

**Boclair Academy  
Technical Dept.**

**H Graphics**  
**Prelim Revision Topics 2016**

[www.technicaldept.co.uk](http://www.technicaldept.co.uk)

# Convert Manual Drawings to Digital.

## Technical drawings manually drawn on paper can be scanned, traced & converted to CAD files.

### Before & After



### Advantages of CAD:

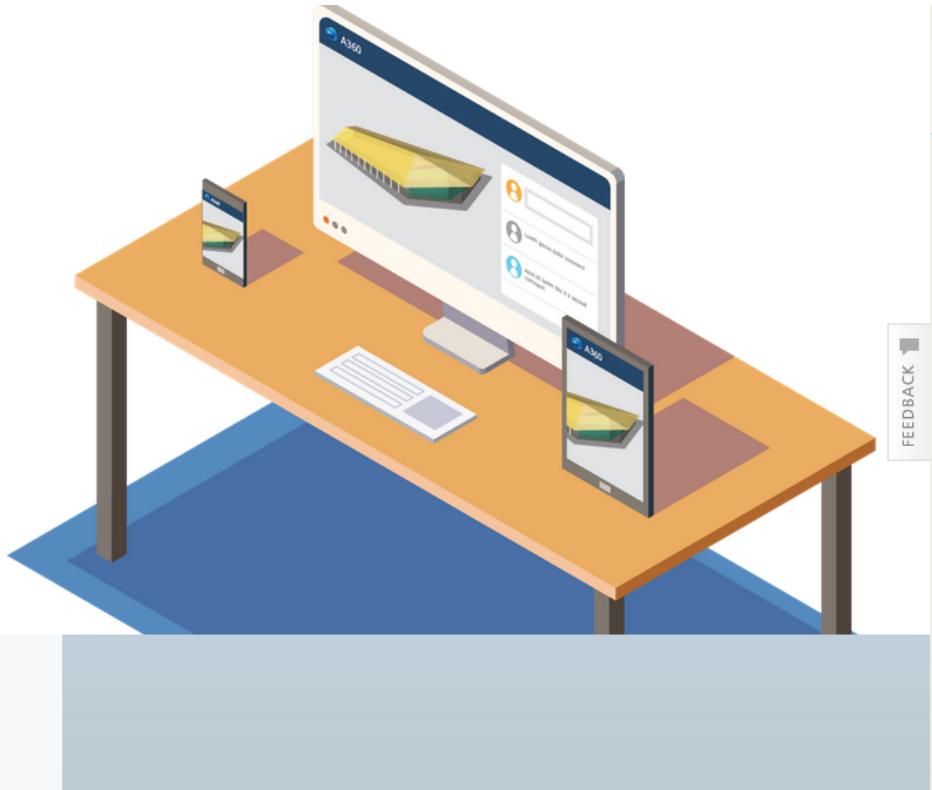
- Standardisation of drawing conventions to Bsi & International standards (ISO)
- Ease of modification. CAD drawings can be edited quickly and accurately.
- Storage and retrieval. CAD drawings can be stored digitally saving space that paper requires.
- Ease of formatting & scaling. Drawing scales & orientation can be changed quickly and enlarged areas of detail can be shown without the need to be drawn from scratch.
- Use of CAD library components.
- Digital CAD can be sent electronically around the world almost instantly.

# Collaborative CAD Software.

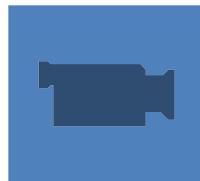
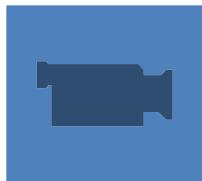
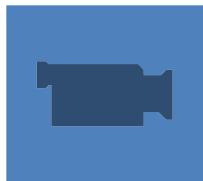


## Collaborate in a single, central workspace

View and share files—including 2D and 3D designs—on the go, on any device. Store data where you'll find it. Find it when you need it.



Find out more - click on a video link below:



# Collaborative CAD Software.

## Collaborative CAD

This type of software helps engineers and designers view, share, review, and find 2D and 3D design and project files in one central workspace. It helps keep projects, files, and teams up to date, whether you're at the office in the field or another continent .

### Advantages:

<b>View 2D and 3D files in a web browser</b>  View models and drawings right in your browser—no plug-ins or downloads needed. The viewer supports more than 50 2D and 3D design file formats, including those from Autodesk, Solidworks, CATIA, Pro-E, Rhino, and NX.  Interact directly with complex models: Zoom in, walk through, create a section analysis, and orbit, all in real time. View from any desktop or mobile	<b>Share files easily</b>  Upload any file, then create a link to share the file by email or chat. Including 3D models to 2D drawings, PDFs to spreadsheets. Share files and collaborate with team members, contractors, clients, and customers.	<b>Review in real time</b>  Turn your design files into intelligent, shared workspaces with A360. Set up a review session to invite team members and other project stakeholders to comment directly within files. Track the latest updates, comments, and design changes from your team in one workspace.	<b>Find information quickly track changes</b>  Search, filter, and find project data across design models, complex assemblies, data archives, and activity feeds. Search for files and track the latest changes made to CAD models and project documents.	<b>Mobile access</b>  Access your projects from your smartphone or tablet with a mobile app, available for iOS and Android.
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# Collaborative CAD Software.

## Disadvantages:

### **1.Unreliability: Another Disadvantage of Group Collaboration Software**

2.Less reliability could be an issue with group collaboration software. When the server with your groupware is down, nobody can work unless they do so separately, which certainly isn't the idea behind groupware. If you have to work separately this can lead to poor communication.

### **2. Groupware Costs a Lot**

Groupware isn't cheap. When you add its price and the other costs you need to make in order to deploy and maintain it and you draw the line, the result could be pretty shocking. Though group collaboration software is frequently considered the cheaper alternative (and it generally is, especially when compared to the price of a business trip, for example), many top groupware products are priced sky high, and the maintenance costs associated with them push their cost even higher.

### **3. You Are Tied to the Groupware Vendor**

Dependency on a software vendor isn't typical for groupware alone, but since it exists with groupware as well, it is worth mentioning. If your groupware creates documents and other files in proprietary formats, then the export of the data to an alternative platform might be virtually impossible. In a sense, you are locked to the groupware you are using and there is no way out, unless you leave all your data behind.

### **4. Security Is a Serious Problem with Group Collaboration Software**

Unauthorized access and risks for data while in transit are the two most notable security issues.

# Simulation of real world environments



## Simulation

This allows the creation of required situations for training, testing design Materials and predicting future events. This is generally cheaper than 'real-life' and safer too.

## 3D Illustration

This improves the visual appearance of a 3D model, and some packages allow the user to interact and animate with the design. Most CAD packages have illustration features imbedded within them—ie Inventor Studio—but there are 'stand alone' products available which are solely devoted to the task.



# Simulation - Finite Element Stress Analysis (FEA)

www.autodesk.com/products/inventor/features/simulation-visualization/stress-analysis

**AUTODESK.**

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Simulation and visualization | Feature 20 of 22 | SEE ALL FEATURES | PREVIOUS | NEXT

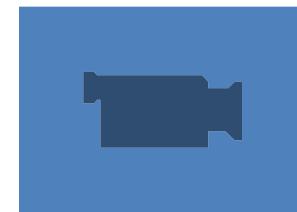
## Stress analysis

INVENTOR, INVENTOR PROFESSIONAL

Run quick checks on parts or perform in-depth analysis of the entire product at any stage.

