



# **Calderglen High School**

**Technical Department**

## **Advanced Higher Graphic Communication**

Study notes for

**Knowledge  
&  
Interpretation**

Booklet 2

## 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**.

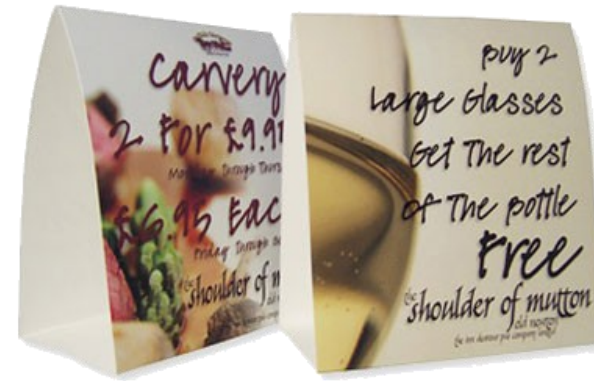
## Line

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.

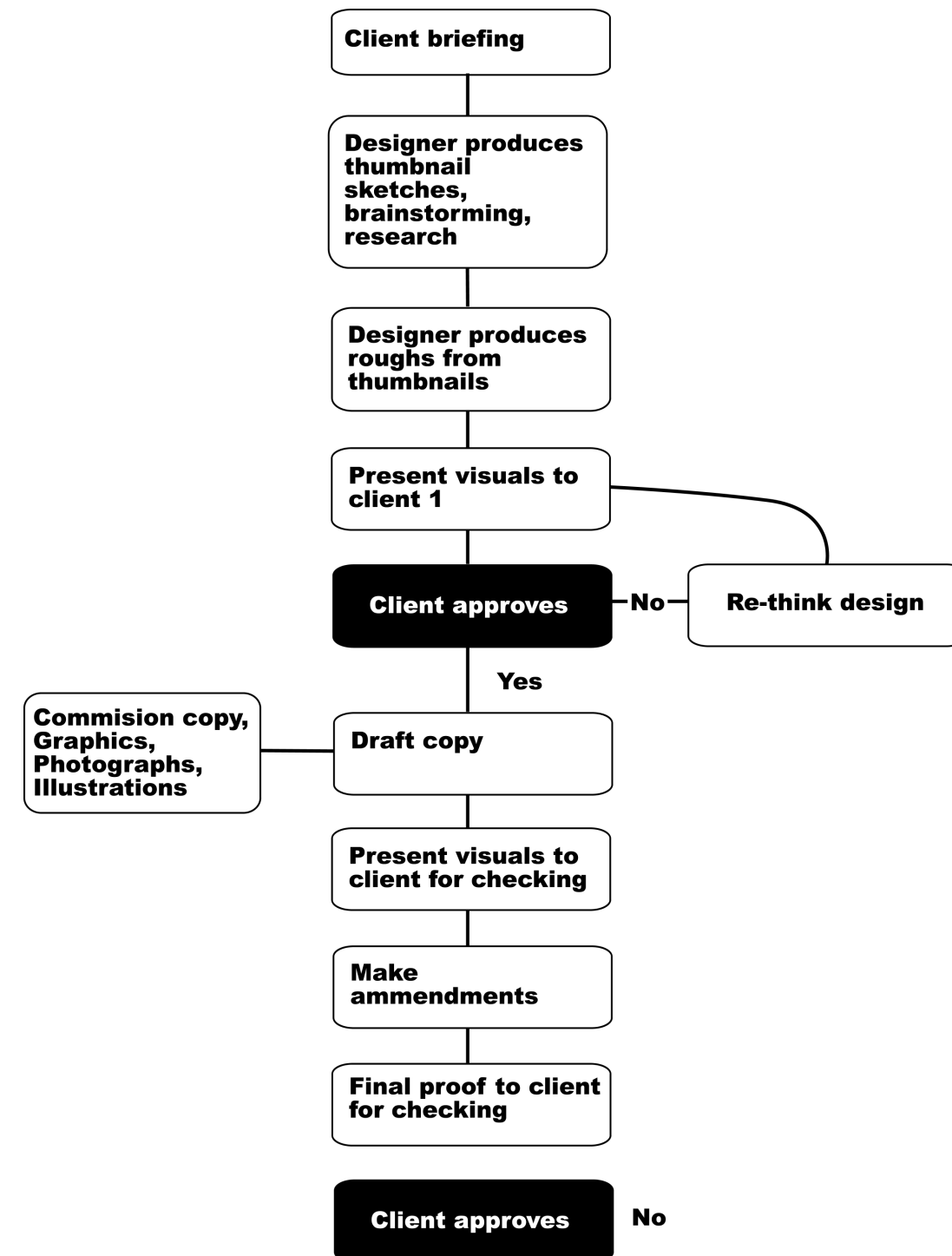






## The Design Process

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:

