanist (Venetian) faces are named after the first roman typefaces that appeared in Venice in 1470, Humanist typefaces were initially designed to imitate the handwriting of Italian Renaissance scholars. These types that are characterised by their strong, bracketed serifs. The letters are in general wide and heavy in colour. Other characteristic letters are the wide lower case *e* with a diagonal bar to the eye. A noticeable feature of *true* Humanist types is the square full point.

These types have a small x-height, moderate contrast between strokes, and an acute 'angle of stress' and do not lend themselves to modern design treatments of type such as reverse or stipple. The style prints best on a unsized stock in black or brown ink.

Garalde (Old Style) were designed centuries ago by such masters as the French printer Claude Garamond and the Venetian printer Aldus Manutius. Garalde typefaces include some of the most popular roman styles in use today.

These faces have rounded serifs and moderate contrast between strokes. The letters are open, rounded and very readable. The thick strokes of curved letters are off-balanced. The 'angle of stress' of these types is less acute than Humanist types.

Like Humanist, these types do not suffer reversal and stippling well, except in large sizes. Prints best on an unsized, off-white stock, in black ink.



Kerning

Before text could be entered using a keyboard, designers made layouts by hand using rub-down lettering to represent finished text in client visuals. Anyone who has ever used these methods will understand just how difficult it can be to properly space letters together. Giving letters equal spacing simply does not look visually correct. This is because there are certain groups of letters that do not look comfortable next to each other. For this reason spacing needs to be added or taken away. Fortunately, because most DTP software programmes control letter spacing, this is only necessary for headline or large areas of text.

Yellow

Unkerned

Yellow

Kerned

Print

The choice of print method depends on many factors such as:

Quantity

Number of colours

Print Size

Medium to be printed on

Print quality required

Finishing required

Cost

Printing Methods

Offset Lithography

This is the most popular printing technique used for most printed matter we encounter such as leaflets, booklets, magazines, catalogues.

The separated image is exposed onto film through a halftone screen. The resulting "Lith" is then exposed onto a light-sensitive plate (sometimes made from zinc, aluminium and even special paper stock). When exposed to a strong light source, the transparent areas let light through the Lith onto the plate. The chemicals on the plate react to the light so that when the plate is treated with further chemicals, the print areas become resistant to water. This is the basis of Lithography, the fact that oily substances repel water. When the plate is dampened and oily printing ink rolled across its surface, the ink will adhere only to the treated areas, i.e. the image areas. The term "Offset" refers to the fact that a large soft roller is rolled over the plate picking up the ink and offsetting it onto printing paper. For full colour printing there will usually be four full printings, one for each of the process colours. However, these days printing presses are able to cope with up to five and perhaps six colours allowing for the use of special inks such as fluorescents, gold, silver and varnishes.

Offset lithography is the most cost-efficient and fastest method of printing hence the reason it is so widely used.

Screen Printing (Serigraphy)

This is one of the most ancient methods of printing attributed to the ancient Chinese and often called Silkscreen printing. This is because the meshes used in the printing were made of silk before synthetic fibres were introduced. Screenprinting was the preferred method for large-scale printing and for printing onto anything from t-shirts to circuit boards and glass. High speed, large format inkjet printing and other advances in print technology have made Screenprinting less competitive for certain types of work.

At its simplest, Screenprinting involves making a stencil which is adhered to a fine mesh screen attached to a frame. Using a squeegee, the ink is pushed

through the stencil and onto the print surface. A halftone from a colour separation can be used as a stencil. This can be adhered by exposure onto a screen coated with light-sensitive emulsion or by exposing onto a light sensitive film, which is treated and then attached to the screen. The photo-sensitive emulsion reacts to light, i.e. where the light penetrates the stencil and hardens. Where the light does not penetrate, the emulsion will remain soft. When the screen is washed, the soft areas of the emulsion wash away leaving just the image area. The main advantage of Screenprinting is its adaptability. One screen can be used again and again, but also easily reconstituted. There are no limits on the amount of colours that may be used and light colours can be overprinted easily onto dark colours.

Flexography

The image to be printed is formed onto a rubber plate, which is then wrapped around a cylinder. It is a high speed, high output method of printing favoured by the packaging industry for use on non-porous materials, polythene bags, cellophane etc. Flexography also favours large-scale work with fast-drying inks. One of the main advantages of flexography is that changes can be made to the plate easily by making a patch, so that the whole plate does not have to be reproduced. One of the disadvantages of flexography is that halftones and small text do not print particularly well as the ink tends to spread.

Gravure

This is known as an Intaglio method of printing just like etching. This means that the image is bitten into a plate, the ink pushed into the bitten areas, the surface wiped clean and the paper pressed onto the plate by a rubber roller. The paper lifts the ink from the bitten areas. The image is formed by engraving the screened image onto a metal cylinder. Gravure is a high speed, long-run process suited to halftones and newspapers, postage stamps etc. Its disadvantage is that plates are expensive to produce and therefore mistakes are costly. Also, the whole image needs to be screened, therefore text does not always reproduce too well.

Collotype

A very rare printing method these days, but is the only one to produce real

continuous tone without using a halftone process. A negative is made of the image, which is then contact-printed onto an aluminium plate coated with light sensitive gelatine. The amount of hardening of the emulsion depends on the amount of light reaching the plate through the negative. It is a slower method of printing used for high quality reproduction work and for very short runs.

Photocopying

Photocopying is now the most common method of reproduction. We are so used to the process that we do not consider it to be a method of printing at all. There are many styles of photocopier available, but they mainly work along the principle of projecting bright light at an image. The light is reflected from mirrors onto an electrostatically charged drum. Toner attaches itself to the charged areas of the drum and the image is fused onto the paper using heat. In modern laser copiers a laser is used to draw the image onto the drum. The advantage of photocopiers is that the cost is small for fairly long runs and, without the need for processing, is very quick. The disadvantages of photocopying are that there are restrictions in printable size, the choice of paper stock is limited and the quality is variable.

The cost of colour photocopying machines is falling at such a rate and the quality is increasing so that copiers may soon compete with small colour offset lithography, at least for short runs. Technology is such that laser copiers now work straight from computer maximising quality and allow editing.

"Direct from PC" methods

Desktop Printers

The massive growth of home computing coupled with the ever-decreasing costs of software and hardware has meant that anyone is able to publish and print quality publications from the comfort of their own home. The cost and print quality of most desktop printers means that many small businesses are

able to publish and print their own literature without ever being involved with the printing industry. However, most desktop printers are designed for short-run work only and are not financially viable for producing large quantities.

The most common types of desktop printer available are the laser printer and the inkjet printer of which there are many variations.

Laser Printers

Lasers are the best printers available due to the quality at which they are able to print. The only disadvantage is that most affordable laser printers are black and white only (colour lasers at present are very expensive). Lasers work by using a laser to draw the image onto an electrically-charged rotating drum. The laser removes the charge from the white areas of the image leaving the image areas to attract toner which is then fused onto the paper by a heat process. Many laser printers have PostScript™ capability installed which allows for Postscript fonts and images to print at the best possible resolution. The quality of laser output is such that it can be used for producing halftones for newspapers, newsletters etc.

Inkjet Printers

Inkjets tend to be sold as colour printers and their cost is so competitive that are usually the choice of most home users. The inkjet works by firing minute drops of ink onto the paper through a print nozzle. The detail with which inkjets can do this increases all the time and almost photographic quality is the norm. The quality of colour is excellent, but the disadvantage is that inkjets are really only intended for very short print runs. The types of paper that can be used in inkjets is limited and best quality is only available on specially coated inkjet papers. Due to the time it takes to print and the cost of the ink cartridges, inkjets can really only be considered for colour proofing.

Other desktop printers

Bubblejet

Bubblejets work via a heating element, which causes droplets of ink contained in a series of fine nozzles to be propelled onto the paper. Print quality is not as good as inkjets.

Thermal Wax

These printers work by using a roll of colour ribbon containing each process colour. The paper is transported through the printer once for each colour. A print head, the whole width of the paper, containing many heating elements melts a dot of colour from the ribbon onto the paper repeating the process for each colour in the process. Although it produces glossy, bright colour, the disadvantage of thermal Wax printers is the cost of the colour ribbon which has to be replaced for each print and the paper which has to be specially coated for the best results.

Dye Sublimation

Dye Sublimation printers work by a process that determines the colour deposited by the amount of heat used on the inks. The result is high quality even from fairly low resolution images. The disadvantage lies in the high cost of consumables and the slow printing times.

There are new technologies being developed all the time for outputting images directly from a PC, though most print techniques such as large-format inkjet printing are designed for short run and one-off work. Many printers now use systems that allow for the printing plates to be created directly from the PC, speeding up the print process and allowing for last-minute editing.

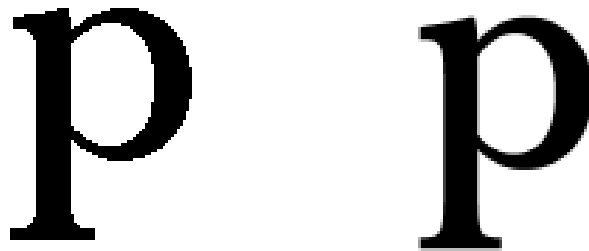
Computer Graphics

There are many different types of computer graphics, each with its own specifications and uses. The trick is to use the correct one for the correct output. Some are specific to a particular software package and some are

industry standards, which can be used across PC platforms as well as software.

There are two main types of computer graphics, the bitmap and the vector. Both are represented on screen as a bitmap, but a vector is like a mini-programme in itself. It uses the relationship between points and the paths between them to describe the image. Because the vector image is referenced, any changes to it are re-plotted each time. It can be scaled, skewed, stretched or otherwise manipulated without losing its quality on screen or in print. The same cannot be said of a bitmap, which, when scaled or distorted in some way will lose its original map of bits. Pixels may have to be added, re-assigned or replaced by the editing programme, but not close enough to the original. For this reason bitmaps are better reproduced at the sizes they were intended to be.

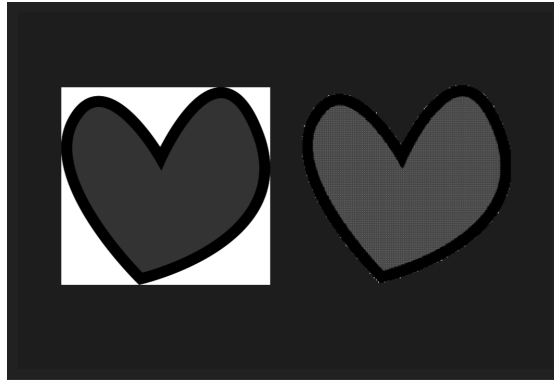
A technique known as anti-aliasing softens the edges of a bitmap taking away the harsh jagged look. This works especially well with fonts:



Bitmap font

Anti-aliased bitmap font

The Anti-aliased font looks smooth simply because there have been very subtle shades of grey used at the edges of the letterform to give the appearance of a smooth edge. A vector or outline font, like a postscript image, uses mathematical referencing to draw the letter at any size or distortion in any circumstance. This is the reason Postscript and TrueType fonts are the standards now. The other advantage of vector images is that the image itself is recorded as a vector file and not the background. So when a vector image is imported into another document it is independent of a background whereas a bitmap will always display a background colour.



Bitmap on the left, vector on the right

Graphic File Formats

The development of Postscript technology meant that the drawing and illustration software packages were able to export vectors in Postscript format. This format is known as EPS (encapsulated postscript) and now even paint programmes save in this format. Another good reason for using EPS files is that they will print at the highest quality of the output device they are printed from, more especially if it is a Postscript device such as a laser printer or image setter.

Most of the other file formats are bitmaps and their uses are described below:

BMP (bitmap) A graphic which is defined by specifying the colours of dots or pixels which make up the picture. Also known as raster graphics. Common types of bitmap graphics are GIF, JPEG, Photoshop, PCX, TIFF, Macintosh Paint, BMP, PNG, FAX formats and TGA. Used mainly for screen display in Windows up to 24 Bit

PCX Originally designed as an application format for windows-based software. It is now used across many applications.

GIF Invented by CompuServe for efficient transmission of graphics, this format can only support 256 colours, or 8 bits. The newer revision, 89a, allows for multiple images in one file to simulate animation. Unisys owns the patent to a form of compression used in GIF files and occasionally decides to demand licensing fees.

Thus, you may want to use the newer and completely free PNG format instead of using GIF files. Used for screen display. It is completely device-independent. Used mainly on for Web images, it can be interlaced which allows the image detail to build up rather than having it wait to download. Uses small colour palette, hence small files.

JPEG (JPG) Joint Pictures Expert Group. The committee which set standards for a file format for graphics. The JPEG file format is a compressed format, with some loss of quality during compression. A popular web format due to the generally small size of pictures. File formats of .jpg, .jpeg and .jpe. Used for screen display, particularly of photographic images on the Web.

PNG Portable Network Graphic. A newer graphic format which is small in size. Usually .png extension.