- Carry over the model, materials, and contacts from the design environment.
- Apply loads and constraints by selecting the surfaces in your model.
- Automatically detect contacts between parts.

Testing throughout the design process helps you iterate and improve your product's performance early in the process.  
(video: 2:49 min.)



# Visualisation & Rendering 3D Models

www.autodesk.com/products/inventor/features/simulation-visualization/visualization-rendering | C | webgl | SEARCH | SIGN IN | MENU

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**Visualization and rendering**

INVENTOR, INVENTOR PROFESSIONAL

Show how your product will look with visualization and rendering tools.

- Choose from a variety of styles inside the design environment.
- Use one of the default shaded, wireframe, monochrome, or illustration modes.
- Use ray tracing to get the best possible rendering.

(video: 2:14 min.)



# CAD Advantages/Disadvantages/Cad Library

## 2D CAD



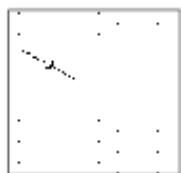
2D CAD can basically be considered as being a computer version of a manual drawing board and is used extensively in the architectural, engineering and construction industries. It also forms the basis for producing 3D models. By applying on-screen commands the user can quickly, easily and accurately produce high-quality 2D drawings of the required format.

2D CAD packages bring several advantages to the process. In addition to increased SPEED and ACCURACY of production, the drawings can be easily EDITED, STORED and TRANSFERRED immediately around the world via the internet. 2D CAD also provides the user with several features which are unique to this medium:

### Grid

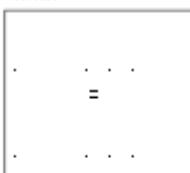
By applying a grid template to the drawing, the user can 'Snap to grid' - this means that each point and line on the drawing is joined to a pre-determined format. The size and style of the grid can be set before drawing and this allows greater accuracy and speed of production. It can be compared with the drawing instruments used with the manual drawing board such as the rule, set squares and T-squares.

#### Isometric



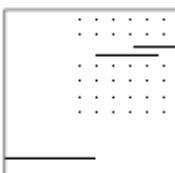
Displays a 30° grid on screen which makes Isometric drawing easier and more accurate.

#### Ortho grid



Displays a grid on the screen to any desired spacing. This makes orthographic drawing easier and more accurate.

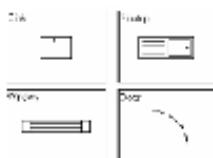
#### Ortho



Restricts the movement of the cursor to horizontal and vertical movement only. This makes orthographic projection

### Library of parts

This allows the user to insert previously drawn and saved parts into a new drawing. The advantage of this feature is that each part is UNIFORM (BSI symbols, etc.) and does not have to be redrawn each time it is required. The library feature allows newly drawn parts to be saved for future use and multiple users can add to and access the library.



HIGHER NOTES

Computer aided design and draughting

### Some disadvantages with CAD...

Using CAD as a software package involves some of the risks associated with any computer systems, such as:

- The initial cost of a computer system is high, as is the cost of retraining staff that are used to producing drawings by traditional methods.
- It takes time to convert existing paper drawings over to an electronic format, although scanners can help with this.
- Loss of material can occur due to computer viruses and power failures.
- Possible theft of materials is more common with a CAD system.

### Layers

A CAD drawing is made up of individual 'layers', with each layer providing a different line type or 'element' of the drawing. This allows that layer to be isolated and edited/applied to the drawing. For example, within a large floor plan the electrical, plumbing or heating systems can be displayed individually so allowing that information to be easily available to the individual required without the drawing becoming 'cluttered' with excess detail.

Layer	Type	Color	Line Weight	Line Style	Width	Offset	Order
Architectural	Line	Black	0.3	Solid	0.00	0.00	1
Architectural	Line	Black	0.3	Solid	0.00	0.00	2
Architectural	Line	Black	0.3	Solid	0.00	0.00	3
Architectural	Line	Black	0.3	Solid	0.00	0.00	4
Architectural	Line	Black	0.3	Solid	0.00	0.00	5
Architectural	Line	Black	0.3	Solid	0.00	0.00	6
Architectural	Line	Black	0.3	Solid	0.00	0.00	7
Architectural	Line	Black	0.3	Solid	0.00	0.00	8
Architectural	Line	Black	0.3	Solid	0.00	0.00	9
Architectural	Line	Black	0.3	Solid	0.00	0.00	10
Architectural	Line	Black	0.3	Solid	0.00	0.00	11
Architectural	Line	Black	0.3	Solid	0.00	0.00	12
Architectural	Line	Black	0.3	Solid	0.00	0.00	13
Architectural	Line	Black	0.3	Solid	0.00	0.00	14
Architectural	Line	Black	0.3	Solid	0.00	0.00	15
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Architectural	Line	Black	0.3	Solid	0.00	0.00	17
Architectural	Line	Black	0.3	Solid	0.00	0.00	18
Architectural	Line	Black	0.3	Solid	0.00	0.00	19
Architectural	Line	Black	0.3	Solid	0.00	0.00	20
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Architectural	Line	Black	0.3	Solid	0.00	0.00	22
Architectural	Line	Black	0.3	Solid	0.00	0.00	23
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Architectural	Line	Black	0.3	Solid	0.00	0.00	88
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Architectural	Line	Black	0.3	Solid	0.00	0.00	150
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Architectural	Line	Black	0.3	Solid	0.00	0.00	158
Architectural	Line	Black	0.3	Solid	0.00	0.00	159
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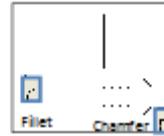
# 2D CAD (2)



## The main CAD commands

These CAD commands are taken from 2D Auto CAD, but all can be used within the sketching mode of 3D Modelling packages, including Inventor. They are all designed to make the drawing of material as easy and efficient as possible for the user.

Fillet and chamfer



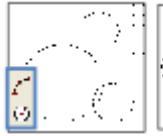
Rounds (fillets) corners;  
Angles (chamfers) corners

Rectangle/box



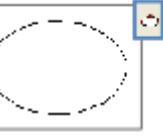
Draws squares and rectangles accurately and quickly

Circle and arc



Draws circles and arcs accurately and quickly

Ellipse



Draws circles and arcs accurately and quickly

Trim, extend and break

trim



Trims the end off a line

extend



Makes a line longer

break



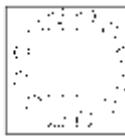
Removes a section from the middle of a line

Dimension



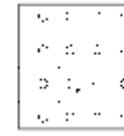
Automatically measures then dimensions chosen parts of a drawing.

Ring Array



Creates a circular arrangement from copied objects.

Box Array



Creates a rectangular arrangement from copied objects.

Text



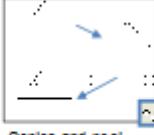
Allows text to be entered in a variety of fonts and sizes

Mirror



Creates a mirror image copy of an object

Copy



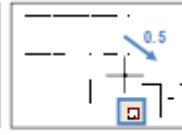
Copies and positions without having

Rotate



Turns an object to any angle required.

Scale

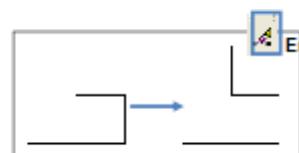


This changes the sizes of objects.