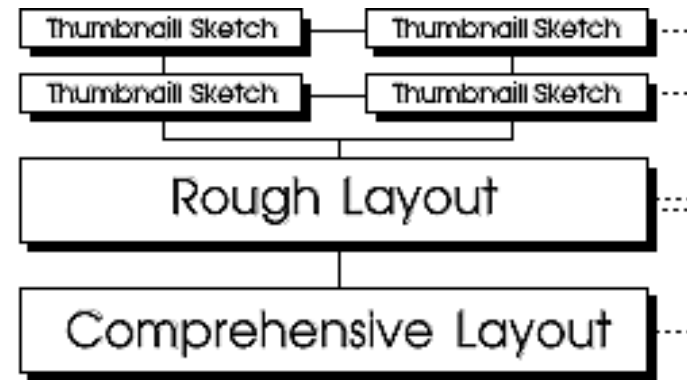
1. *Objective of the product.* What is the purpose of the finished product? Is it to sell? Inform? Reference?
2. *Target group.* Will the printed material be for personal use, for scientists, for teenagers, or for some other group? The design approach would be different for each.
3. *Personality of the 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

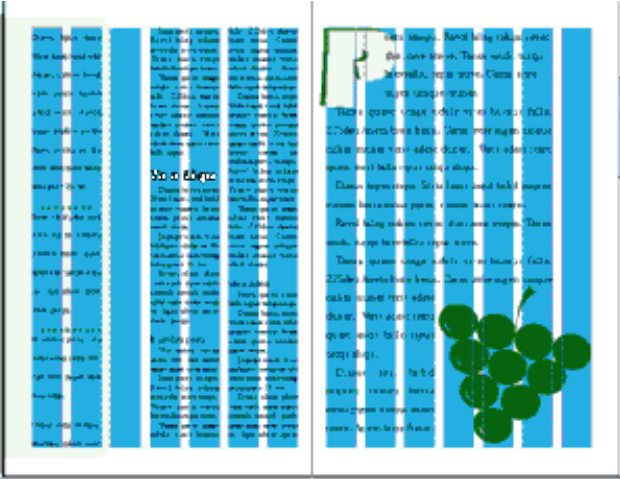


FIGURE 3: two page spread showing the underlying 7-unit vertical grid (blue)

## 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.



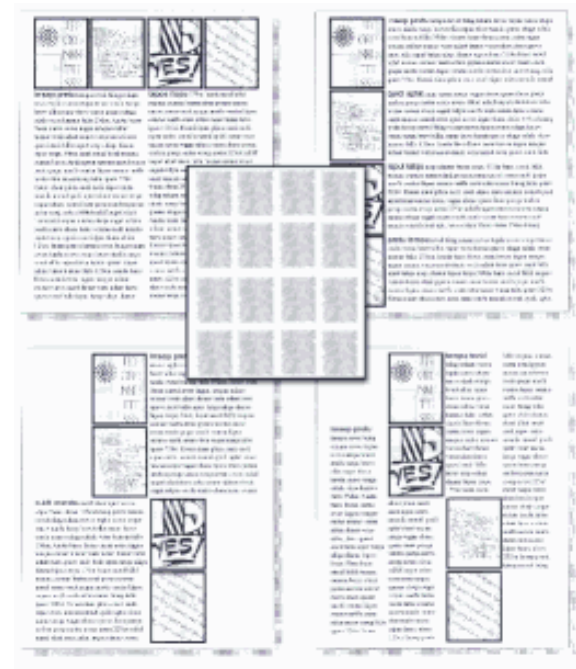
**FIGURE 4:** 3 informational sheets that share a common 3 unit grid



**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.

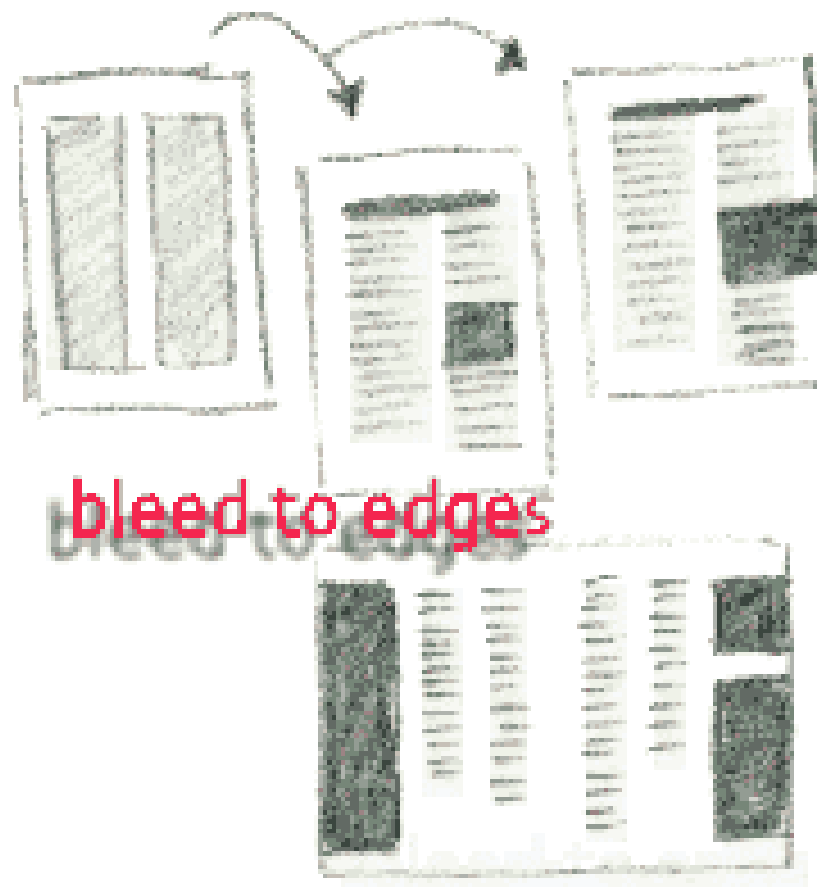
1. Layouts based on grids are not appropriate in all cases.
- 2.
3. Grids should fit the mix of elements rather than forcing elements to fit the grid.