PICT Originally a Macintosh format designed for printing.

ZIP Zip is a file format where the files are compressed (referred to as "zipped"). Using a file compression program (such as PKZip for DOS, or Winzip for Windows), a zip file could be created from one or more original files.

Windows XP includes "Compressed Folders", a built-in file compression and extraction utility. Nonetheless, Winzip and PKZip still prove popular additions to computers.

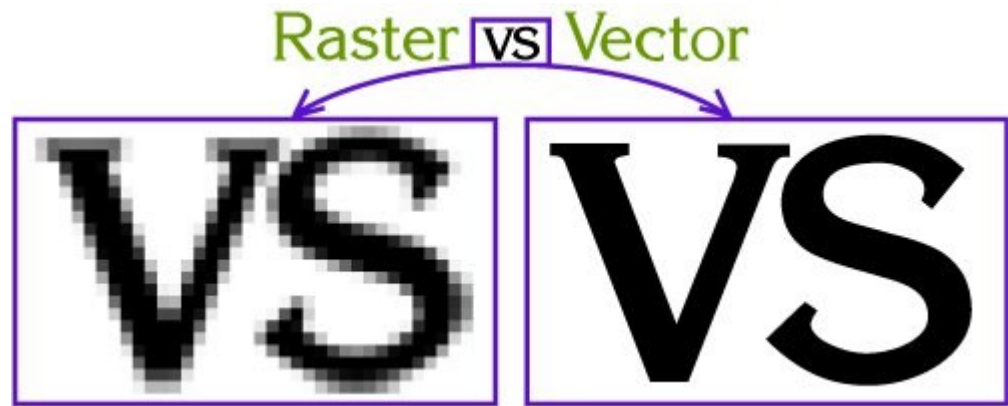
TIFF A Bitmap graphics file format. It was developed by Aldus in 1986 to provide a common format for scanners, and is mainly used for that purpose, desktop publishing, and as the data format for scanned faxes.

Most widely used image type for printing and for high resolution images. It is a good cross-platform format. Some applications allow for compression.

Raster (Bitmap) vs Vector

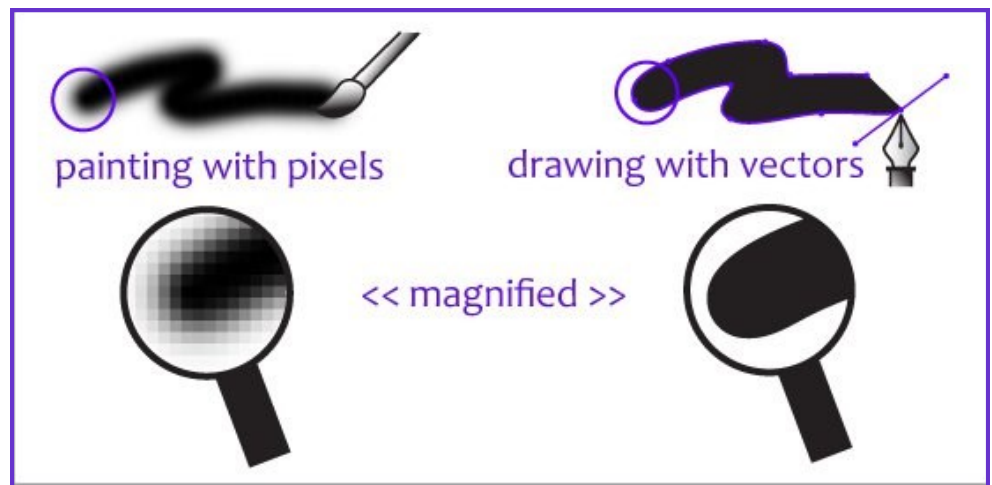
Raster images are made of pixels. A pixel is a single point or the smallest single element in a display device. Vector images are mathematical calculations from one point to another that form geometrical shapes.

I've magnified a raster and vector image above to better see the



differences between the two, but you cannot always see the difference at a glance. Vector graphics also display an *outline or wireframe view* which is important for processes that require vector art.

When a raster image is scaled up, it usually loses quality. A raster image can be enlarged by either adding more pixels or enlarging the size of the pixel.



Either way you are

spreading the original data over a larger area at the risk of losing clarity. A vector program will use a mathematical formula to build an image that can be scaled to any size without losing quality.

Raster / Bitmap Images

Raster images' dimensions are measured in pixels. Because raster images cannot be enlarged without losing quality, different suppliers have specific size requirements for their processes; they require a specific *pixel resolution*: a specific amount of pixels within each inch.

The amount of pixels within each inch in the image represents the image pixel resolution or ppi (pixels per inch).

How large a raster image can be printed - and maintain quality - depends on 2 things: the pixel dimension of the image (e.g. 6824 pixels wide by 2345 pixels high) the pixel resolution: pixels-per-inch (ppi) required by the particular printer Some offset printers (paper printing) require a minimum of 300 ppi Some screen printers (cloth printing) require a minimum of 240 ppi Large format printers (banners, billboards) vary a lot because it also depends on the distance from which the sign is going to be viewed - could be as low as 20 or more than 200.

How to determine what size your raster image must be, for good quality printing:

Multiply the resolution required by the area to be printed. Examples:

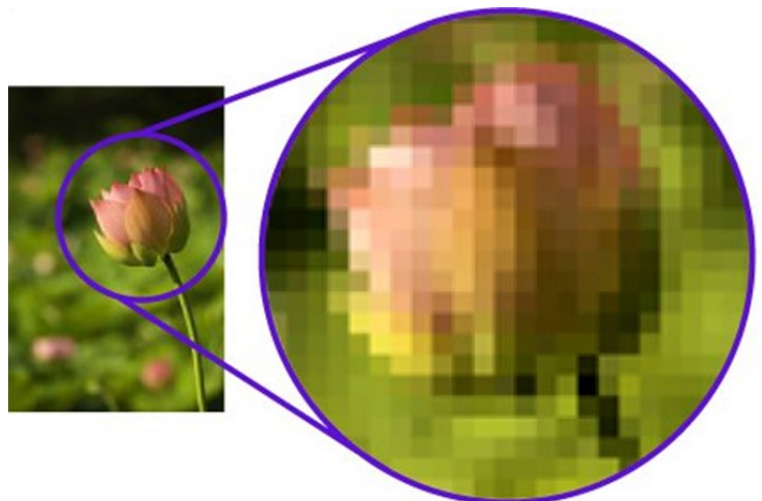
If a printer requires a minimum of 300 ppi and you want to print an image in an area that is 5 inches wide, multiply 300 pixels x 5 inches ($300 \times 5 = 1500$). Your image must be at least 1500 pixels wide.

If a printer requires a minimum of 240 ppi and you want to print an image in an area that is 12 inches wide, multiply 240 pixels x 12 inches ($240 \times 12 = 2880$). Your image must be at least 2880 pixels wide.

Once the image is created at a certain dimension, you may not be able to use this image at a larger size

without losing quality. When you manually increase the resolution with a program like Photoshop, Photoshop randomly adds pixels and the result will most likely be a high resolution image of poor quality.

Sample of a raster image.



How to determine what dimension your existing image can be printed at:

Divide the pixel dimension of your image by the resolution required by your printer.

To view and edit an image pixel dimension you must use a photo-editing program like Adobe Photoshop or Paint Shop Pro to open the raster file.

Examples:

If your image is 1993 pixels wide & printer requires 300 ppi ($1993 \div 300$) can be printed at 6.643 inches

If your image is 1993 pixels wide & printer requires 240 ppi ($1993 \div 240$) can be printed at 8.304 inches

- **Common raster image files:** jpg, jpeg, gif, png, tif, tiff, bmp, psd and pdfs originating from raster files
 - **Common raster programs:** paint programs like Photoshop & Paint Shop
 - **Common raster images:** photographs, illustrations with soft blends of colour gradients

.....Vector Graphics

Vector graphics are made of mathematical calculations that form objects or lines - they do not use pixels therefore they are resolution-independent.

Vector graphics can be enlarged and printed at ANY SIZE!

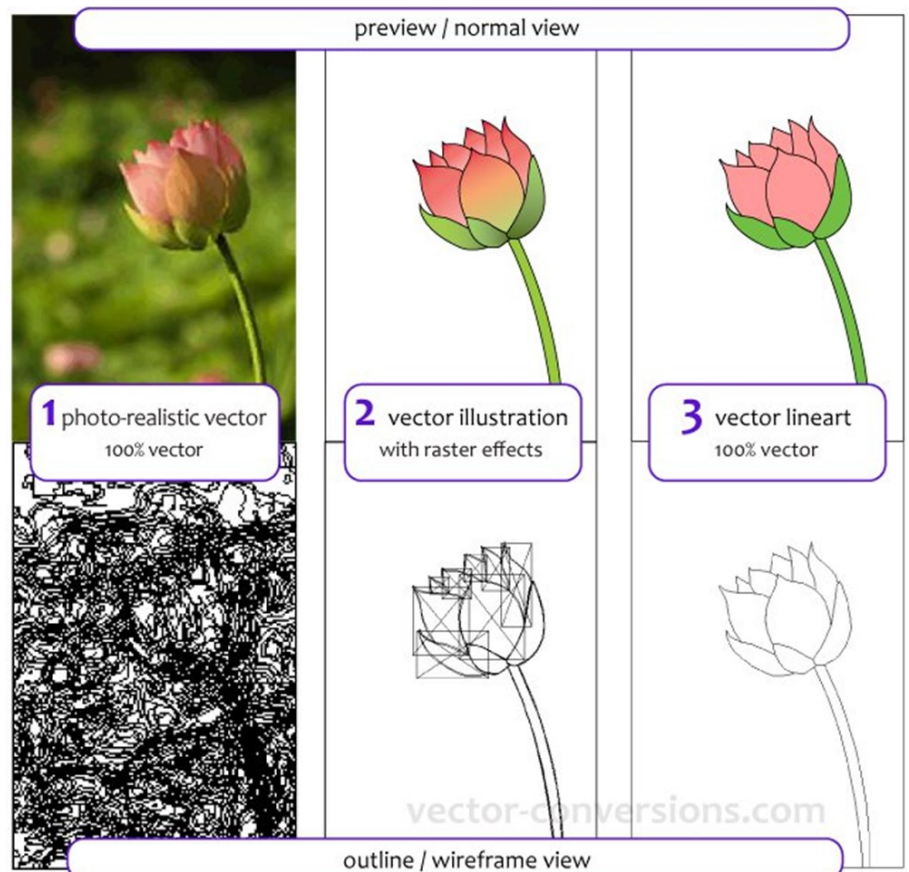
Instead of pixels, vector graphics use objects and lines (shapes) to represent images. Vector graphics can be scaled to any size without losing quality.

Some Vector programs have two different views; preview/normal view which displays the image as we normally would see it and an outline/wireframe view which displays the outline of every object in the file. This vector *outline/wireframe* is important to some companies like engraving & vinyl-cut signs because it guides the equipment they use to create their products.

For categorizing purposes I have named the above: photo-realistic vector, vector illustration, and vector lineart.

Photo-realistic vector: a photograph was traced as vector using a multitude of colours to allow the image to have a closer resemblance to the original. This vector image can be used in many different processes like CMYK or digital printing,

but as you can see from the outline/wireframe view, there are too many objects for it to work for engraving or vinyl-cut signs, or any other process that is guided by the vector outline. Photographs are best printed as they are: raster images



Vector illustration. This is a hand-drawn, simplified illustration using a limited amount of colours and colour blends. Colour blends can be created in vector programs but they are actually *raster effects* so this image is NOT 100% vector. The raster effects show up as boxes on the outline/wireframe view. This vector image is suitable for many processes except those that are guided by the vector outline such as vinyl-cut signs or engraving.
There are other ways to achieve colour blends, please see traced vectorization of images with colour blends.

Vector lineart. This is 100% vector art; NO COLOR BLENDS. The outline/wireframe is acceptable for all processes including those that are guided by the vector outline.

- **Common vector graphic file format:** eps* ai, cdr, ps, pdfs originating from vector files
 - **Common vector graphic programs:** drawing programs such as Illustrator, CorelDraw, FreeHand
 - **Common vector graphics:** logos, illustrations, drawings * eps and pdf files can originate from either raster or vector programs, and/or can include raster & vector elements. Is EPS Vector?
-

If I am creating a new design which software should I use; Raster or Vector Graphic Program?

It depends on the design itself. If it's going to have photographic elements with continuous tones and blends of color, you are probably better off using a paint program like Photoshop which is a raster program that specializes in photo editing, or use any other PAINT program.

If you want your final design to look like an illustration instead with clear contrasts between objects & shapes, then use a vector program.

You MUST use a vector program when creating art for plotters, vinyl-cut signs, engraving and other specialty items.

Ideally a company that has a logo design with photographic elements, also has a secondary version of their logo in vector format that can be used for those specialty items that require vector art. Sample below:

Raster (Bitmap)

Made of pixels

Represents and edits photo and photo-like elements better than vector programs with the use of continuous tones. The use of different colour pixels allows for smooth blends of colours.