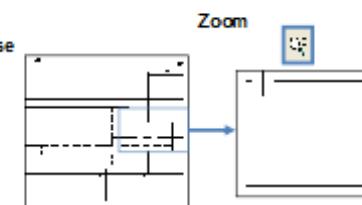
Line types

Name	Appearance	Description
Solid	---	
Dash-dot	-----	Dash-dot
Long-dash	-----	Long-dash
HIDDEN	-----	Hidden(5%)

Allows any BSI line types to be used in the drawing.



Erases selected lines or areas from a drawing



Zoom

Enlarges view so that small details appear bigger and are easier to work on.

Layers

Name	On	Freeze	L	Color	Line style	Line width
0	Y	Y	Y	250	Continuous	Default
Panel line	Y	Y	Y	251	Continuous	11P.W
Joints	Y	Y	Y	252	Continuous	Joint
Dimension	Y	Y	Y	253	Continuous	0.15 mm
Hidden line	Y	Y	Y	254	HIDDEN2	0.15 mm
3D-Block line	Y	Y	Y	255	Continuous	0.15 mm

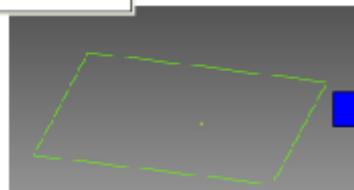
Allows a complex drawing to be built up in several layers to make it easier to work on.

# Modelling features:

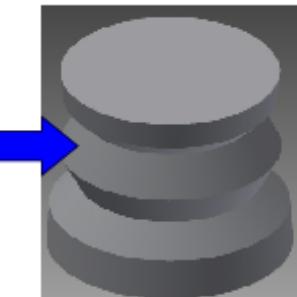
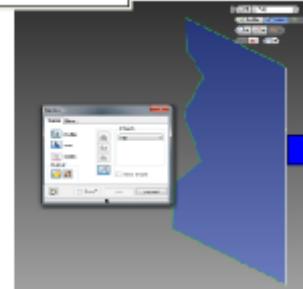


These are the functions which transform the sketch into the 3D model.

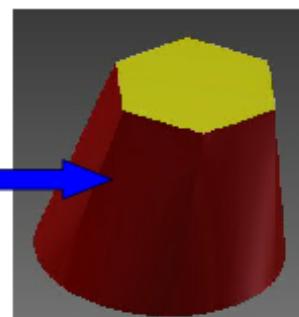
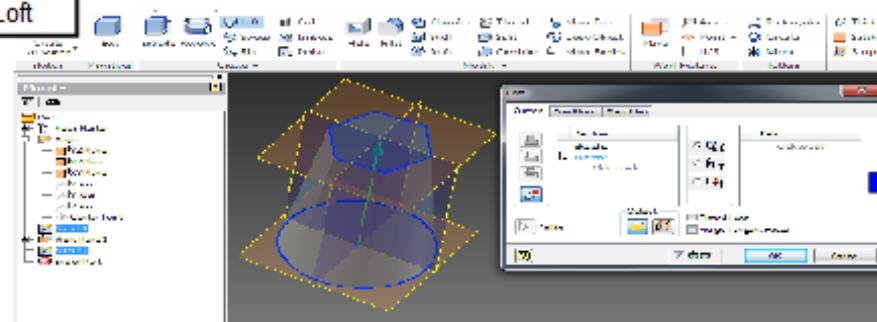
Extrusion



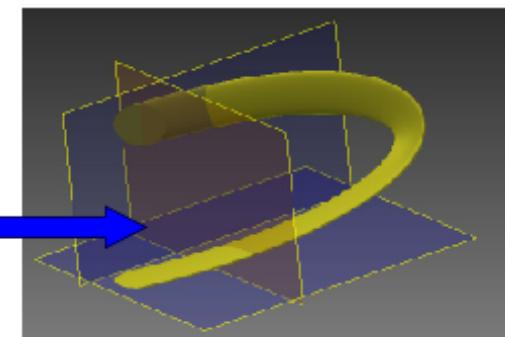
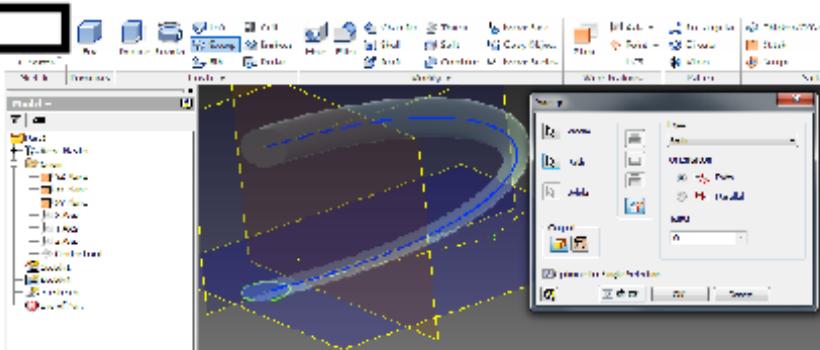
Revolve



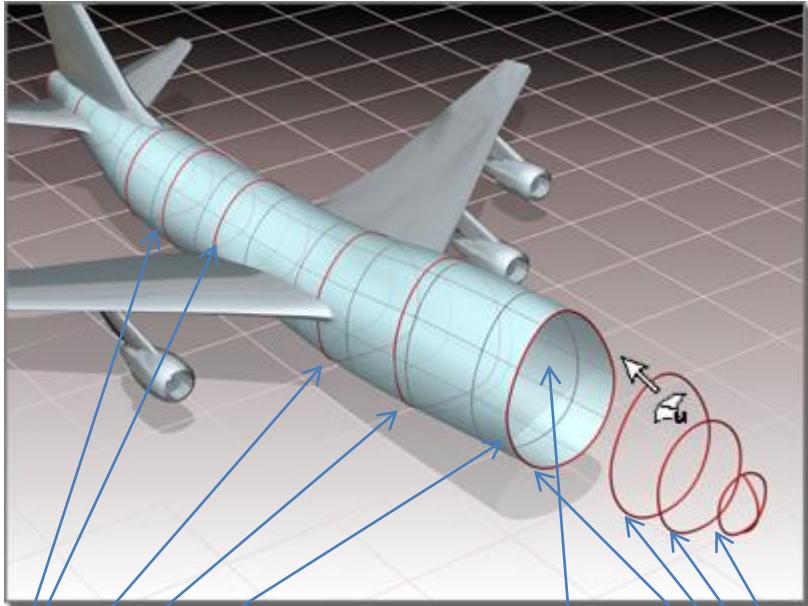
Loft



Extrude Along a Path (Sweep)



# Loft – Creating Complex Features



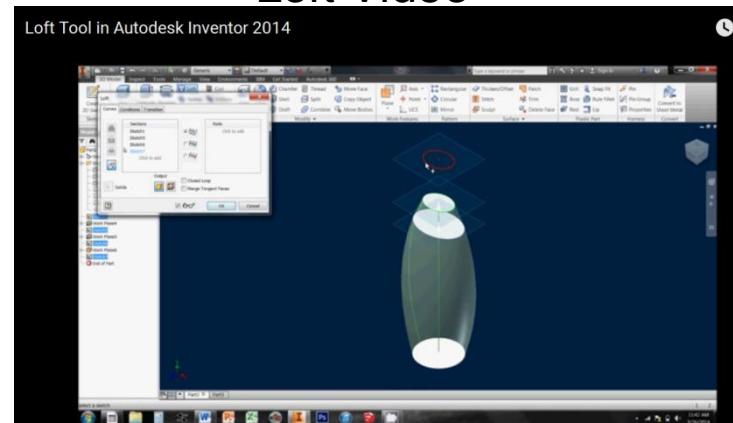
Loft between each sketch

Sketches on  
each workplane

Shell

1. Create multiple work planes.
2. Dimension each workplane spacing.
3. Draw sketches on each workplane & dimension them.
4. Loft between each sketch to create a complex feature.
5. Shell the feature if it is to be hollow.