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.

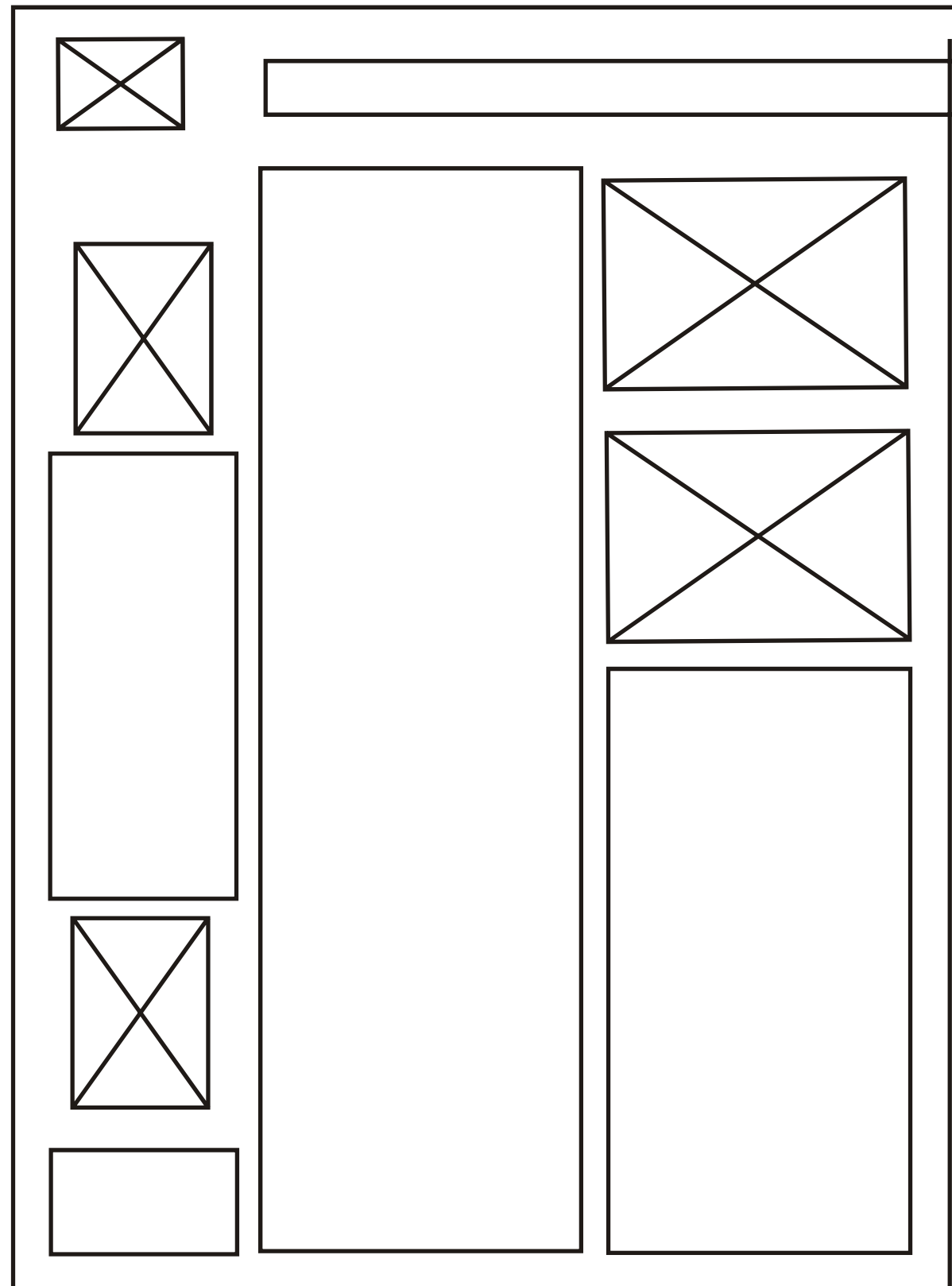


- Mix long and short articles in the same publication using a different grid for each. Or use different grids for feature material and regular recurring departments.