Disadvantages

Is bound by the number of pixels in the image. It cannot be scaled up without losing quality.

Large dimensions & detailed images equal large file size.

Some service providers like

engravers, stencil-cut signs, etc, must have vector art.

It is more difficult to print raster images using a limited amount of spot colours.

Depending on the complexity of the image, conversion to vector may be time consuming.



Vector

Made of mathematical calculations that form objects and lines.

Can be scaled to any size without losing quality.

Resolution-independent: Can be printed at any size/resolution.

Number of colours can be easily increased or reduced to adjust printing budget.

A large dimension vector graphic can maintain a small file size.

Vector art is required by many service providers.

Can be easily converted to raster

Disadvantages

It is not the best format for photographs or photo-like elements with blends of colour.

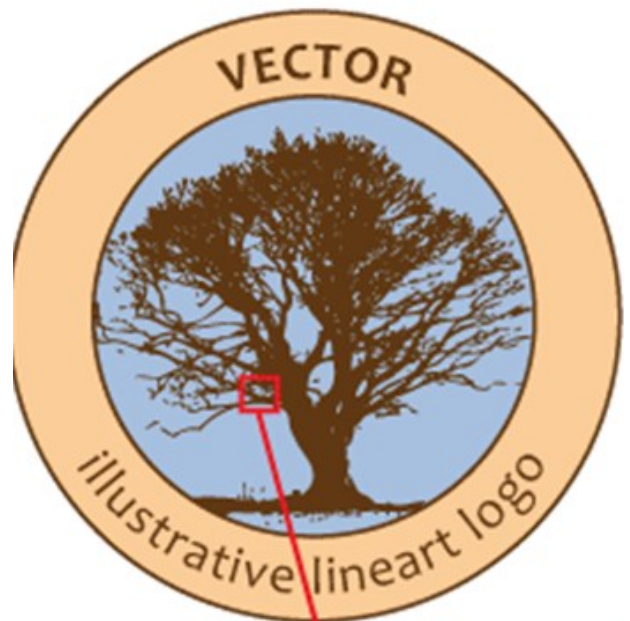
DPI vs PPI

DPI - Dots per Inch

This is the amount of ink dots the printer will put on each pixel of your image. The DPI is set by the actual printer device.

PPI - Pixels per Inch

Digital raster images are measured in pixels, or picture elements. How many pixels per inch is determined by the device you create the digital image with: camera, scanner, or graphics software and can be modified with a photo editing software like Photoshop.



Typography Tips

Try to match the typeface to the style of the document. Think carefully about who is going to be viewing the document, who it is for and what it is intended to say. For example, an Old Style typeface may not be suitable for a magazine about cars unless it is about classic cars. Conversely a script typeface would not be suitable for a fire safety leaflet.

Try never to use more than two typefaces on a page. Better results can be achieved by varying the size and style of a typeface.

Be consistent. If using a certain typeface for headings and sub headings, make sure that they are at the same size, style and weight throughout the document.

Consider white space. Think of the opposite of the items in the document, the areas not covered with text or images. These can be just as important as the rest of the document adding balance or contrast where required.

Never make body text any larger than 14 Pts or any less than 8 Pts. The only exception to this is when producing a document for people with who have a visual impairment.

Leading in headlines may need to be reduced. Remember that as the size of the type increases, so does the automatic leading settings which can lead to quite large gaps between lines of type.

With body text, line spacing is very important too. Sans serif typefaces need more leading than sans serif because without serifs to lead the eye across the page, it easier for the reader to accidentally re-read the same line. Leading should normally be set at about 20% more than the type size.

Always set the type size before changing the leading.

In body text, the larger the x-height, the greater the leading should be.

When placing white text on a dark background, make it bold for legibility and check the kerning which is much more prominent.

Limit the use of styles like underline and outline. Instead use Bold for emphasis.

Never make the spacing between words greater than the leading. This is difficult to read, and can leave ugly rivers of white down the page.

Try never to use more than 64 characters per line (including spaces). Any more make large amounts of body text difficult to read.

Avoid headlines that are set entirely in capitals. These can be too imposing and more difficult to read. Also lines of capitals take up much more space on a page.

Avoid widows and Orphans. That is words, or lines, which are left alone at the top of a new page or column, or words, or lines, left at the end of a page or column which belong to a following paragraph.

Hyphenation cannot be avoided with body text, but should never happen with headings and sub-headings.

Justified text, although it looks neat can, especially if "force justified", cause unsightly, exaggerated word spacing often leaving single words stretched across a whole column. It can also leave rivers of white space down the page.

Print Preparation

The modern print process is still changing as regards reproduction technology, but the basic process is the same. The computer files may be sent to the printer or graphics bureau who may be asked to make up a high quality proof such as a Matchprint© or Cromalin© which are as near to the printed document as possible in terms of colours and resolution. These can be very expensive, but are cheaper in the long run than having to recreate an entire plate or worse still reprint an entire publication.

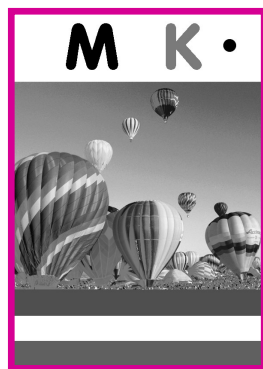
Traditionally, when the final proof is agreed, the designer will make up "Colour Separations". These split the image up into its constituent colours for four-colour printing. There will be one separation each for Cyan (Blue), Magenta (Red), Yellow and Key (Black), known as CMYK colour. In theory, there need only be three colours in printing, because every colour is made up from the three primary colours, red, yellow and blue. As a result of the impurities of printing ink and the reflective qualities of paper, the three colours mixed would make up a muddy brown, so a black separation is added to give definition.

Cyan

Magenta

Yellow

Key (black)

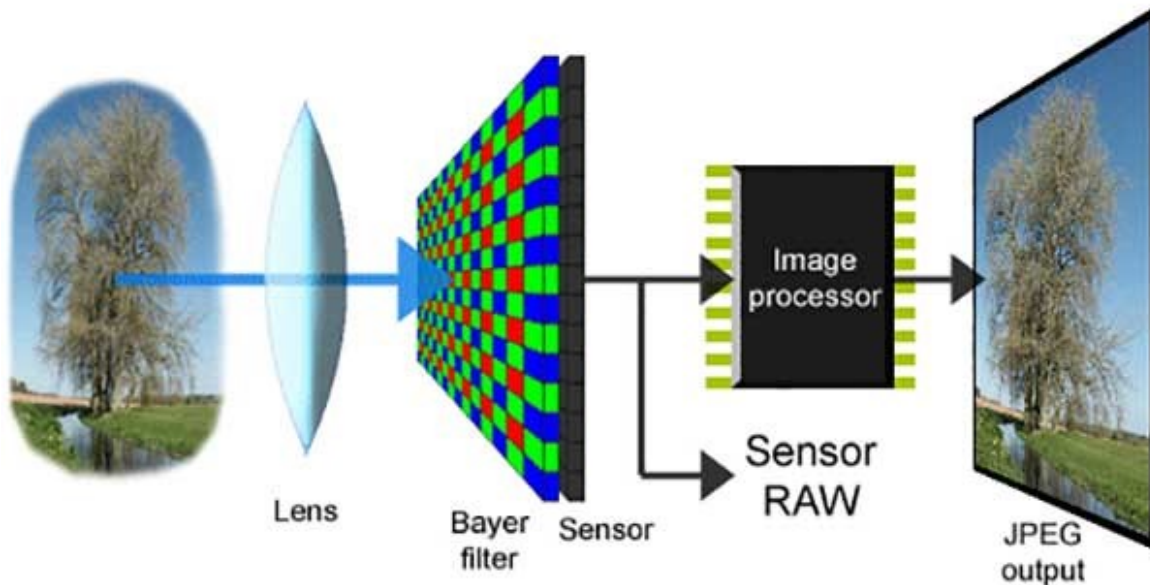


CMYK



How a process Camera Works

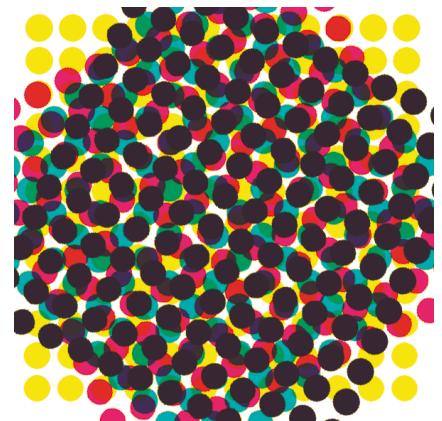
The original image is photographed through a "Process Camera". This works by photographing the image through colour filters which split the image up into three colours with a further one made up for black. Each separation is photographed through a fine mesh known as a halftone screen which splits



the image up into a series of dots. These dots vary in size and proximity depending on the depth of tone required.

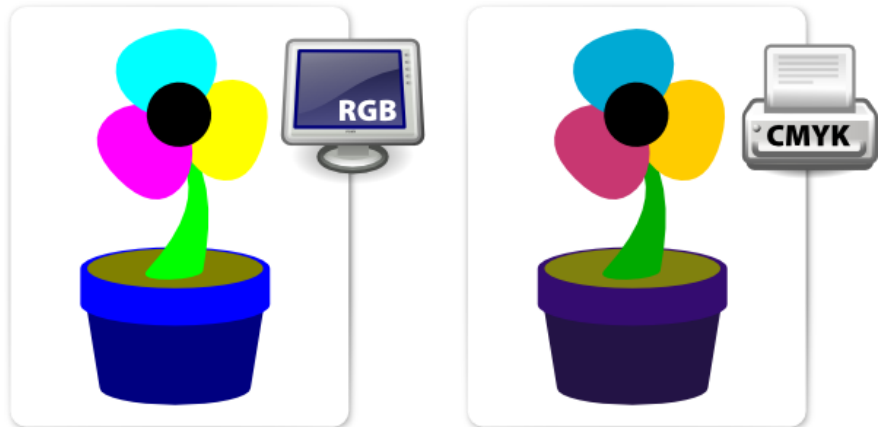
Looking closely at a newspaper picture reveals these dots, but in full colour printing the dots tend to be much closer together and smaller, so it is more difficult to see them with the naked eye.

The resulting photograph for each colour will usually take the form of a "lith" which resembles a black and white negative except that it consists entirely of black dots. The other important factor in making the halftones is the direction of the dots. The screens used for converting the images into dots must be set at different angles. If not, the effect known as moiré occurs. This interferes with our perception of the image making the pattern of dots used very obvious. By setting the screens at different angles this can be eradicated.



Issues associated with converting RGB to CMYK

When you take a photograph with a digital camera or scan an image using a digital scanner, the resulting file will use the RGB (Red Green Blue) colour space. You can then view it on your computer monitor and print it out using your desktop printer and get a good representation of the colour in the original image; this is because your monitor and printer use the same RGB colour space.



If you need to have your photograph printed by a commercial printer using 'full colour process printing', you will have to convert RGB files to CMYK, as a printing press uses the CMYK (Cyan Magenta Yellow Black) colour space.

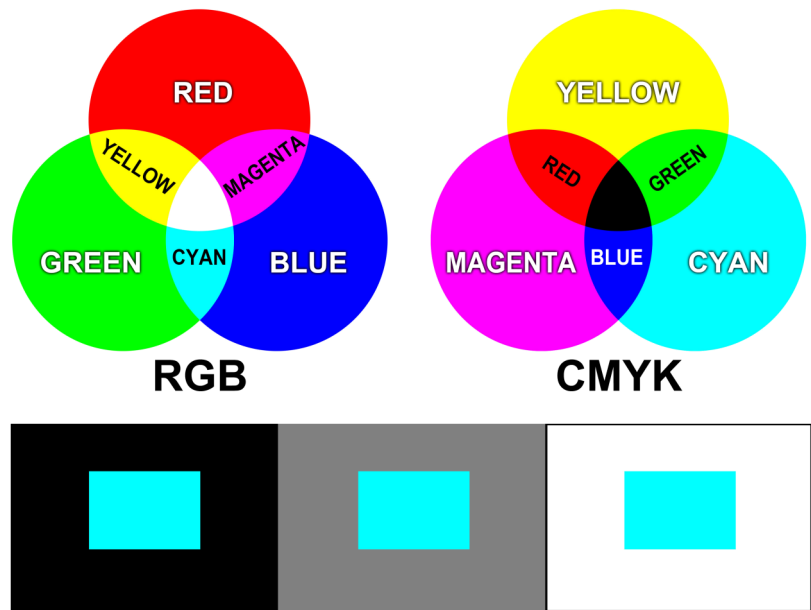


The image to the right is the original RGB, to the right, the image has been converted to CMYK. Notice the colour shift. The larger photo has been adjusted slightly to bring out the colour.