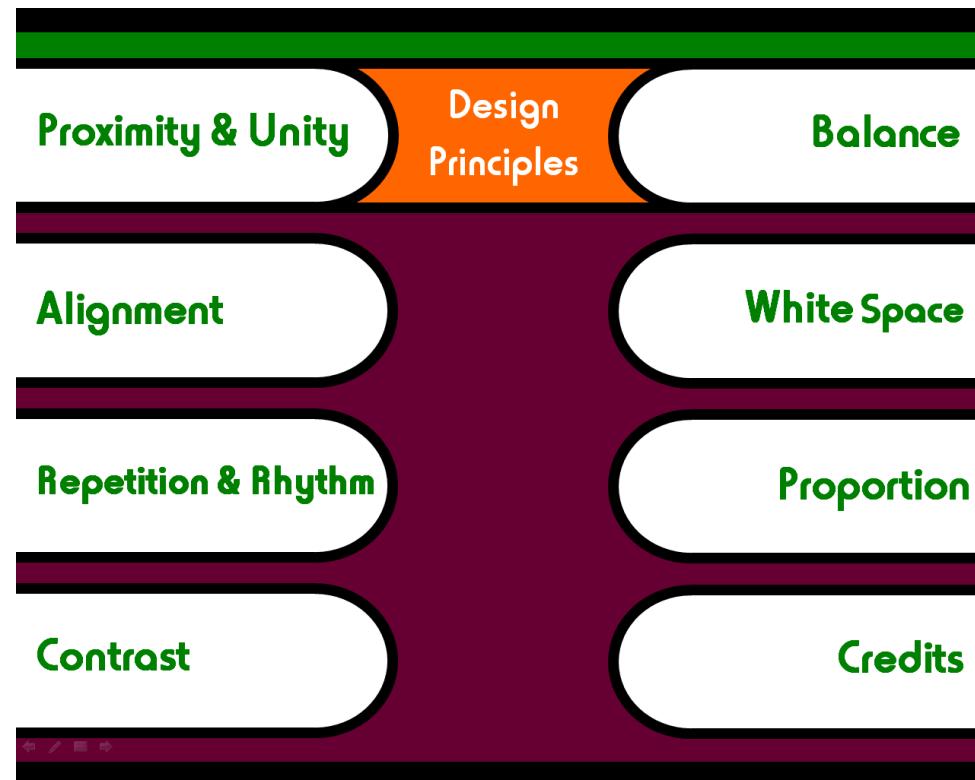
## Loft Video



# DTP - Design Elements & Principles

- Know about Design Elements & Principles and how they are used in a layout.
- Be able to look at a DTP layout and identify which ones have been used.
- Be able to explain their impact on the DTP layout.
- Be able to compare one layout with another and describe any improvements.

Click to link to  
this  
presentation



# Design Elements

## Line

The use of line can be an important and effective technique to enhance a page. They can be used to connect parts of the layout, create emphasis on certain items and separate parts of the design from others.



The use of the two sets of lines brings repetition to the display, and links the product on the right hand side with the text on the left. The lines also link both coloured parts of the layout together.



By simply applying two thin lines, the viewer's eye is led along the page from the product name to the slogan at the bottom right. The vertical line passes behind the product, so linking it to the slogan and the light blue element of the layout. This also brings depth to the display.



The wavy lines in this layout make it feel less formal and more vibrant than the other two layouts. An impression of movement is created here and again the reader's eye is taken to the slogan at the bottom.

# Design Elements

## Shape

Layout techniques

As most layouts take the form of squares and rectangles, it is effective to use different shapes within the design. The use of circles for example, are useful for bringing contrast to a layout and creating visual interest. This is especially true if the product being advertised has straight edges, in this case a mobile phone.



This layout is very straight and rectangular in structure. All the graphic items are in boxes, and the shapes of the product are also rectangular.

The red lines further add to this feel, and the display is not very eye-catching or exciting.  
It lacks visual impact.



This layout has more vibrant and eye-catching as circles have been applied to it. The circles contrast well with the rectangular outlines of the phones and make them stand out more.

The straight red lines have been replaced with wavy lines and this gives a feeling of movement and contrast to it.

A change of font for the slogan further adds to the contrast in shape—it is less 'straight' than before and harmonises well with the circular shapes now adopted.

# Design Elements

## Colour

The use of colour can have a dramatic effect on the impact of graphic layouts. Colour combinations should be considered, and not just colours in isolation. Colours working together are what makes a difference. If colour combinations are effectively applied, they can:

- Give visual impact to the layout
- Suggest a mood
- Unify a layout
- Make a product stand out
- Connect the product with a target market

You should be familiar with colour theory, which is covered elsewhere in your notes.

This colour scheme predominantly uses tones of the same colour—blue.

This unifies the display and contrasts well with the red of the product—so creating visual impact.

The red of the product is used in the two items of text—this now becomes the accent colour. This unifies the display and also creates brand awareness as it is the same as that of the hairdryer.



HIGHER NOTES

### Layout techniques

#### White space

White space does not need to be white; it refers to a blank area or empty space on a page.

There are three main reasons for including white space in a layout:

- It calms a layout and makes a busy layout less busy.
- It can make an item in or near the white space stand out more—it gives that item emphasis.

It can allow the reader's eyes to rest. This is advantageous if the layout is busy.



The application of colour combinations does not work effectively here—too many colours are used. The colours are in conflict with each other, and make the layout confusing to read. It is also difficult to read the slogan at the bottom.



This colour scheme only uses the colours of the hairdryer product. This means no 'extra' colours are used and they work well together to create a harmonious feel.

The light grey of the flashbars is effective in giving depth to the layout and makes the product stand out.

It is easier to see the slogan at the bottom now a single colour gradient has been applied to it.

# Design Elements

## Mass, value and texture

Value

TEXT

Company Name

TEXT

This deals with the use of colour tones in a layout. Darker tones have a higher value and setting them against lighter tones makes a graphic display more dramatic.

Mass

**HEADLINE**

Sub-heading

Elegance

Fun

All items in a layout have a mass. A bold heading has a greater mass than a small sub-heading. Lines and colour fills add mass but thin lines bring a formal elegance, while heavy blocks of colour can show

Texture

Holidays  
2015!!

Practical  
woodworker

Craft fair  
monthly

Texture can be considered in two ways: Physical texture is provided by the smoothness or coarseness of the paper.

Visual texture is the pattern in images such as the pattern of tree bark in a photograph.

## Design principles Balance

It is quite straightforward to understand and apply the principle of balance in a layout.

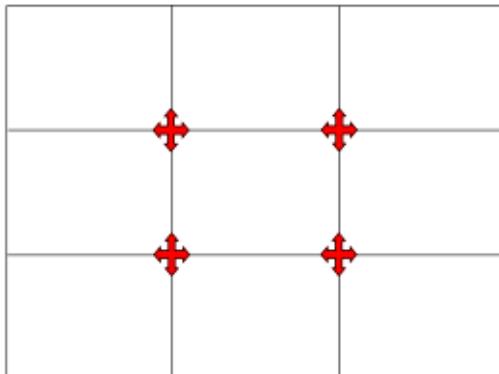
Most layouts are based on a rectangular shape. If the advertised product is placed in the centre, there are two areas to fill—each either side of the graphic.