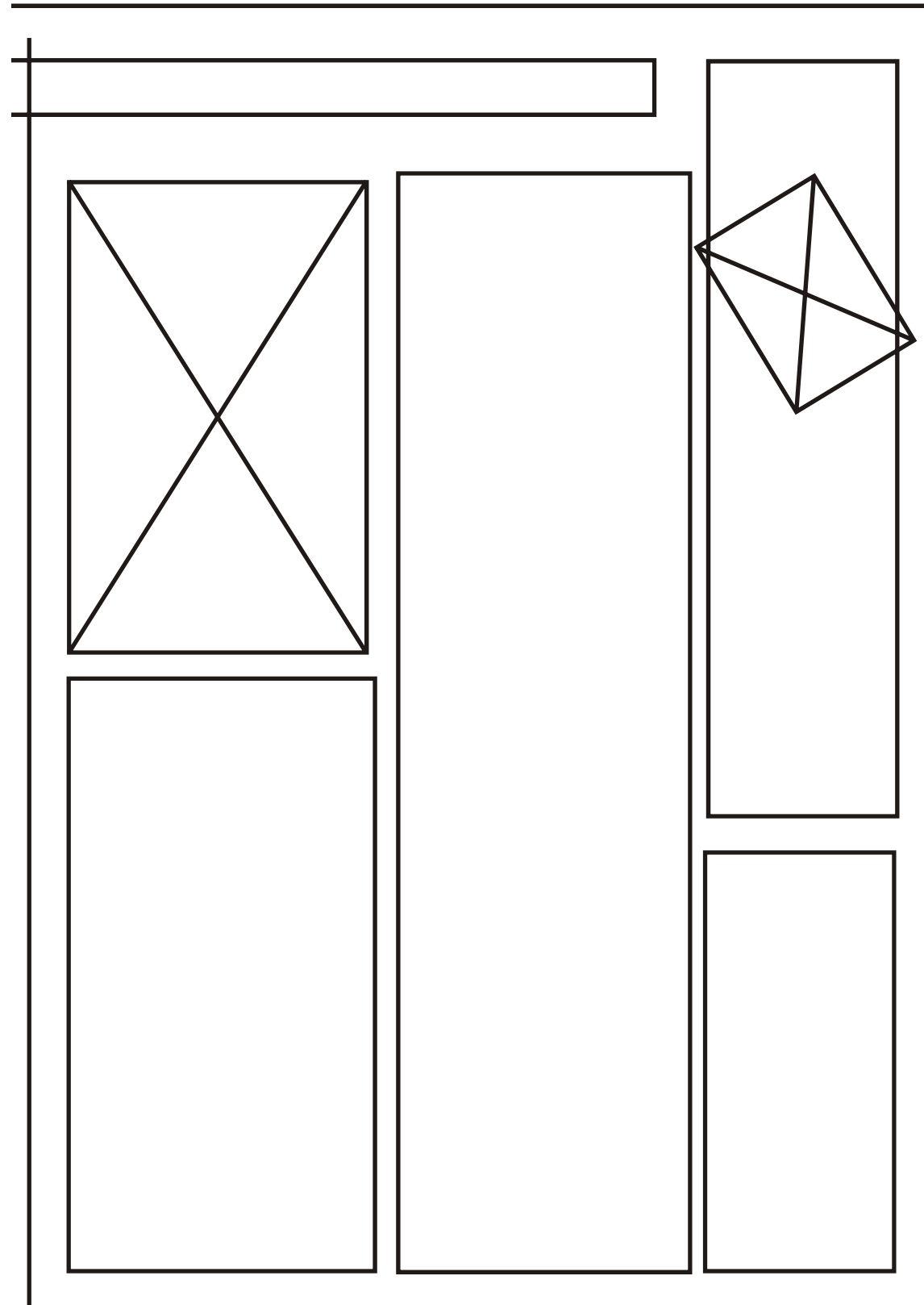
As with any grid system, use it consistently. Let content guide your design and make your grid a partner in your page layout -- not a dictator.