The problem is; the range of colours, referred to as gamut, that can be produced using CMYK colour inks on paper, is a lot smaller than what can be represented using RGB. This can result in a photograph printing with some of the colours changing hue and looking dull. This often happens to the bright rich blue found in sky areas of an image.

We have a further problem. There is no standard fixed CMYK gamut; so the same percentages of CMYK inks will not always produce the same colour. There are variations in the inks, the absorbency of the paper, the printing conditions, and different press setups which vary in different parts of the world. The black ink in CMYK printing is used because the CMY inks do not produce a pure black when added together: they produce a brown colour due to impurities in the inks. The black ink when added gives more contrast to the image with darker shadow areas.



It is possible to replace any grey areas of an image (represented by equal amounts of CMY inks) with an equivalent percentage of black ink, thus reducing the amount of ink used. This is referred to as undercolour removal (UCR).

Therefore, there are many possible combinations of CMYK to achieve the same image as in the original RGB file.

<https://www.youtube.com/watch?v=6gOVHTwJ2mQ>

What is the difference between CMYK and Pantone Colours?

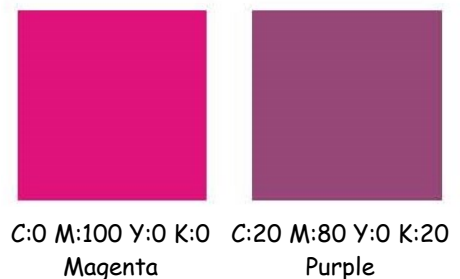
CMYK and **Pantone** are two different colour systems to describe the printing process of your finalised graphics work. **CMYK** or 'four colour process' printing has become the norm of late as consumables, idle machinery and the dominance of internet mediums force costs down. To simplify **CMYK** printing, think of the cartridges that go in your office or home laser printer - there's likely a yellow one, a red, a blue and a black that combine to provide a full colour range. In the crudest sense, that's **CMYK** - Cyan, Magenta, Yellow and Black.

A Pantone colour, on the other hand, is a specific colour that has its own ink well. It's an industry-standard colour system and when printed professionally should always look the same. If we promise you your logo will come out in Pantone 7725 U (a lovely emerald-grass green), it will print in that exact shade.

So which one is for you?

Pantone is reliable but adds expense. Considering that most mediums used today are printed in full colour, it almost makes Pantone printing obsolete. But if you're a stickler for colour and want the exact shade, it's the only way to go. If this is the case, you will need to choose your colour from a special Pantone Colour book.

CMYK on the other hand allows for all forms of full colour printing, including popular short, digital print runs. However, these representations of colour can vary because of ink type, the type of printer used and paper quality. Magazines and newspapers are generally printed in **CMYK**.



A selection of colours from the Pantone colour chart which uses the **CMYK** to achieve its colours

Spot Colour

In offset printing, a spot colour is any colour generated by an ink (pure or mixed) that is printed using a single run. The widespread offset-printing process is composed of four spot colours: **Cyan, Magenta, Yellow, and Key (black)** commonly referred to as *CMYK*.

2 Colour Printing - Two Colours are Better than One

In 2 colour printing, only two ink colours are used instead of one on lower end marketing materials. The inks used are typically Pantone® colours, and are frequently used to print a logo, design or symbol in a unique colour. Pantone inks are the industry standard in two-colour printing because they are part of a standardized colour matching system to help different manufacturers in different locations or industries reproduce the exact same colour by referring to the Pantone Matching System Colour Guides. Adding a second colour to black and white printing will add colour and impact and can improve the professionalism and increase the response on marketing materials. A unique, readily identifiable spot colour is sometimes used by companies to create a brand colour that is used on all their marketing and product materials.

Advantages to 2 Colour Printing

- Having a specific reproducible colour for brand identification, especially if you print multiple items across different vendors or product types.
- Spot colours can be printed more consistently than a *CMYK* (four colour process) colour build across multiple pages of a multi page catalogue, or across multiple printed pieces or even product types. If you need a standard logo colour on a brochure, a plastic credit card or something like a metal product, a spot colour can more easily be matched on all of them.

Heidelberg 2 colour printing press



If you are printing a piece that has a large, heavy saturated area of ink or a solid block of colour that is used on every page in a booklet or catalogue, using a spot colour helps to insure that the colour is consistent throughout the piece.

- A PMS or spot colour is necessary for certain colours such as navy blue, bright orange or metallic colours that are impossible to produce using CMYK inks.

In some cases, especially for higher quantities, it's less expensive to use 2 colour printing than 4 colour process printing.

Examples of two colour printing shown opposite and below.



Disadvantages to 2 Colour Printing

- In most cases, two colour printing is more expensive than CMYK, unless the size of the piece or quantity is fairly large.
- You can't have full colour photos or a variety of different coloured elements on a project printed with just two colours.
- Unless one of the colours used is black or a dark colour, text readability might not be optimal.



You end up with a less professional looking product that might have a negative impact.

Paper Weight

This is measured in gsm (or grammes per square metre)
For example most writing paper is 80 - 100 gsm

Whereas thin paper such as newsprint is 30 - 60 gsm
is represented by the following sizes:

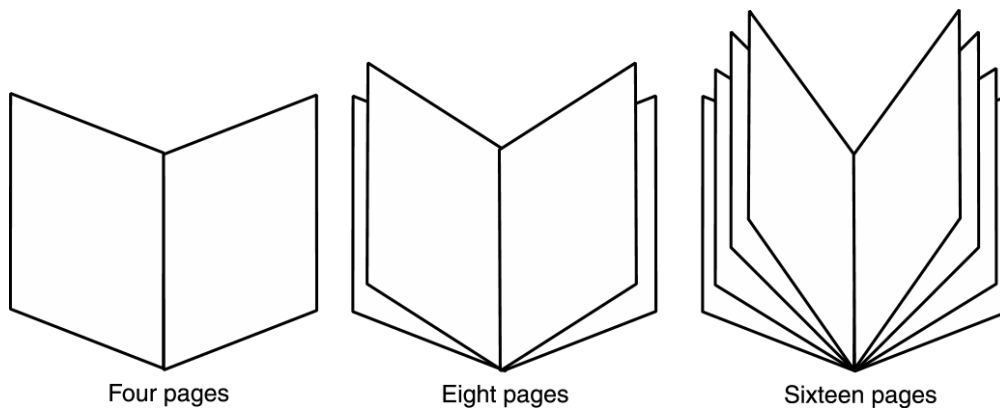
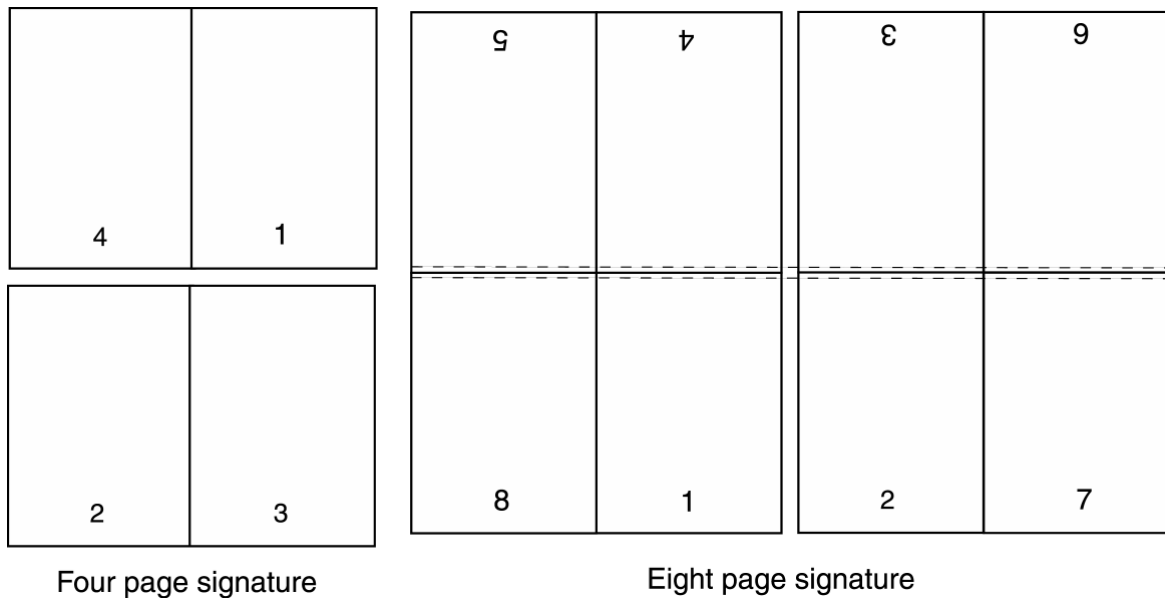
Size	MM
RA0	860 × 1220
RA1	610 × 860
RA2	430 × 610
SRA0	900 × 1280
SRA1	640 × 900
SRA2	450 × 640

Paper Opacity

Some papers are not suitable for heavy duty printing or double-sided printing because of "show-through". How transparent the paper is has to be taken into consideration before printing.

Paper size

The two main systems of paper sizes are the American and International Systems.



The way in which a document is bound makes a huge difference to how it is used and perceived, so binding has to be one of the first considerations for multi-page document design. When all of the imposition and printing are complete, the pages are then collated and bound. There are several methods for binding:

Mechanical binding methods

Ring Binding is one of the cheaper methods where binders are easily available in many forms with two or more rings. Their advantage is that they can hold a lot of paper and new sheets can easily be inserted. This method can be used without specialist equipment. The disadvantage is that the paper, unless supported, can tear and break free from the binder. Also, the inner margins must allow for holes to be punched.

Imposition & Binding

Imposition is the process of ordering the pages to be printed in such a way that they will read correctly when trimmed and bound using the least amount of paper and ink. For very large numbers of documents, the savings in paper, ink and time are crucial, so good imposition is almost a science. An imposition of pages is known as a signature and here are a few examples:

Spiral Binding, again, is also one of the cheaper methods of binding where specialist equipment is not needed. The spirals can be made from metal or plastic and take various forms. Their advantage is that a document can be opened out flat and that they are fairly sturdy. The disadvantage is that they can be time-consuming to produce and that the metal spirals can sometimes fray if badly fitted. Also, the inner margins must allow for holes to be punched.

Saddle Stitch binding is a method where the pages are sewn along the centre-spread and then trimmed. One disadvantage is that an allowance has to be made in the design for "creep", where, with many pages the inner pages creep further out than the outer pages, which means that the whole document must be trimmed.

Side Stitching is used where the document is too thick to be Saddle-stitched. The stitches are made through the side of the document. A cover is then added. The disadvantages are that the publication will no longer open out flat and that extra space has to be allowed in the design to accommodate that taken up by the stitching itself.

Perfect binding is one of the more specialised forms of binding, far sturdier than the other methods above. The pages are gathered, roughened on the spine edge, then glued, sometimes with a strip of gauze for strength. Then the cover is glued on and the whole publication trimmed.

Edition binding is the most traditional and expensive form of binding. The pages are gathered, and end papers glued to first and last pages. These are then stitched and trimmed. A strip of gauze is glued to the spine end for strength, the spine added, and the cover glued to the end papers.

Paper

The variety of paper available is enormous and has a huge effect on the quality of a finished presentation. The method of printing can often determine which papers will work well and which will not. Papers come in various finishes from rough to glossy and various weights and sizes. Here are just a few types of paper and a description of their uses:

Newsprint

This is the cheapest paper so-called because it used mainly in the newspaper industry. It is absorbent, but is slightly rough, tears easily and fades quickly.

Board Paper

This is standard commercial paper, which comes in a variety of weights and sizes.

Calendered paper

Smooth paper used mainly for magazines.

Art paper

Standard printing paper. It has a polished surface making it ideal for glossy magazines and covers.