Layout [1] has been balanced symmetrically—if you divided it in half vertically, each side would be essentially the same.

### The Rule of Thirds

If a space is divided into 9 equal rectangles, the four lines dividing the space provide focal points. If objects are and text are placed here or close to these lines, a more visually effective layout can be produced.

The points where the lines cross are called impact points, and these are key areas to place important features.



### Layout techniques

1.



This symmetrical layout is quite difficult to follow, and text items are spread over the page. This can make it difficult to read the text and there is little 'flow' to reading the layout.

2.



This asymmetrical layout is more eye-catching. As the text is positioned to the left and the graphic to the right, the layout 'flows' better.

3.



Some small alterations have been made here to further improve the layout. The text is grouped more together than before, the product has been enlarged and a shadow effect has been applied. The 'HeatWave' text has been reduced slightly in size and also moved to the left.

# Design principles

## Unity, repetition and harmony

As layouts usually consist of different graphic items and text, it is important to connect these different elements together within the layout so that they appear linked and together.



Unity is achieved here by overlapping the image onto the text. This makes a physical connection between the image and the text.



The same effect is achieved here by positioning the image over the lines



The repetition of the thicker blue lines with black outlines creates unity here. The use of a similar colour to the graphic is also a unifying feature.



By overlapping the image onto all three areas of the layout, unity is achieved. Again, a harmonious colour is effective in contributing to this effect and the flashbar connects the text to the image.



The three circles are filled with a similar colour to the graphic. The repetition of these circles creates a unifying effect to the layout.



By wrapping the text around the image, the layout is unified and connected.

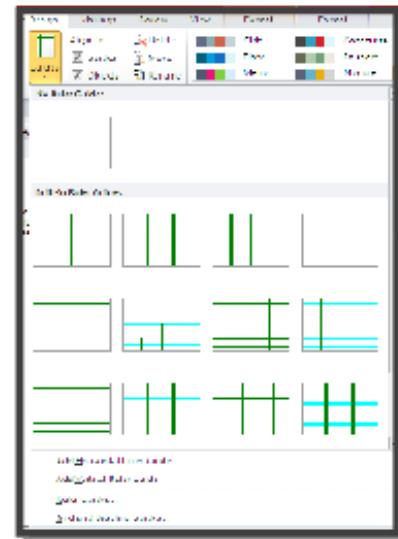


Colour, repetition and positioning of graphic are used here to effect to create a unified layout.

# Design principles

## Alignment

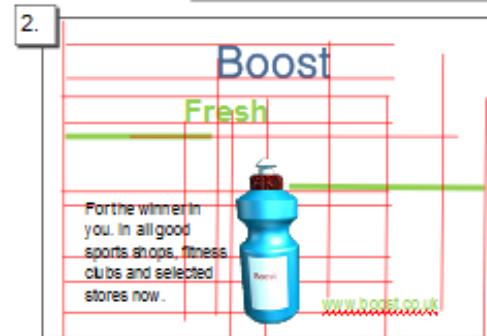
Alignment is an effective method to improve the structure of a layout. Good alignment makes a page easy to follow and organised and helps make it neat and sharp.



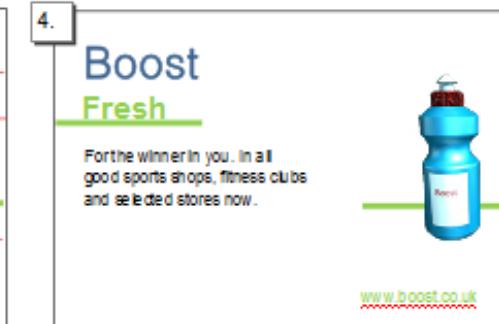
This screenshot from Publisher shows how using a layout guide and the 'Snap' tool can effectively and easily enable alignment to be achieved in the display. Such a guide has been applied to the layout in [3]. One can see how the edge of each item and text is aligned with another.



This layout [1] is poorly aligned. The impression given is one of disorganisation, and it appears messy and ill-structured. The image and various items of text are almost scattered around the layout, and it becomes difficult to take in the information.



Once guidelines are added to the display [2], one can see how poorly aligned the graphic items and text are. The guidelines illustrate where alignment can be achieved with edges of items.



This layout [4] has the guidelines removed and demonstrates how effective good alignment is to a display. Compare it with the original layout [1] and note how it is more structured and organised.

# Design principles

## Depth

As layouts are produced in a 2D format—usually a page—it is important to create an illusion of **Depth**. This illusion stimulates the layout and makes it more eye-catching. There are several methods to achieve an impression of depth.



If a pictorial view of the product is chosen, it appears to have more depth than a simple 2D view. Another simple method of creating depth in this layout is the application of a single thin line behind the hairdryer, making it look as if it is closer than the line.



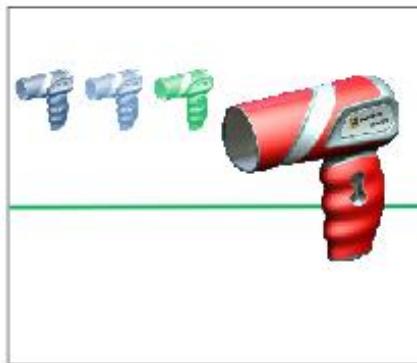
The same effect is achieved here by placing the product onto a coloured shape. As green is a receding colour, the effect is to push the hairdryer into the forefront of the layout—which makes it eye-catching.



Using the Drop Shadow tool in this instance creates depth in the layout by making it appear that the product is standing out from a background.



By applying an image as a background, depth is brought to this display. It is important to consider the style of the background to successfully achieve this, and in this one a blue washed out colour doesn't take away the emphasis on the hairdryer.



By placing the hairdryer in the forefront of the layout with smaller images of the same product next to it, an impression of depth is created.



By placing the product in front of the text, an impression of depth is created and the hairdryer is brought to the forefront of the layout.

# Design principles

## Emphasis and dominance

As graphic layouts are often looked at hurriedly by a reader, it is important to attract their attention quickly. If a page has no focal point or is generally bland, the reader shall ignore it and move on.

As a layout may contain several items of text and graphics, a strong focal point must be provided to centre the display around. This is normally the graphic or photograph on the page.

**Dominance** is when one item of the layout stands out more than the others.

**Emphasis** occurs when one item is made more eye-catching.

These are the three rules of order to dominance in a layout:

1. The main graphic or image should dominate the layout.
2. The title, heading or product should be next.
3. Less important items should be grouped and positioned effectively to support this order.

This layout has no item achieving overall dominance; as it is advertising the 'Boost' drink then the bottle should be the main item the viewer notices.

In this case, the bottle is 'swamped' by the other features in the display—the slogan and the athlete are perhaps the most noticeable features. The font size of the 'Boost' is almost the same as that of the slogan.



For the winner in you.

Some simple changes have been applied here to make the product become the dominant feature and emphasise the product name:

- The bottle has been enlarged and put off-centre. This immediately attracts the reader's attention.
- The athlete has been reduced in size, and relocated to the top left corner. She still contributes to the layout, but does not take over.
- The crowd silhouette has been faded slightly and put more behind the bottle—this is acting as a **flashbar** so giving the layout more depth and pushing the product forward.
- 'Boost' has been underlined to emphasise the product name more effectively
- The line at the bottom gives further dominance to the bottle and leads the eye to the slogan—which has been reduced in size.
- A gradient fill has been applied to the background. This has the effect of making the items in the layout stand out more and not be overcome by the starkness of the original solid background.