## 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.

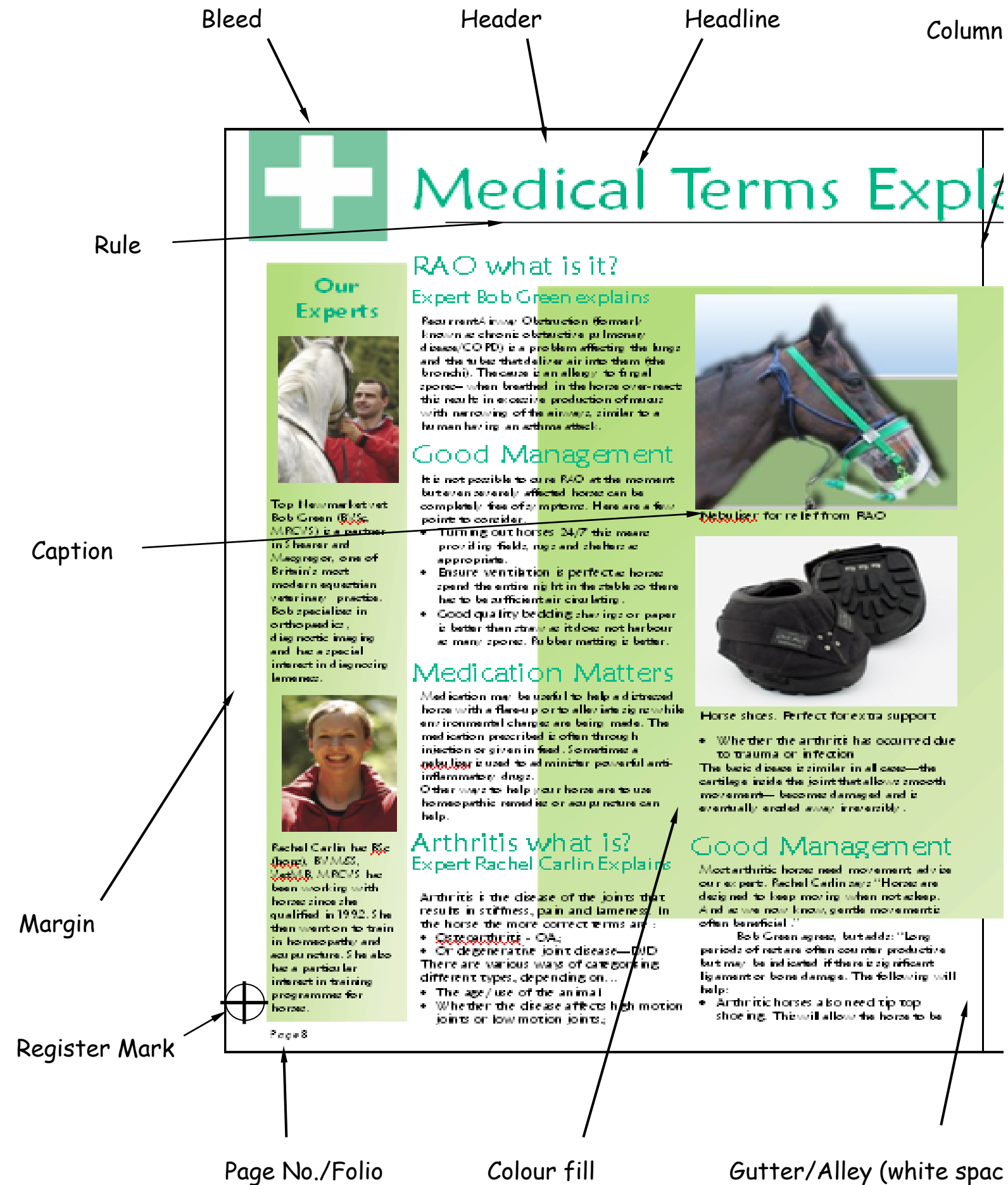


The solution/final draft to the example below can be seen overleaf.





## Typical magazine page layout



mn Rule (black line)

Heading

# Lained By Experts

Text

## Azoturia what is it?



Magnetic boots for arthritis

- Examining old shoes for wear. If one side is more worn than the other then this is how the horse should be shod.
- Turn out—with care. The horse will benefit from plenty of turn out, but must be kept warm and dry.
- Magnetic therapy products can be useful. Blankets are good especially for sore backs.

## Medical Matters

Injecting anti-inflammatory drugs directly into the affected joints is a common procedure. This also means that the horse can remain active. Homeopathic methods can also be considered and, if organic. Therapies such as acupuncture and physiotherapy are also considered a good form of management. But the cheapest, simplest and most effective way is painkillers and often do good jobs.

Most commonly known as "text-fert" and "tying up" - the correct name for this condition is chondromalacia. 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, to per-son level.

## 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 and let 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 viruses make horses much more susceptible to arthritis.

## Medication

"High-strung" horses also appear to be pre-disposed to tying up. In these cases judicious use of light sedatives 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 arthritis 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 times in an hour losing 4g of sodium in every litre.

## Exercise

Whilst the condition is triggered by exercise, controlled exercise is central to successful management. Detailed exercise plans will vary depending on the size of the horse and the number of episodes of tying up it has suffered. Consistency counts. Stick to rescheduling 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 tying up.

## Tilly's Top Tips!



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

## Useful Contacts

- Rabb and Sney Veterinary Clinic  
01693 355239
- Top Spec  
0370 240 6596  
[www.topspec.com](http://www.topspec.com)
- Trinity consultants  
01243 556493  
[www.trinity.co.uk](http://www.trinity.co.uk)

Page 9

Reverse (Text)

Tilt

Margin

face)