Antique paper

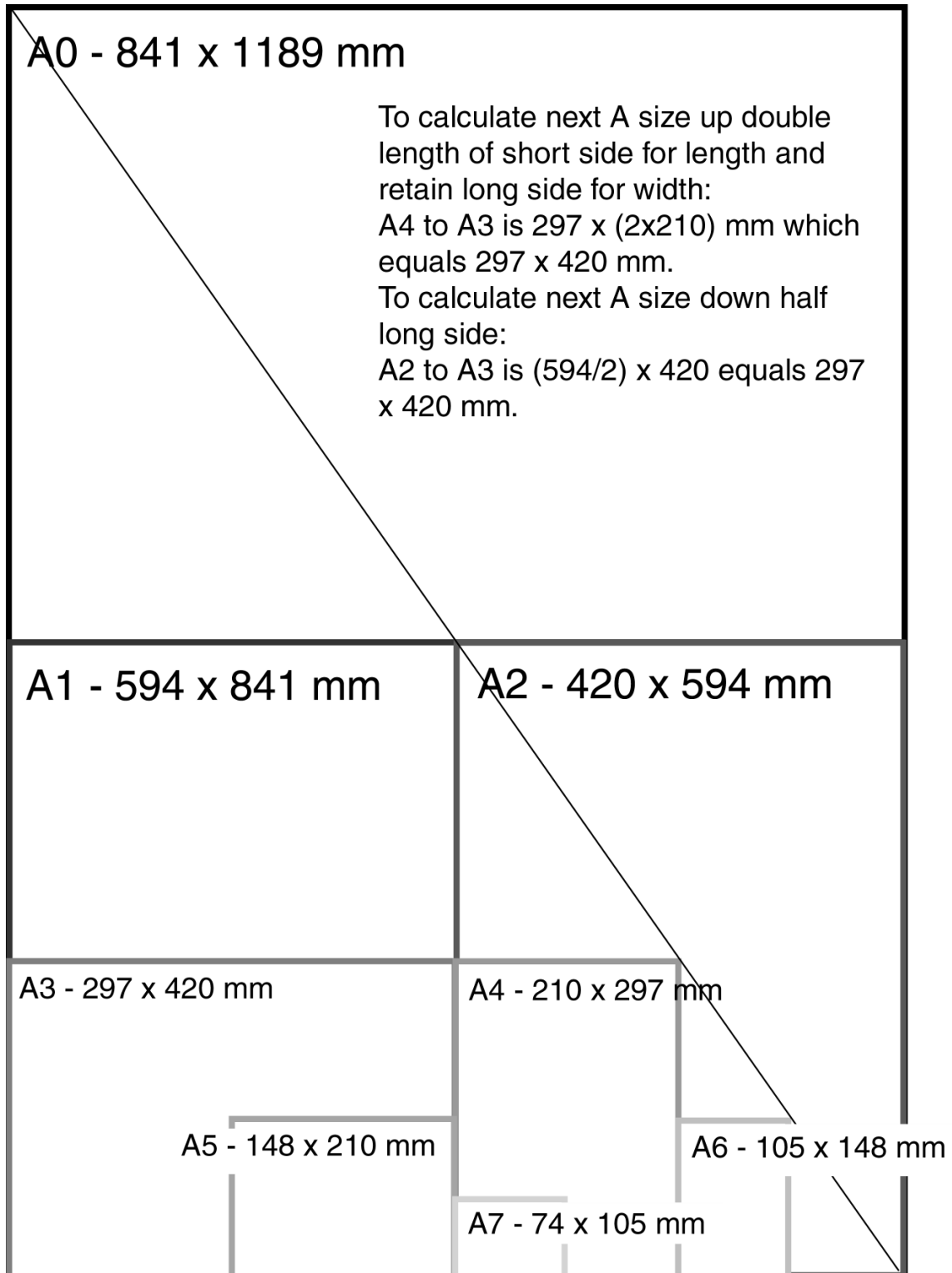
Matt, rough paper useful for book printing.

Cartridge paper

Can be coated or uncoated, the coated type giving better print definition for halftones.

Paper Size

These sizes represent the finished, trimmed size of a document. For the purposes of printing bleeds, registration marks and trimming have to be allowed for, so there are extensions of the above paper sizes known as RA and SRA which allow for these.



Paper Textures & Finishes

Paper is often something we take for granted. It's just 'there.' Sometimes we have no choice about the type of paper on which our designs are printed. Normally we can't dictate the paper used for ads in newspapers or magazines. Even when we do have a choice, we're limited by budget, printing requirements, or other factors. However, paper can be an important textural element in our desktop published documents.

Some papers just 'feel' better than others. Grab up some paper from around you. Get a newspaper, a magazine, some paper from your printer, and a few different samples from your Class Samples. Close your eyes and touch the different surfaces. Can you identify the general type of paper (newsprint, etc.) simply by touch? Probably so. But also consider how they feel to your touch — smooth, rough, slightly patterned, fuzzy, bumpy, slick, shiny, dull, warm or cold..

Antique Finish

Cockle Finish

Eggshell Finish

Felt Finish

Granite Finish

Linen Finish

Machine Glazed

Mottled Finish

Onionskin Paper

Supercalendered Paper

Wove Finish

Cast-Coated Paper

Dull Finish

English Finish

Glazed Finish

Laid Finish

Machine Finish

Matte Finish

Natural Finish

Parchment Paper

Vellum Finish

Design Concept & Texture

Varying paper surfaces can dramatically or subtly alter the mood you want your designs to convey. An exercise from *Using Design Basics To Get Creative Results* by Bryan L. Peterson uses the example of a piece of jewellery placed against two totally different surfaces — a shiny tile of black Formica vs. a piece of cement.

Graphic Communication and the effects of its use in every day living.

As much as graphic communication has excelled in recent years making all of our lives better, it does however leave a carbon footprint. A carbon

footprint is determined by the human effect on the environment through green house gasses, paper waste, and pollution of volatile organic compounds found in inks. The footprint is measured in units of how much carbon dioxide has been released into the atmosphere.

Virtually every product you will see on a shop shelf has a package which has been graphically designed and subsequently printed. The print industry through the use of ink and paper has a lot to answer for.

Water

In 1995, 92 percent of the global population had a sufficient supply of water. If the world continues to consume water at its current rate, it is projected that water sufficiency in 2050 will be only 58 percent. It is further predicted that nations will go to war over water supplies within the next two decades.

The print industry makes a negative contribution to this situation. Large quantities of water are used in most printing processes (even digital), the exception being waterless printing.

Printers can reduce water usage by recycling the water used on the printing presses.

At the other end of the process is the issue of water contamination. All printers are legally required to clean waste water before disposing it. Some company's don't do this as well as they should.

Energy & Emissions

In addition to the waste printers use up, they also use a significant amount of energy - from electricity to run the presses, to fuel for delivering the finished product.

The industry can adopt measures to reduce energy consumption, such as using voltage optimisers (*making the most of the voltage available*) on the presses, driving fuel-efficient delivery vehicles, and switching to green electricity suppliers.

But until measures like these are widespread, energy consumption will keep on creating carbon emissions.

Waste

As has been discussed the print industry generates relatively high levels of waste. As shown below, a lot this waste can be recycled or reused, but currently much of it ends up in landfill.

Examples of how waste ink can be reused.

Waste inks and varnishes can be used as low grade fuel or mixed with concrete and buried in 'special (or hazardous) waste landfill'. A large printer could be chucking out around 9000 tins worth of waste ink per year.

Ink tins are usually crushed and recycled.

Ink cartridges are often favoured over tins, but although these plastic cartridges waste less ink than tins, they're classed as hazardous waste and usually sent to 'special waste landfill'.

More environmentally aware printers will pay for them to be collected and recycled into drainpipes etc. A large litho printer could be generating around 800,000 of these cartridges per year.

Waste chemicals (solvents, developer, fixer).

In a year a large printer could chuck out around 65,000 litres of waste solvent and 85,000 litres of waste developer. Responsible printers will make sure they're either used as 3rd grade fuel or that they undergo 'bio-digestion' to make the chemicals safe before flushing them into the water course.

Wooden pallets are usually sent to landfill, but are occasionally recycled into chipboard.

Plastic wrapping will usually be sent to landfill. However, if recyclable, it can be washed, shredded and recycled into more plastic wrapping.

CDs and cases are usually sent to landfill, although they can also be ground up, washed in caustic solution to remove the ink and foil, and then re-used.

Digital

There are some huge environmental advantages to printing digitally:

You can run a print job as and when needed.

Re-printing costs no extra, so there is no need to print 5000 extra copies in case you run out.

Downsides:

Digital inks are currently difficult to remove in the recycling process .

The choice of paper can be limited to approved papers, which are rarely recycled or FSC certified. (Forest Stewardship Council)

Large amounts of energy are used in the manufacturing of the machines themselves.

Intellectual Property Rights

This is a creative process to generate new ideas, whether in the field of graphic design, music, art or elsewhere. These ideas, which may have commercial value, are the intellectual property (IP) of the creator, whether they are an individual or a company organisation.

These rights have enormous commercial value, and can be traded as a commodity.



These six types of protection are:

Confidentiality

Copyright

Trademark

Design right

Registered design

Patent.



This is basically the big name for secrets. Secrets have been around for a long time, and they are cheap to keep as long as the people keeping them can be trusted. In general, the fewer people who know a secret, the safer it is.

Confidentiality

Some companies use confidentiality rather than patents because applying for patents results in the application becoming public. Not much use if you are designing a top-secret product!

Having said this, secrets are not much use for some people. For example, protecting a new tune with a confidentiality agreement would mean that the composer would never earn any money, as no one would be able to hear it.

Only three people in the world know the exact recipe for Barr's Irn Bru. Until recently they were all members of the Barr family, but now one of the company employees has the 'know how'.

The reason that the recipe is kept secret is that competitors have to guess how to copy it, whereas if it was patented they could visit the patent library, find out exactly how it is made and alter their own brew slightly, and not to infringe the Barr patent.

Some agreements prohibit those 'in the know' from travelling together in the case the secret is lost due to an accident

A confidentiality agreement is usually drawn up by a solicitor and is signed by those 'in the know'. This is then legally binding and any breach could result in legal action.



Copyright

Copyright is used mainly to protect written, printed or broadcast materials, and is relatively simple to use.

It actually exists on any written piece, the copyright usually belonging to the author automatically, although it can belong to the company employing the author if that has been agreed. The copyright can be bought and sold in the same way as any other commodity.



Trademark

Trademarks are all around us nowadays.

Most logos that you see on anything from adverts to clothing are Trademarks. They identify the product with a company, and the company hopes that its image will help to sell the product.

Trademarks have been registered since 1876, at the Patent Office.

Trademarks are usually words, although it is becoming more common for other items to be protected in this way too, for example tunes (T-mobile) and aromas (perfumes, etc.).

Companies protect their names to prevent other competitors from copying or 'passing off' their products.

It is common practice not to trademark the company's own name, but only the 'brands' that they produce.

Some companies may wish to protect their company logo and in some cases this can be done, for example Nike.



Design Right

Design Right is a new form of IP that was introduced in the UK in 1988 and which is very similar to Copyright, although there are some important differences.

Design Right's main similarity to Copyright is that it exists automatically, i.e. there is no application process involved.

Offers less protection, and is really only suitable for protecting items that fall out with the other forms of IP protection.

Due to its simple nature it is also a cheap form of protection.

Design Right is particularly useful for protecting the way things look; shape, form and appearances of products that are different from before but sufficiently so to allow for patenting.

For example, the appearance of a new toaster may be protected by Design Right because underneath the stylish case are the same mechanisms as the previous model's.



As there is no formal registration system for Design Right, all that needs to be done is to mark the work 'Design Right' and date it.

It is a good idea to keep the idea secret until this has been done and an original has been kept somewhere secure with proof of the date when it was

Design Right only protects the idea in that specific form, and it is easy for competitors to copy with minor changes so as to avoid infringement of the Design Right.

DR has a short lifespan of only 10 years from the first sales, and during the last 5 of these anyone is entitled to copy the design provided they pay a licence fee to the owner of the IP.

Registered Design

Registered Design is a form of IP protection that was first used in 1787, in response to the demands of the textile manufacturers who were concerned about competitors using their patterns.



It is still much used by industry today as this form of protection covers the appearance of a product, but not how it works.

If the way it works is new then a **Patent** may be applied for, in addition to using Registered Design to protect its appearance.

It is important to understand that one product may involve several or even all of the forms of IP protection.

Car body shapes are good examples of Registered Designs. Manufacturers want to stop other companies copying successfully styled cars, even if the technology inside the car is too similar to the previous models to be able to patent them. Distinctive features such as radiator grills can be protected as well as the overall body shape.



The process for registering a design is similar to that for obtaining a patent and is also controlled by the Patent Office.

The design has to be kept confidential before the application is filed, and then a search is carried out to see if there is any previous work that is similar. If the search does not show up any possible conflicts, the design is granted its Registration.

Once granted, the registration can be kept for 25 years, as long as renewal fees are paid.

If the company does not feel it is worth spending the money as the product's life cycle nears its end, they may allow its registration to lapse. This enables competitors to begin copying the design legally.

The first patent was granted in 1449, to John Utynam, who wanted to protect his method for making stained glass.

He was granted a monopoly on the process for 20 years by the King, in the form of an open letter.

This was the method before the Patent Office was opened in London in 1852. Nowadays, over 30,000 patents are applied for each year.

If you own the patent on a product you will have exclusive design rights on it for up to 20 years.

However, as part of the process the patent is made available to the public for any interested parties, including competitors, to see.

This has two results: competitors can keep an eye on what the opposition are working on and see which way the market may be going; 65% of research and development (R&D) has been done before and is available for viewing in the Patents Library. This can save vast sums of money in R&D budgets.

The main aim of this process is to encourage innovation.

Camera-ready Copy

Camera-ready is a common term used in the commercial printing industry meaning that a document is, from a technical standpoint, ready to "go to press", or be printed.

History

The term camera-ready was first used in the photo **offset printing** process, where the final layout of a document was attached to a "mechanical" or "**paste up**". Then, a **stat camera** was used to photograph the mechanical, and the final offset printing plates were created from the camera's negative.