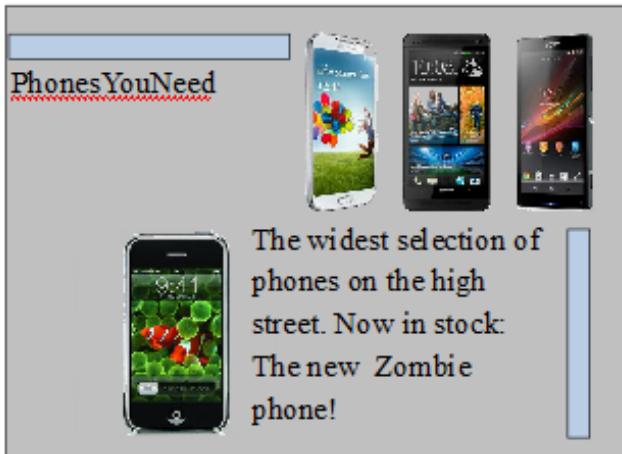
# Design principles

## Contrast

The purpose of a designed page is to grab the reader's attention—this is especially true in promotional graphics where the layout is competing against other adverts and products.

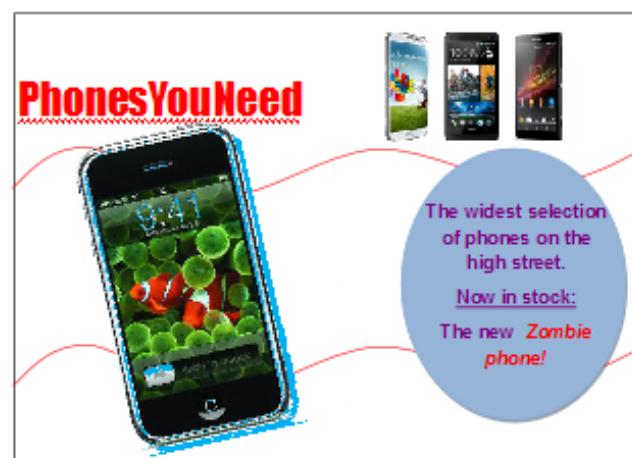
An effective way to achieve this is through the use of contrast—especially by comparing opposites.

Opposites can be between colours, horizontal and vertical lines and between shapes—such as circles and squares.



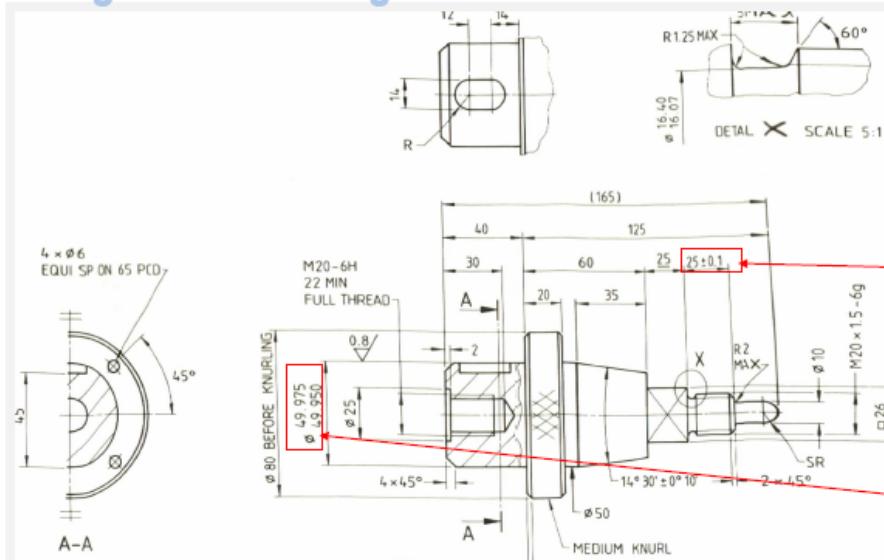
This promotional layout provides no occasions of contrast. The black text is almost lost against the grey background. The page is aligned well, but the straight shapes of the phones and the coloured shapes give the page a very grid-like feel and nothing in particular stands out.

This layout is different however. The display has a much more vibrant feel to it; the red wavy lines contrast strongly with the rectangular shapes of the phones, and by increasing the size of the main image and tilting it the phone grabs the reader's attention. By applying a gradient fill to the flashbar the red text of the company's name stands out more. The use of a circular background for the product information contrasts with the straight lines of the product and flashbar and grabs the reader's attention.



# Title Block Information

## Scaling and tolerancing



1 TO BS 1134		TOLERANCE	MATERIAL	PROJECTION	DRAWN MAP	ORIGINAL SCALE	DO NOT SCALE	
L OVER EXCEPT	DIMENSIONAL ±0.2	STEEL TO BS 970	070M26		DATE 86 06 17	1:1	ALL DIMENSIONS IN mm	ORG NO.
E STATED	ANGULAR ±2° UNLESS				CHECKED LD		CONNECTOR	2
ADS TO BS 3643	OTHERWISE STATED				DATE 86 06 30			

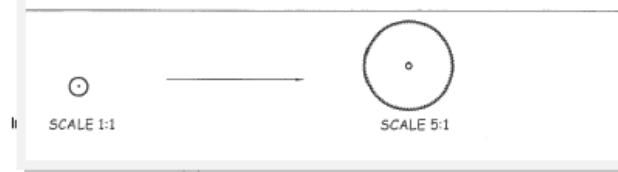
## Scaling

A drawing can be scaled to make it bigger or it can be scaled to make it smaller.

The scale of a drawing depends upon:

1. The size of the paper being used
2. The size of the object being drawn
3. The amount of detail required

In general, scales should allow easy and clear understanding of the object being drawn.



HIGHER NOTES

Drawing standards  
Click on Sign to add text and place signature on PDF File.

## Tolerances

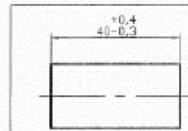
Tolerances are required during the manufacturing process. Anything which is required to fit or interact with another part must be manufactured to set tolerances. E.g. a tyre for a bicycle must be able to fit onto the bicycle wheel, an electrical plug must fit into the socket, batteries must be able to fit into the holders etc etc. Tolerances are also required in other situations. The position of a brick wall in a house, steel girders in roof structures etc.

The tolerance required will vary from situation to situation. A ROLEX watch will be made to much "finer" tolerances than a child's TIMEX watch. The machinery and equipment required to produce a ROLEX will be much more expensive than the machinery required for the TIMEX.

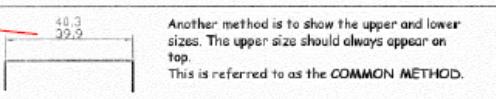
How to show a TOLERANCE



These are SYMMETRICAL tolerances. This means that the size could be anywhere between 0.5 bigger or 0.5 smaller than the nominal size.



This is an ASYMMETRICAL tolerance. This means that the size can be different above and below.



Another method is to show the upper and lower sizes. The upper size should always appear on top.  
This is referred to as the COMMON METHOD.

## Title block

This contains such information as drawing name, number, date, tolerances, scale and third angle symbol. This is important as it sets out the standards the drawing uses and ensures there is no ambiguity regarding the information it represents.