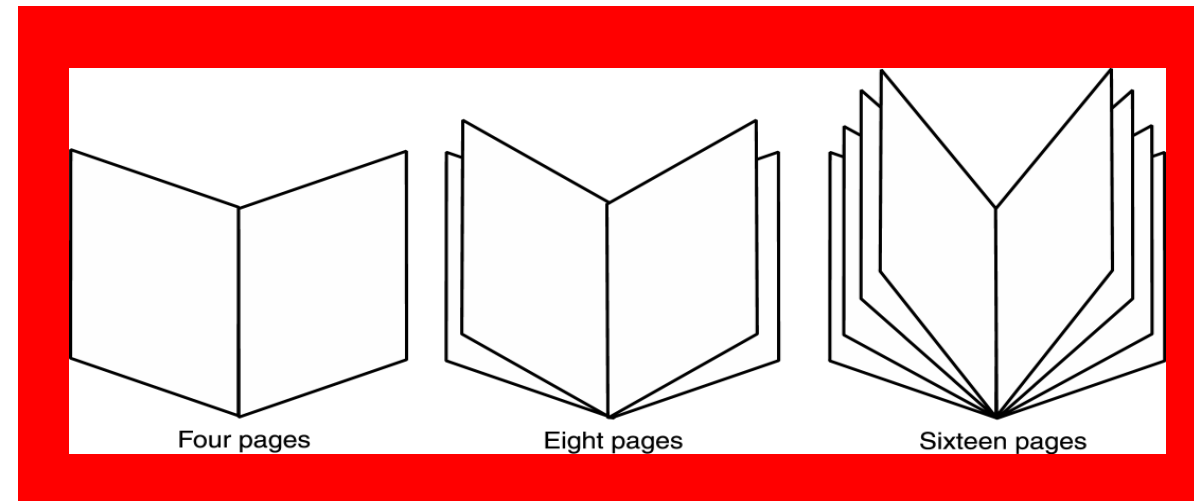
Sub Heading

Footer

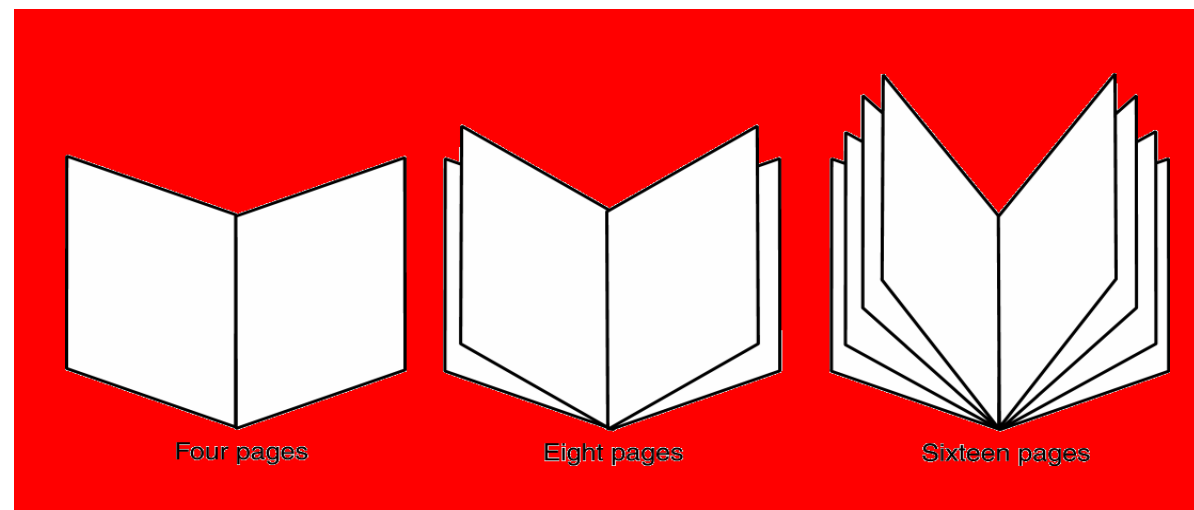
Crop Mark

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

Abcdefghijklmnop  
qrstuvwxyz

Flow Text along a path

Text Wrap round an object

Text

**Drop Shadow**

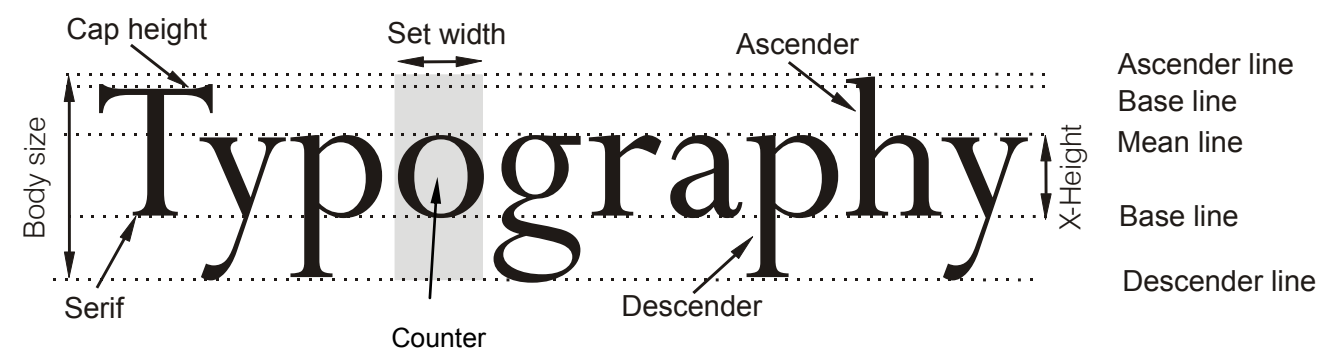
White space doesn't have to be white. The large block of black created by the graphic of people adds a large block of black **white space**. Multiplying the number of people and reducing the size of the car in the second "White Space" example provides additional **contrast** and reinforces the theme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