In this system, a final paste-up that needed no further changes or additions was ready to be photographed by the process camera and subsequently printed. This final document was camera-ready.

Present usage

In recent years, the use of paste-ups has been steadily replaced by desktop publishing software, which allows users to create entire document layouts on the computer. In the meantime, many printers now use technology to take these digital files and create printing plates from them without use of a camera and negative. Despite this, the term *camera-ready* continues to be used to signify that a document is ready to be made into a printing plate.

In this new digital-to-plate system, a digital file is usually considered *camera-ready* if it meets several conditions:

It is created with a software program commonly used in the printing industry, such as *LaTeX*, *InDesign (Adobe)*, *Illustrator (Adobe)*, *Freehand (Adobe/Macromedia)*, *Quark XPress (Quark, Inc)*, and exported in a commonly used file format, such as *EPS*, *PDF* and sometimes *TIFF*. *JPEG* images are usually considered *not camera-ready*, as the compression used in the *JPEG* format deteriorates the quality of the image.

The document uses the correct colour setup. If printing a (full) colour document, all graphics should be converted to **CMYK** (cyan, magenta, yellow, and black). If it is a **spot colour** document, the colour(s) to be used by the printer must be specified in the digital file.

The layout is created at the correct and final size to be printed, and the document size in the desktop publishing program matches the size of the final printed piece.

Text or graphics that are intended to **bleed** off the page of the final printed piece should be extended off the document boundary in the digital file. The amount varies depending on location, but is usually 1/8 inch in the US, and 3mm in metric systems.

Fonts used in the digital file are converted to **vector graphics** (usually defined by the software as "convert to paths" or "outline text"), or alternatively, the fonts are included in the final digital package sent to the printer.

Raster or image files are originally created at high resolution settings, such as 300 DPI (dots per inch). This ensures a high quality image. Images saved from Internet web pages are usually low-resolution, 72-dots-per-inch JPG or GIF files, which are not considered camera-ready.

Printing Registration

In colour **printing, registration** is the method of correlating overlapping colours on one single image. There are many different styles and types of **registration**, many of which employ the alignment of specific marks.

Ink Color Registration

Four colour process printing uses four ink colours - **Cyan, Magenta, Yellow and Black**. These four colours are applied one after the other on a printing press. They overlap each other in various concentrations on the paper to create the visual effect we know as full colour printing. Because these four colours combine to make an image, the proper registration of these colours is crucial to produce a sharp image. Even a slight position shift in one of the four colours will cause the printed image to appear blurred or fuzzy.



Exaggerated example of a mismatch of **CMYK** registration

For the same reason as above, proper registration is also a concern for two-colour and three-color printing. One-colour printing is not concerned with ink registration since only one ink colour is used (but like all printing jobs, the ink must be properly registered

to the paper so that the image transfers to its intended location - i.e., not closer to one edge of the paper than intended).

There are many different styles of registration for many different types of printing. These deal with **stone lithography**, as used in **fine arts printmaking**. In **colour printing**, **registration** is the method of correlating overlapping colours on one single image. There are many different styles and types of registration, many of which employ the alignment of specific marks.

This method, using small measured registration marks on both the stone and the paper, is very accurate and simple to do. The printer measures the exact size of the paper and the desired margins. Then marks are made at both ends of the sheet of paper, and corresponding marks (usually in the shape of a "T") are made on the stone. Then the printer matches the marks on the paper to those on the stone. This way many runs of different colours can be pulled exactly in line with one another, each of them measured from the same system of marks.



In the example shown above is of a registration misalignment, note the cyan and magenta plates are not in the exact place. Also halftones are visible on the top area.

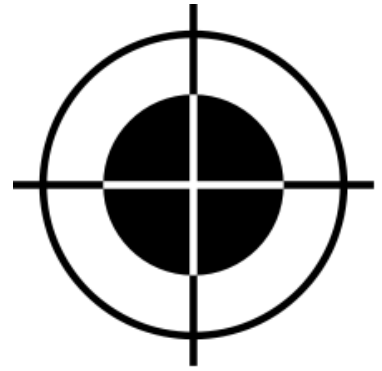
Pin-hole

This method involves laying the paper on the un-inked surface, and making a pin-hole through both the bottom and top of the paper, being careful to make a mark in the stone's surface. Then the locations of the holes are transferred to each sheet of paper to be printed. When printing, one should place pins in each hole of a sheet of paper, and lower it onto the inked stone, placing each pin in its respective hole in the stone. This method can ruin paper by creating holes.

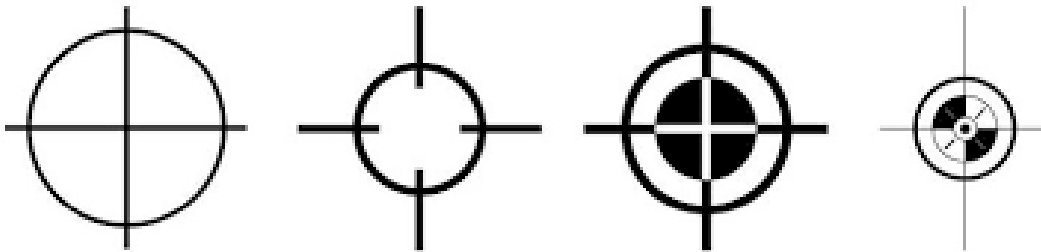
Eye-balling

This method relies solely on hand-eye coordination. The printer places the paper over the stone-image, measuring and judging registration by eye.

This is not very consistent, depending on the Person who is doing the eyeballing.



Below are common registration marks that you might see on any item that is being printed on a professional printing

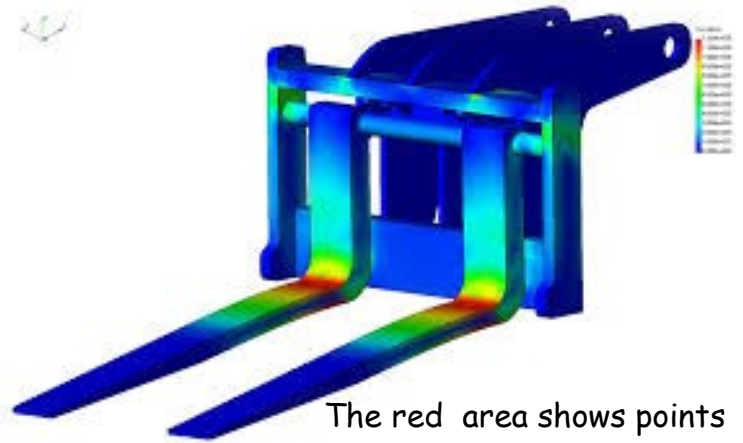


Digital Testing (FEA, Finite Element Analysis)

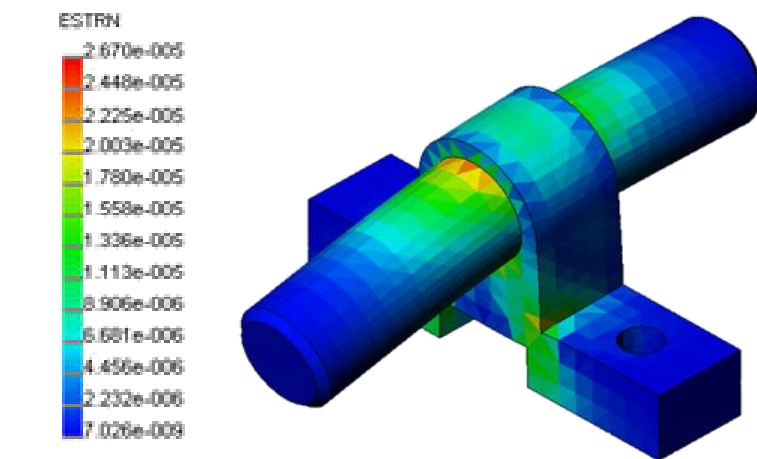
Digital testing of products is used to test all sorts of mechanical components from pipelines to controlled car crashes.

It is also referred to as **Digital Prototyping** and very basically explained allows conceptual designs (new designs), the ability to virtually explore a complete product before it's built. Industrial designers, manufacturers, and engineers use Digital Prototyping to design, iterate, optimize, validate, and visualize their products digitally throughout the product development process. Innovative digital prototypes can be created via CAD through intelligent and near-optimal iterations, meeting multiple design objectives (such as maximised output, energy efficiency, highest speed and cost-effectiveness), identifying multiple figures of merit, and reducing development gearing and time-to-market. Marketers also use Digital Prototyping to create photorealistic renderings and animations of products prior to manufacturing. Companies often adopt Digital Prototyping with the goal of improving communication between product development stakeholders, getting products to market faster, and facilitating product innovation.

Digital Prototyping goes beyond simply creating product designs in 3D. It gives product development teams a way to assess the operation of moving parts, to determine whether or not the product will fail, and see how the various product components interact with subsystems—either pneumatic or electric. By simulating and validating the real-world performance of a product design digitally, manufacturers often can reduce the number of physical prototypes they need to create before a product can be manufactured, reducing the cost and time needed for physical prototyping. Many companies use Digital Prototyping in place of, or as a complement to, physical prototyping.



The red area shows points of great stress. Followed by yellow and blue being the least stressful areas.

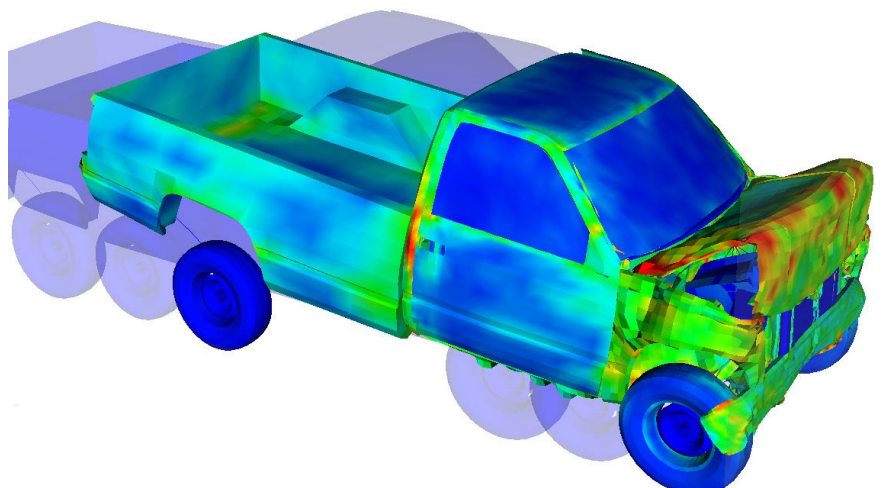


Digital Prototyping changes the traditional product development cycle from **design>build>test>fix** to **design>analyze>test>build**.

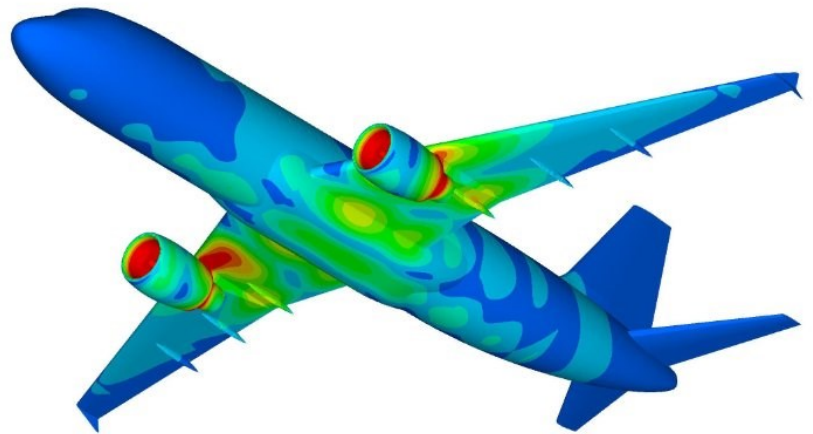
Instead of needing to build multiple physical prototypes and then testing them to see if they'll work, companies can conduct

testing digitally throughout the process by using Digital Prototyping, reducing the number of physical prototypes needed to validate the design.

Studies show that by using Digital Prototyping to catch design problems up front, manufacturers experience fewer change orders downstream. Because the geometry in digital prototypes is highly accurate, companies can check interferences to avoid assembly issues that

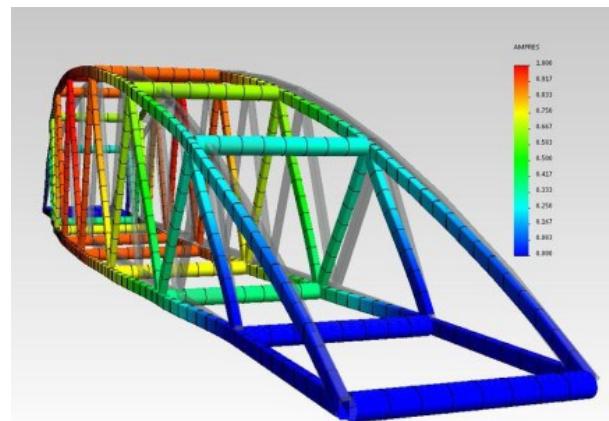


generate change orders in the testing and manufacturing phases of development. Companies can also perform simulations in early stages of the product development cycle, so they avoid failure modes during testing or manufacturing phases. With a Digital Prototyping approach, companies can digitally test a broader range of their product's performance. They can also test design iterations quickly to assess whether they're over- or under-designing components.