### EXPLANATION OF THE SCALE TERMS.

Scale 1:1 means the actual size of the object.

Scale 5:1 means five times bigger than the actual size.

Scale 1:5 means one fifth of the actual size.

# BSI Line Types

## HIGHER NOTES

DESCRIPTION	LINE	APPLICATION
continuous thick line	—	visible edges and outlines
continuous thin line	—	dimension, projection, hatching, leader lines
dashed thin line	- - - - -	hidden edges and outlines
thin chain line	- - - - -	centre lines
thin chain , thick at ends	- — - - -	cutting plane/section lines
thin chain double dashed	- - - - -	fold/bend lines on a development, extreme positions of moving parts
continuous thin straight with zigzags		limits of partial or interrupted views
continuous thin irregular		

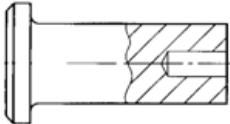
# BSI Standards - Types of Sectional View - Revolved & Removed etc.

## BRITISH STANDARDS

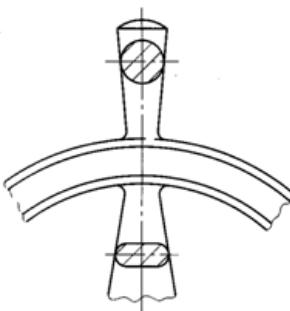
### Sectional views

There are many types of sectional view (other than a section along one plane) that can be employed to aid the clarity and understanding of production drawings. The following types of sectional views are useful for showing detail in more complex engineered objects:

- local or part sectional view



- revolved sections



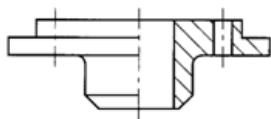
### Partial views

It is not always necessary or desirable to enlarge a full view. There are occasions when a partial view can be used to enlarge a detail and improve clarity.

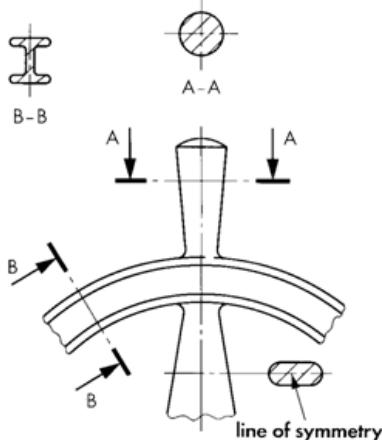


Enlarged Partial View

- half sectional view

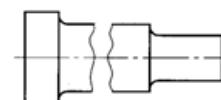


- removed sections

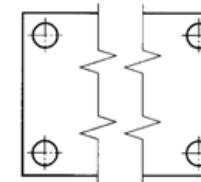


### Interrupted views

Drawings can be made to fit a sheet or screen more easily using interrupted views. These views only show the portions of a long or large object that are necessary to define it. They are drawn close to each other and break lines are used to define the edges of the section that has been removed.



Type C lines used  
for solid shaft



Type D break lines



Conventional break  
lines for solid shaft



Conventional break  
lines for hollow shaft



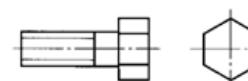
General break lines  
(type C lines)

### Representing standard components

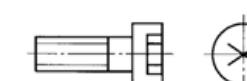
Modern engineering makes use of an extensive range of standard components. It's important that these standard components are all represented properly to allow products to be assembled correctly.

### Screws and nuts

The simplified representations of a range of screws and nuts are shown below. Although you may not need to use many of the representations shown here, learning them builds your theoretical knowledge and enables you to read engineering drawings more accurately. Note that these are not actual representations, but are drawn to conventions. A convention is an agreed method that is accepted as common usage.



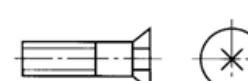
Hexagon head screw



Hexagon socket screw



Cylinder screw cross set



Countersunk screw



Hexagon nut



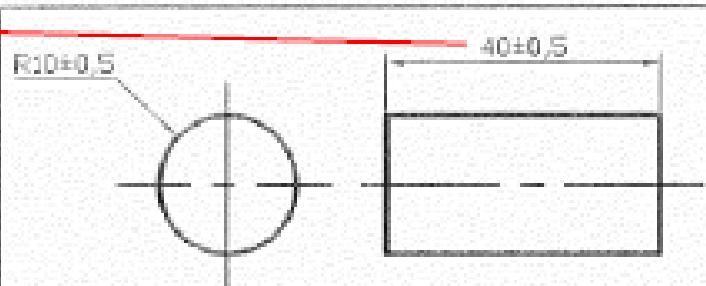
Square nut

## Tolerances

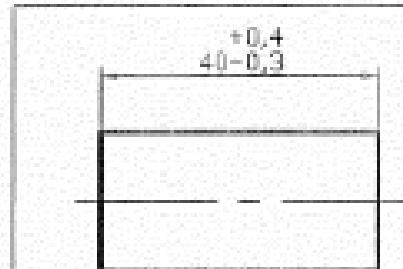
Tolerances are required during the manufacturing process. Anything which is required to fit or interact with another part must be manufactured to set tolerances. E.g. a tyre for a bicycle must be able to fit onto the bicycle wheel, an electrical plug must fit into the socket, batteries must be able to fit into the holders etc etc. Tolerances are also required in other situations. The position of a brick wall in a house, steel girders in roof structures etc.

The tolerance required will vary from situation to situation. A ROLEX watch will be made to much "finer" tolerances than a child's TIMEX watch. The machinery and equipment required to produce a ROLEX will be much more expensive than the machinery required for the TIMEX.

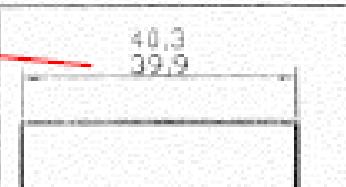
### How to show a TOLERANCE



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This is an ASYMMETRICAL tolerance. This means that the size can be different above and below.



Another method is to show the upper and lower sizes. The upper size should always appear on top.  
This is referred to as the COMMON METHOD.

# DTP

Register marks and crop marks



Registration Marks      Crop Marks or Trim Marks

**Register marks:** When printing an image that has more than one colour, it is necessary to print each colour separately and ensure each colour overlaps the others precisely. If this is not done, the finished image will look fuzzy, blurred or "out of register" (see image to right). To help line the colours up correctly, a system of registration is necessary.



An example of registration misalignment, note the cyan and magenta plates are not in the exact place. Also halftones are visible on the top area.



A commonly used registration mark. Although it seems black in colour the actual value should be  
 $C=100, M=100, Y=100, K=100$

and place signature on a PDF File.

## Crop Marks

## Registration Marks

The desired layout page is usually printed within a sheet of larger paper than what is required. For example, an A4 page shall be on an A3 sheet.



Exaggerated example of a mismatch of CMYK registration

### DTP techniques

#### Header

This is called a running header, and appears on every section of the magazine.

#### Headline

The headline introduces the article. In this case, the bold font creates emphasis, and the reverse text on the blue/grey fill gives it visual impact.

#### Drop capital

This larger first letter signifies the start of the article. The use of reverse also attracts interest.

#### Margin

Margin—the space at the side and bottom of the page where there is no text or graphic.



#### Bleed

This main image bleeds off the printing area and through the margin. This creates an informal feel to the page.