**Basic anatomy of type**



## 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

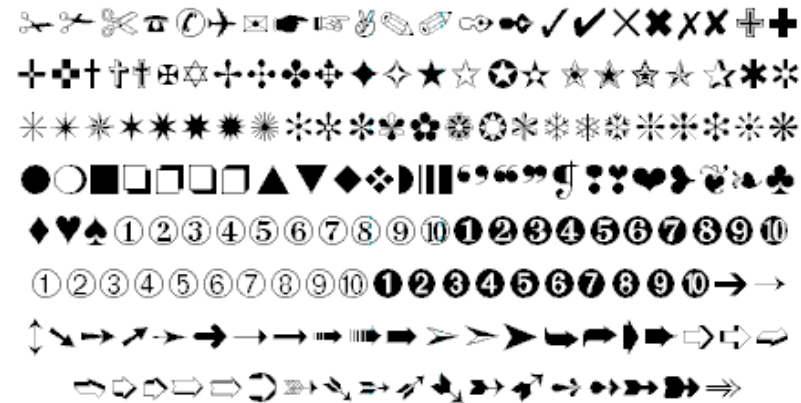
***Serif*** fonts tend to create a formal, serious look. The serif is a decorative feature at the ends of letters, numbers, etc. **See example below**

***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.

àáâãäåçèéêëìíîïðñòóôõöøùúûüýþÿ

- Page 126

*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 type-face.

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. Head-line 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*.

Helvetica  
*Helvetica Italic*  
**Helvetica Bold**  
***Helvetica Bold Italic***  
Helvetica Narrow  
*Helvetica Narrow Italic*  
**Helvetica Narrow Bold**  
***Helvetica Narrow Bold Italic***  
**Helvetica Black**  
***Helvetica Black Italic***

## 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.

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;

9 on 9 point Palatino

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;

9 on 10 point Palatino

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;

9 on 12 point Palatino



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.

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 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.



## 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.

**Our Competitive Rates  
and Quality Service ...**

*make us the choice  
of discriminating buyers.*

- Appraisals
- Custom-designed jewelry
- Repair and cleaning

*We're so sure you'll love us that  
we offer a money-back guarantee  
if you're not completely satisfied.*

Visit our two locations:

421 Bryson Road    32 Simpson Street  
Melbourne        Malangaview

**GEMSTORE JEWELLERS  
OF CENTRAL PLAZA**

*We take jewelry seriously!*

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.

## 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.

## Rules

The rule line (often, but not always, aligning at the baseline) is used extensively for horizontal ruling, including underscoring (which should be discouraged), vertical rules for design impact, to separate columns of text and for simple and convenient borders surrounding newspaper display advertisements.

Perhaps the thinnest possible line that can be printed is the Hairline. Care should be used in applying hairlines, and the printing requirements should be considered since such effects as reverse or overprint could present problems.

### Aligning type with rules

When rules and type are used in combination in the same line it is important that the rule should line-up with the baseline of the type face.

Given Name \_\_\_\_\_

Given Name \_ \_ \_ \_ \_

**First line incorrect; second line correct.**

### Letter spacing

Since display faces can exaggerate mistakes brutally, the typesetter should be aware of the critical choices that must be made.

The first of these is letter spacing. Inconsistencies of letter spacing may go unnoticed in text types, but they are very obvious and disturbing in the display sizes.

Many situations result in letter combinations that do not look right together, particularly when using capital letters. One obvious way to overcome this problem is to *kern* certain letter combinations. Kerning is the adjustment of space between two letter combinations.

*INVITATION*  
*INVITATION*  
RAILWAY  
RAILWAY

**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.

**CONDENSED LETTERS  
ARE WEAKEND BY  
LETTER SPACING**  
as are standard  
lowercase letters

**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.

AFLPTVWY  
*Group 1 — No additional spacing*  
 BCDEGJKOQRSXZ  
*Group 2 — Minimum additional spacing*  
 HIMNU  
*Group 3 — Maximum additional spacing*

### 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.

V S O H s n  
 E E f E e f  
 R T R t l  
 T T L T i i  
 I I I J n n  
 C N N C g p  
 A G E A g s  
 L S L

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.

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.

ABCDEFGHIJLM  
NOPQRSTVX

'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:

Humanist  
Garalde  
Transitional  
Didone

### **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.

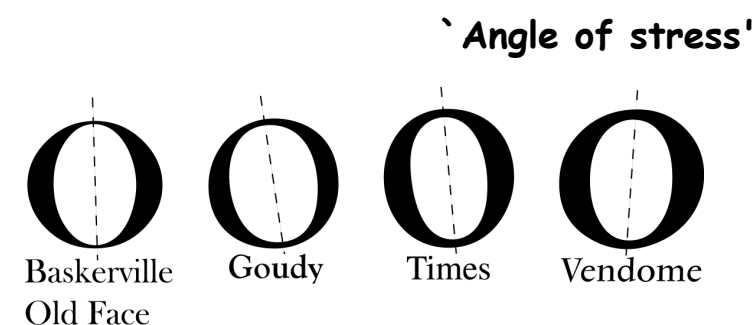
**Humanist** (Venetian) faces are named after the first roman typefaces that appeared in Venice in 1470, Humanist typefaces were initially designed to imitate the handwriting of Italian Renaissance scholars. These types that are characterised by their strong, bracketed serifs. The letters are in general 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.

**Garamde** (Old Style) were designed centuries ago by such masters as the French printer Claude Garamond and the Venetian printer Aldus Manutius. Garamde 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.