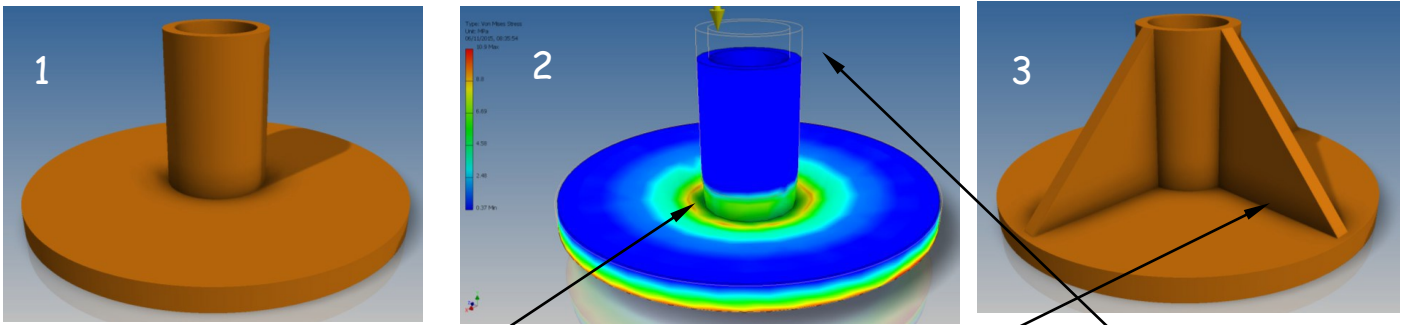
Research from the Aberdeen Group shows that manufacturers that use Digital Prototyping build half the number of physical prototypes as the average manufacturer, get to market 58 days faster than average, and experience 48 percent lower prototyping costs.

In FEA a 'load' is often applied to a product to test whether or not it can withstand the maximum weight that it could potentially bear when in use. A good example of this is a bridge. Digital tests can determine the strength of the bridge when loaded at its full capacity (possibly during rush hour) and whether or not the structure would be safe and fully functional when at maximum load.



Reinforcing Structures—Webs

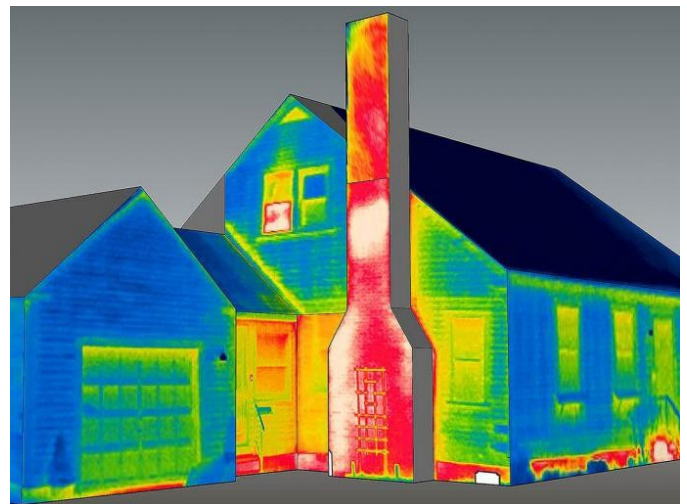
Conducting tests on products can highlight high levels of stresses and strains on weaker sections of the product which could potentially lead to failures. Structures, such as the plastic base of a microphone stand shown below, can be reinforced after testing to strengthen the structure. Four **webs** have been added to strengthen the central extrusion after initial tests highlighted minor areas of weakness and possible deformation under certain loads. **Webs** are commonly added to reinforce weak areas of a structure.



FEA showed slight weaknesses in these areas as well as minor deformation. Webs were added to reinforce the boss.

A 3D model of a house could also be used to evaluate aspects of the design, prior to construction. It could be used to calculate, evaluate or determine;

- Flood risk
- The strength of a part of the structure using FEA
- Ventilation and extraction
- Thermal efficiency
- Lighting and illumination levels



Applied Lighting Styles

There are four different types of lighting available when rendering in a 3D modelling package. These are:

Ambient light

Provides a constant illumination to all surfaces of a model.

Is always there and does not originate from any particular source.

Ambient light on its own does not produce good rendered images.

Distant Light

Gives a parallel beam in a particular direction

The user specifies the target point and the light source location.

Think of a torch shining on an object.

Landscape Architects

Landscape architects create the landscape around us. They plan, design and manage open spaces including both natural and built environments. They work to provide innovative and aesthetically pleasing environments for people to enjoy, while ensuring that changes to the natural environment are appropriate, sensitive and sustainable. Their work can help clients visualise proposals for new designs by:



- Showing/communicating the location of different features in gardens, building complexes, open areas etc.
- Helping to visualise the ways in which spaces might be used
- Showing/communicating the materials that might be used in the solid landscaping
- Showing possible colour schemes/colour combinations
- Showing possible planting schemes
- Showing the position of critical features/buildings in relation to other surrounding buildings/areas.



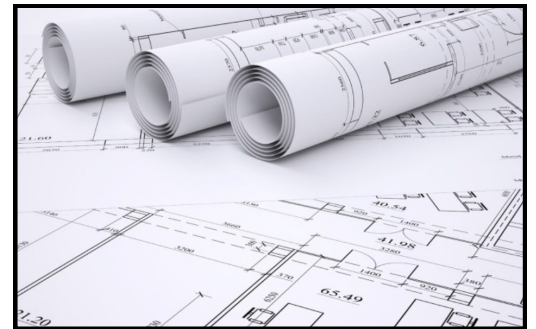
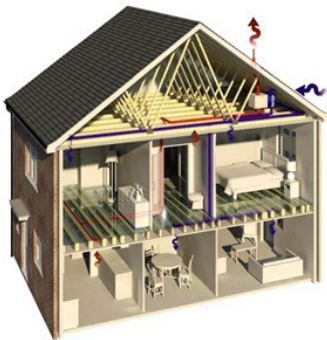
Architectural Technicians

Architectural Technicians use their skills in science and engineering to help bring architects' construction ideas to life. They work on design plans, advise on the best use of building materials and monitor progress of projects. Furthermore, they prepare plans using computer aided design (CAD) software and can work on anything from extensions through to new designs for sports stadiums. Architectural Technicians will produce a variety of graphics, many of .

which will be used to communicate relevant technical data to the construction trades. Graphics will include information which;

- Shows where structural elements will need to be built
- Shows where energy saving materials and/or features are required
- Indicates where services will be required
- Supports pricing/cost and labour calculations for estimates/bills and quantity
- Indicates where material junctions occur/materials converge or meet
- Below are some examples of graphics produced by an Architectural Technician

Below are some examples of graphics produced by an Architectural Technician.



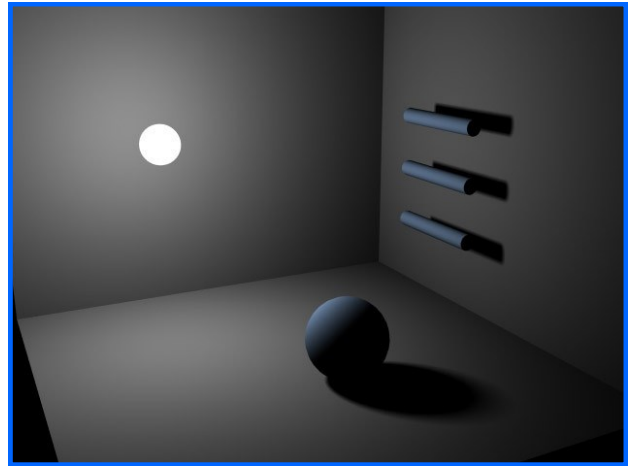
Lighting techniques (information courtesy of www.3D-ace.com)

There are several well established 3D lighting techniques, and it is often predetermined by the type of an environment, which technique is most appropriate in the case. For instance, some techniques work well in an interior environment and make very little sense in an exterior modelling. The same approach works for the "studio" lighting as it requires procedures that differ much from lighting for 3D animations and films. Let's make an overview of some **standard lighting options** that are available in most 3D software packages:



Point or Omni Light

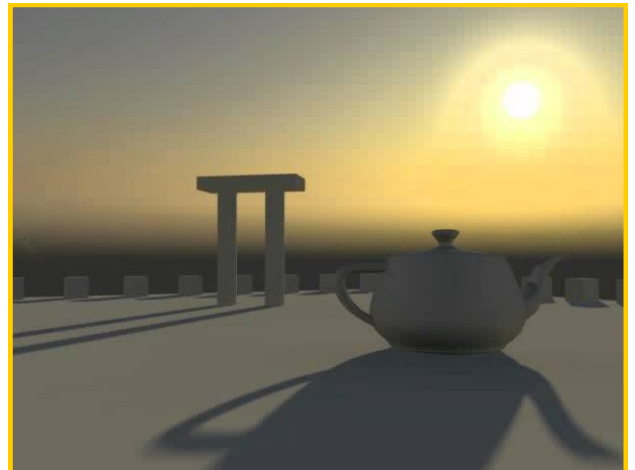
A point light casts rays in every direction from a single, small source in 3D environment. It has no specific shape and size. Point lights can add "fill lighting" effect to a 3D scene, as well as simulate any light source like candles, Christmas tree lights, or others.



- A point light emits light in all directions from its position.
- The user specifies the point light location.
- Point lights are used for general lighting effects.
- Point lights are used with spot lights for lighting effects.

Directional Light

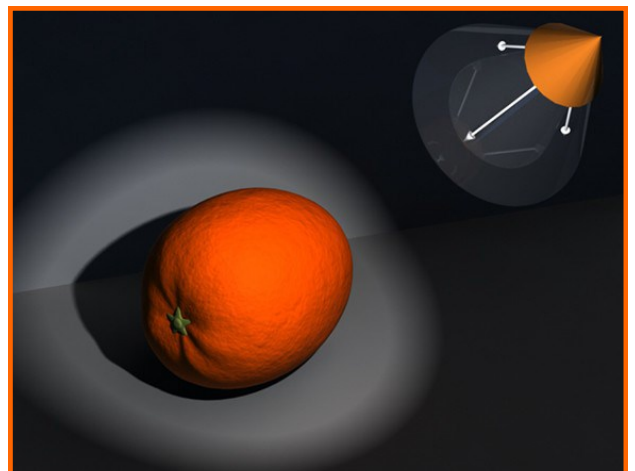
It is the opposite of omni light, it presents a very distant source of light (like the moon light). Directional rays go parallel in a single direction. This type of 3D lighting is often used to simulate sunlight. To change the illumination of the scene you can adjust the position or colour of the light and rotate the directional light source.



Spot Light

There are targeted spot lights and free spots, which means that they have no target objects. It is often used to simulate light fixtures, for example desk lamps or streetlights, as it casts a focused ray of light.

- Gives a directional cone of light.



Spot Light (continued)

- The user specifies the direction of the light and the size of the cone.
- The intensity of the spot light diminishes with the distance from the model.
- Spot lights have hot-spots and fall off angles that determine how the light diminishes at the edge of the cone.
- Spot lights can be used to highlight specific features on a model.

Volume Light

It is similar to omni light as it casts rays in all directions from a certain point. Yet, a volume light has a specified shape (any geometric primitive) and size. This volumetric light illuminates only surfaces within the set volume. Volume Light provides the effect of smoke, fog, and so on.



Ambient Light

An ambient light is not similar to any other light type. It casts soft rays in every direction, though it has no certain directionality and emits no shadow on the ground. Often it sources as addition to the colour of the main light source for a 3D scene. When sun rays pass through the window of a room they hit the walls and are reflected and scattered into all different directions which averagely brightens up the whole room. This visual quality is described by ambient light.

Scenes/Environments

3D models are often placed within a scene/environment. The location of the environment is generally selected based on where the model would be most commonly used in a real life context. This helps give context to anyone viewing the model and can be useful for promotional purposes. An example of a bench is given below, with and without an environment. The environment enhanced the overall quality of the rendered image and gives the model context (it is used in an outdoor „square“ setting where benches are commonly used).