#### SPECIAL FEATURE



## KASABIAN

**K**asabian burst onto the British music scene in 2004 with the release of their eponymous debut album. Distracted with the clean living 'non' attitudes of the current groups of the time—Coldplay, Keane, etc.—they vowed to bring back some of the excitement and glamour that had been sorely missing. They have since gone from strength to strength, becoming the major attraction at festivals over the years. As guitarist Serge says: "Oasis have gone. We are the biggest band in Britain now. Kasabian are to head the Isle of Wight and Rockness festivals."

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#### Gutter

This separates columns, and helps to de-clutter the page.

#### Colour fill

Contrast and harmony can be achieved by formatting the text box appropriately. These two text boxes use a blue/grey fill which harmonises with the main picture, but contrasts with reds used in the headers.

#### SPECIAL FEATURE

### Excitement... what it is all about

Lead singer Tom explains the Kasabian philosophy

Where do you prefer to perform?

Scotland—the crowds are always up for it and go mental.

Why do you hate some other bands' boring attitudes?

All rock bands have a responsibility to live the life of a rock star—who wants to hear about Chris Martin's vegan diet or the Fratelli's going to bed early? People want an escape from the grinding routine of life, and we'll give them that.



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#### Text wrap

As it suggests, the text wraps around the image.

#### Cropped image

This is an image with the background removed. It creates a more interesting shape.

#### Reverse

The body text colour is black. The text of the subheading has been reversed, and the box filled with a darker colour. This creates contrast and gives the page interest.

#### Heading

This introduces a separate section of the article.

#### Tilt

This image is tilted, which catches the reader's attention. It creates a modern feel, which will appeal to the youthful target market.

#### Caption

Gives information about the image.

#### Sub-headings

These break up the large section of body text. The use of the accent colour produces a visual rhythm.

# Desktop Publishing (DTP)



Desktop Publishing (DTP) enables the production of magazines, newspapers, books, promotional literature etc. to be created on a desktop computer or laptop. The publishing industry creates these documents and the physical paper documents are produced by the printing industry. The design is the result of the work of the graphic designer.

## Benefits of DTP to the Graphic Designer

Graphic designers nowadays operate on a very flexible basis—work can be produced anywhere and any time using modern technology and sent to the office via the internet.

Modern DTP packages allow exciting and imaginative displays to be very quickly and easily created. The main benefits DTP software brings to the graphic designer are:

- It is simple to make modifications to images such as colour, shape and formatting.
- Further modifications to the design can easily be implemented on behalf of the editor or client.
- The grid structure templates within DTP software enables designs to be created accurately and quickly.
- Design proposals can be sent to the editor or client electronically to save time. Their responses can be returned this way.
- The graphic designer can work from home. This saves travel costs and environmental impact of their journey.

## Benefits of DTP to the graphics industries

As there is great competition among newspapers and magazines in the market and the circulation of most printed newspapers is declining, DTP provides many advantages to the industry:

- Proposals and final editions with full designs and images can be sent quickly electronically. These can then be forwarded onto the printer in this way.
- News reports can be sent from anywhere in the world email.
- The time it takes to design and publish a document is greatly reduced. Modifications can easily be made by the editor and sent to printer.
- Common features within a publication can be quickly produced via templates such as footers, running headers etc.

## Benefits of modern printing methods to society

The advent of modern methods has had a major impact on the printing industry. Traditional methods were very labour intensive and large numbers of people were employed in various roles such as print-setters, labourers and engineers. The amount of semi-skilled workers has been reduced, although there is now great demand for highly skilled operators as more reliance is placed on computer controlled design and production. The new technology has also had an effect on the industry's environmental impact:

- Modern printing methods are more energy efficient than previous means.
- Many publications provide an electronic or online edition. This reduces the amount of paper and ink required.
- Most publications use paper which can be 100% recycled as a result of modern printing technology.
- Modern inks are more environmentally friendly and less quantity is required. Inks are now based on vegetable oil rather than on petrochemicals.
- The quantity of paper and inks required is digitally controlled. This reduces waste.



# Font Styles – Serif / Sans Serif

## Desktop Publishing



### Text

Text is obviously used throughout a publication, and it is put to different uses to satisfy particular requirements of the piece. Headers and footers appear at the top and bottom of the page respectively, and give information, such as date, page, the feature concerned, etc. Headings and titles give an introduction to the article, and subheadings divide the article into smaller sections. Pull-quotes draw the reader's attention to the article and captions explain an image or photo. The main body of text is called body type, or body copy.

### Typeface

Fonts are in two styles— serif and sans serif.

M H S

Serif text—they have a line crossing or tail between the two free ends of the stroke.

This creates a serious/formal look and is often used for the body text in quality

M H S

Sans serif—a typeface without serifs.

This creates a less serious,



### Examples of fonts

Times New Roman

Baskerville Old Face

Century Schoolbook

Serif fonts

Arial

Europa

Sans serif fonts

Arnold Bocklin

Gospel

Fun fonts

Contrast can be created in a publication by using a sans serif font for the title, and a serif font for the main body text. A good 'rule of thumb' when deciding on font styles is keep it simple - use 1 sans serif font for headings, subheadings and captions, and 1

HIGHER NOTES

## Desktop Publishing

Justified text produces vertical lines on each side. It gives the text a strong visual shape, but can create unwanted hyphenation and exaggerated word spacing.

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of the best.

### Text formatting

Text size is measured in points.

#### 22 point bold text

14 point regular text

A drop capital indicates the start of the article and indents the main body copy next to the drop capital:

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as

Bullet points can make the piece more 'snappy', especially

#### ROOMS

- En suite WC
- Sky TV

A hanging indent uses a drop capital, but indents the rest of the column underneath:

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of

An indent is a good way of signifying the beginning of a

Left-aligned text can make the publication appear more sophisticated. It is the most

This year's T in the Park may have one of the lowest key line ups in recent years, with few major stars of note.

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of

Right-aligned text can look sophisticated and is often used for subheadings and

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of the best.

Centred text creates a symmetrical column of text, but is difficult to read and

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of the best.

Text wrapping allows text to be placed around an im

Last year, the presence of the mighty Kasabian, global superstar JayZee and even Madness kept up the festival's reputation as one of the best.



## Text/Typography/Font

There are different ways of organizing text which are used globally. This is referred to **justification** or **alignment**.

**Aligned Left**

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**Aligned Right**

## Justified

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## Centered

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  minim veniam, quis nostrud exer-  
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  ex ea commodo consequat.*

## Copy/cut/paste

When you take an image/piece of text etc. and copy it from one place to another. Cut is when you delete something from its original location and paste it somewhere else.

Shortcuts: Ctrl C / Ctrl X / Ctrl C

## Text Box

A text box is what you would insert into a page in order to input text into your document. It should look something like the image shown.



## Handles

Handles are the parts which appear when you select an image. By moving these you can manipulate the image in many ways i.e. changing the size or rotating an image.



## Colour Fill

This is when you take a shape with an outline and fill it in with a colour this is shown in the images below.



### Before coll

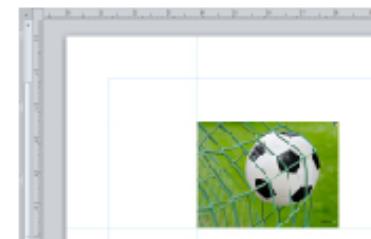


### After colour

## Guidelines:

Guidelines are guides which you access via your rulers on your page. They act as a guideline for aligning images/text etc.

You can select **Snap to Guidelines** which will allow your image to automatically jump to meet with guidelines you have positioned on the page.



Finish