Mapping and Rendering

When rendering models using software, certain elements can be applied to create a higher level of realism. Some of these are listed below;

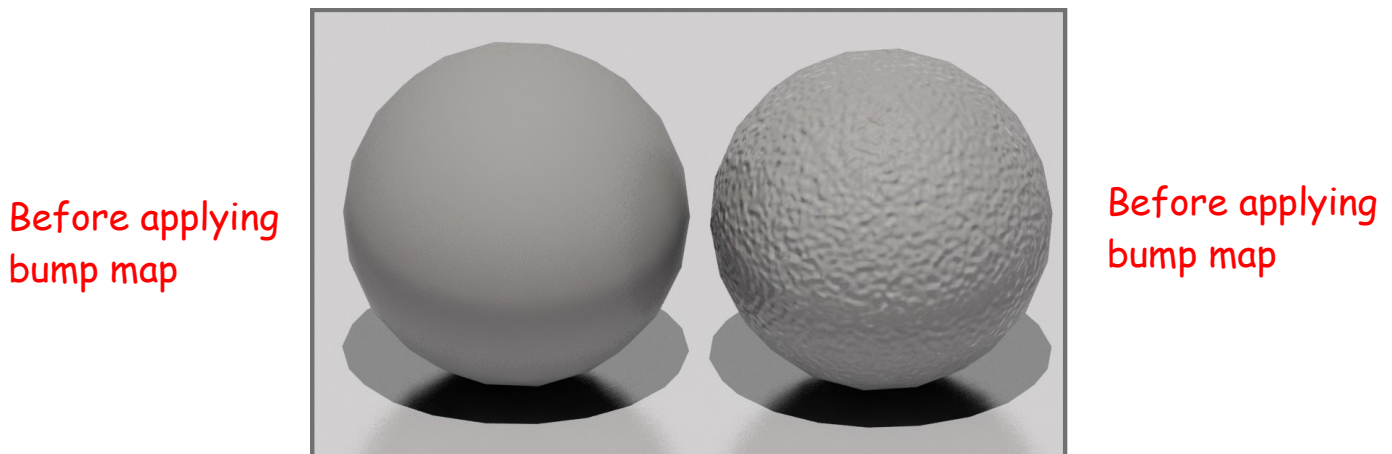
- Bump map
- Texture map
- Displacement map
- Lighting
- Environment/scene



Bump Map

Bump maps are grayscale textures you map to objects, to create the illusion of surface relief on an otherwise flat object. They are:

- unable to cast or receive shadows
- unable to be seen if you silhouette the mapped object
- takes less time to render than displacement maps



Although the sphere with the bump map may appear to have physical raised and lowered areas, it is just an illusion created by the grayscale texture. The „bumps“ on the object will not show in the object’s shadow, as illustrated above.

Texture Map

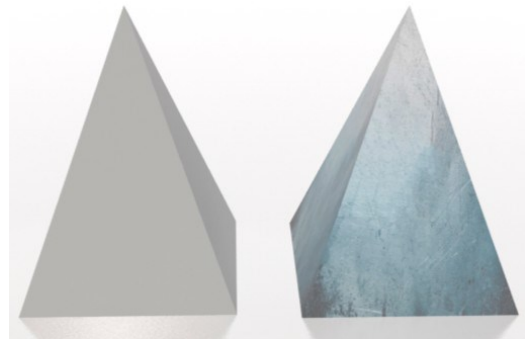
A texture map is the application of a 2D image/colour to the surface of a 3D object. Some characteristics of a texture map are:

- It does not show depth of colour
- It is shown in plain colour

A texture map can be a 2D image saved from the internet which is then applied to a 3D model. An example is given below.



Image from internet



3D model of pyramid before and after image of texture was applied

Creating Materials

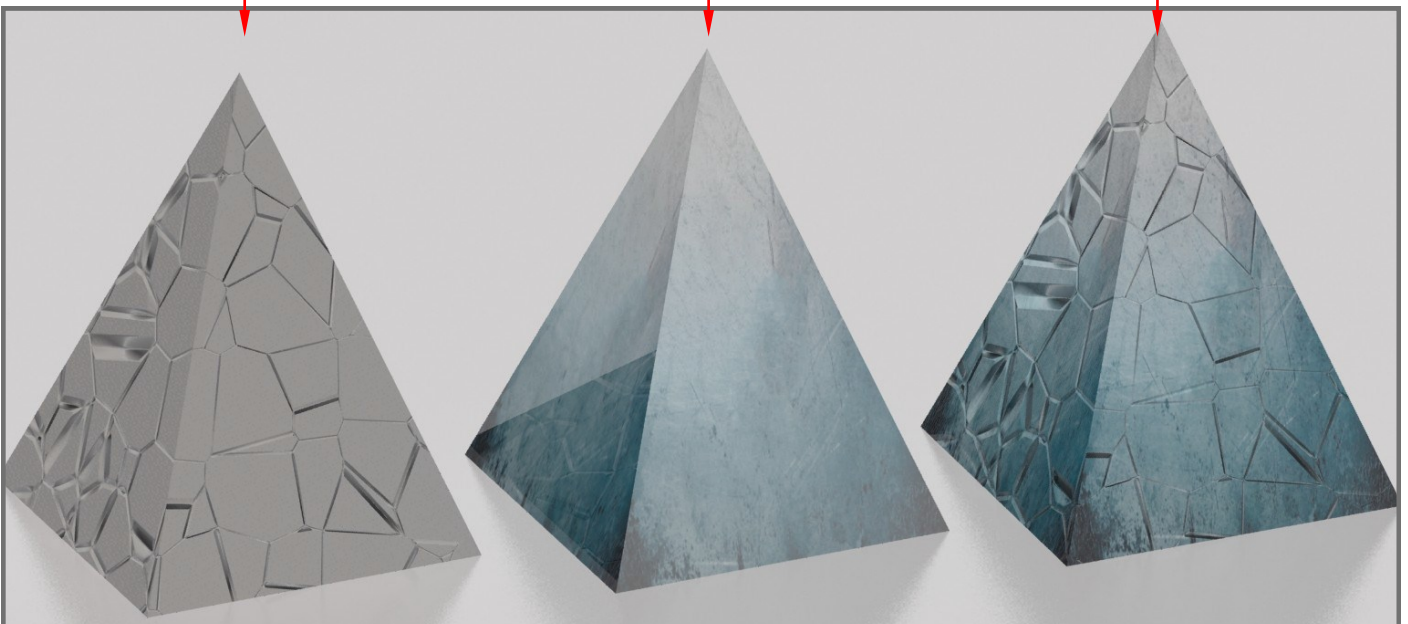
When creating materials to render a 3D model it is common practice to add both texture maps and bump maps to the model. The bump map will create the illusion of „surface relief“ (3D texture effect) on the model, whereas the texture map will give the model the visual characteristics of the material being simulated (different colours, shades, patterns etc.). Some examples are given below.

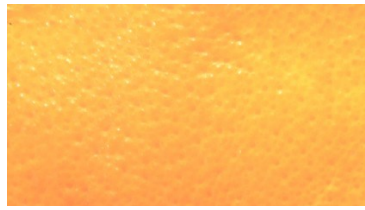


Bump map applied

Texture map applied

Combination of both

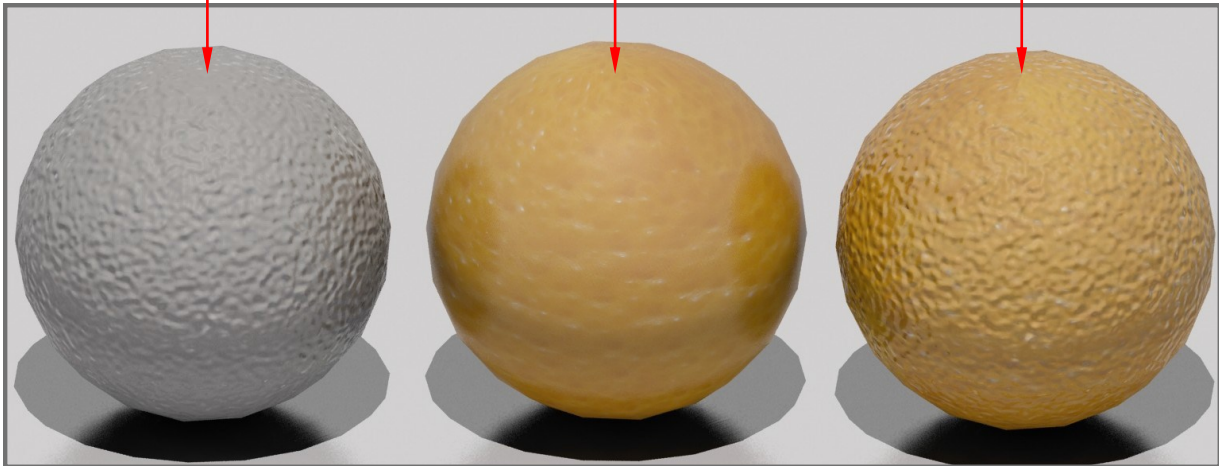




Bump map applied

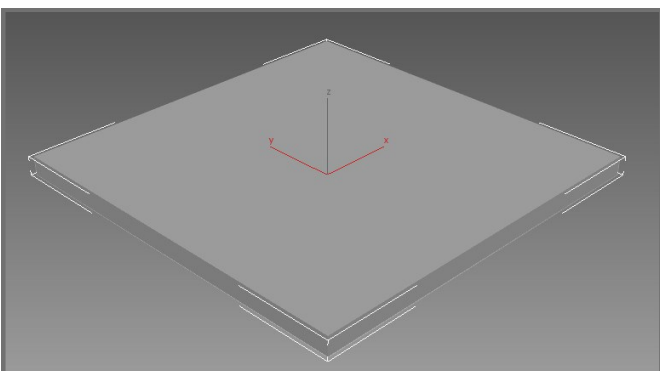
Texture map applied

Combination of both

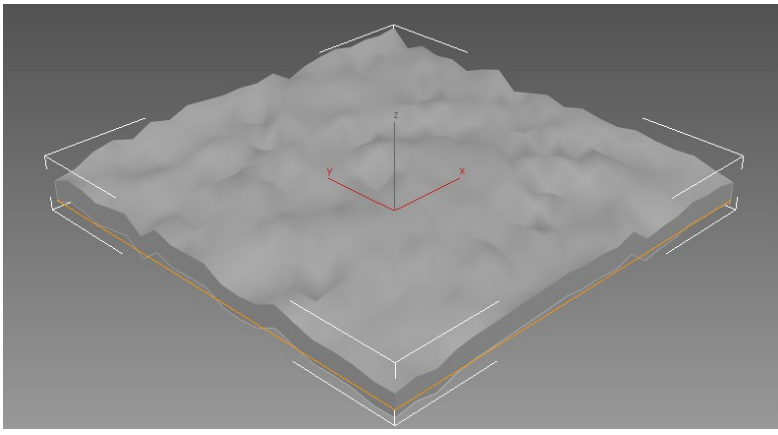


Displacement Map

Displacement mapping is an alternative computer graphics technique in contrast to bump mapping, using a **texture** or „height“ map to cause an effect where the actual geometric position of points over the textured surface are **displaced**. It gives surfaces a greater sense of depth and detail and allows shadows to be cast of the „displaced“ parts of the model. Rather than creating the illusion of surface relief (like a bump map), this method creates **actual** surface relief by altering and moving the physical properties of the 3D model. An example is given below.



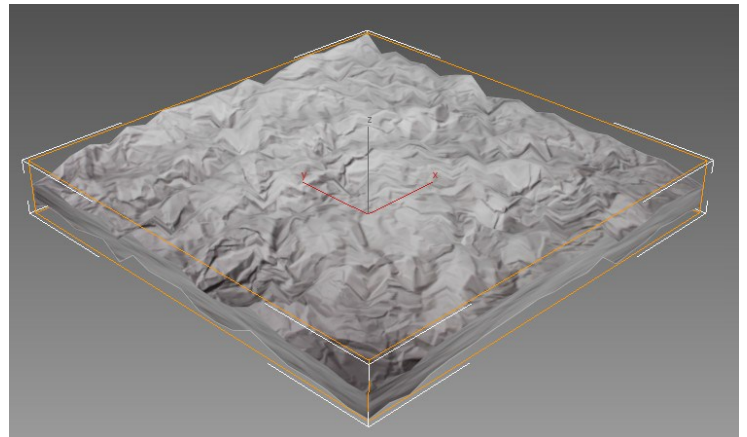
I created a cuboid using 3Ds max. I wanted to achieve a „creased paper“ effect on the top surface so I selected an appropriate image from the internet which mirrored the effect I needed.



I applied a **displacement map** to the model using the internet image as my texture to mimic. The software used the image to plot the displacement areas. I was able to increase the displacement effect gradually until I achieved the correct height of displacement (shown opposite).

I then also added the image of creased paper as a **texture map** to further add to the realism of the model.

The displacement map created the 3D creased effect and the texture map made the model look more like paper.



Screen Grabbing

Screen Grabbing is a useful tool to capture and image of your computer screen, however it does have its drawbacks;

- The Screen capture saves an image only at the same size as it is presented on the screen.
- Although this is relative to the resolution of the screen/monitor, screen capture is normally low-resolution (72 ppi) and will result in poor print quality by either pixilation of the image itself or the image being small.
- Screen captures will also download everything on screen, not just the image, meaning cropping will have to be used to remove unwanted details (additional photo-editing software would be required to do this).