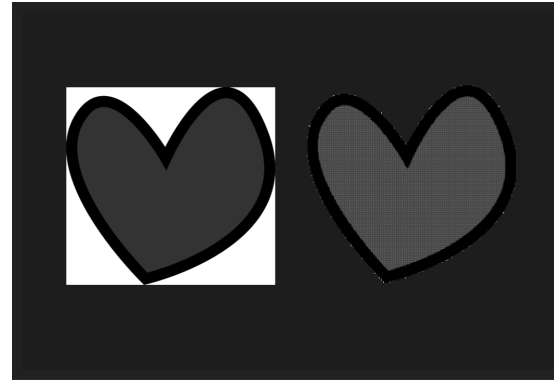
A technique known as anti-aliasing softens the edges of a bitmap taking away the harsh jagged look. This works especially well with fonts:



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.

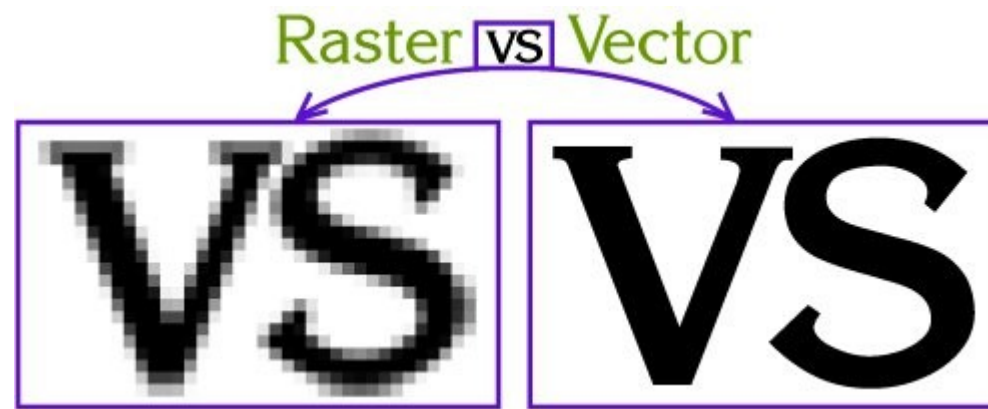


## Raster (Bitmap) vs Vector

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.

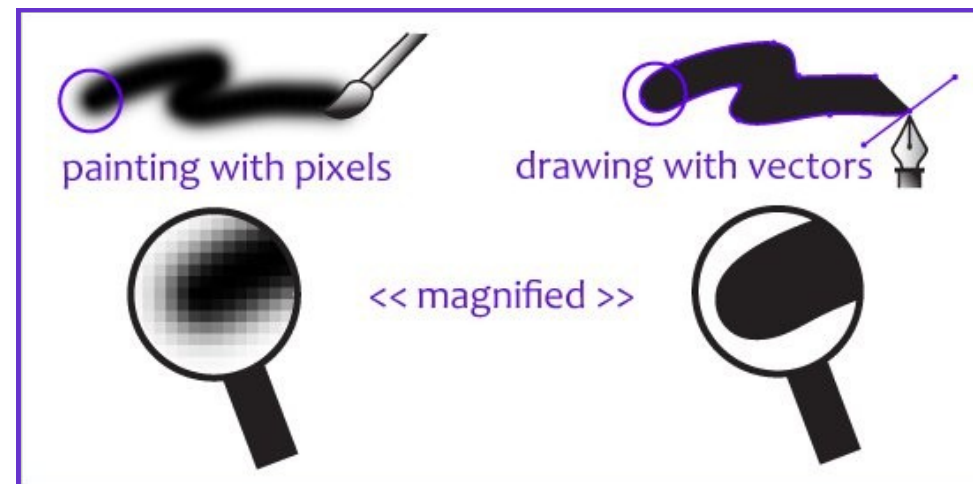
I've magnified a raster and vector image above to better see the

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:

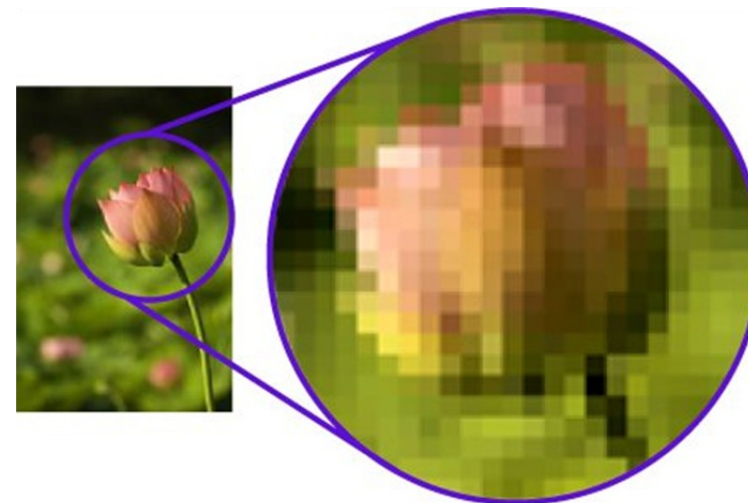
**Multiply the resolution required by the area to be printed. Examples:**

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!**

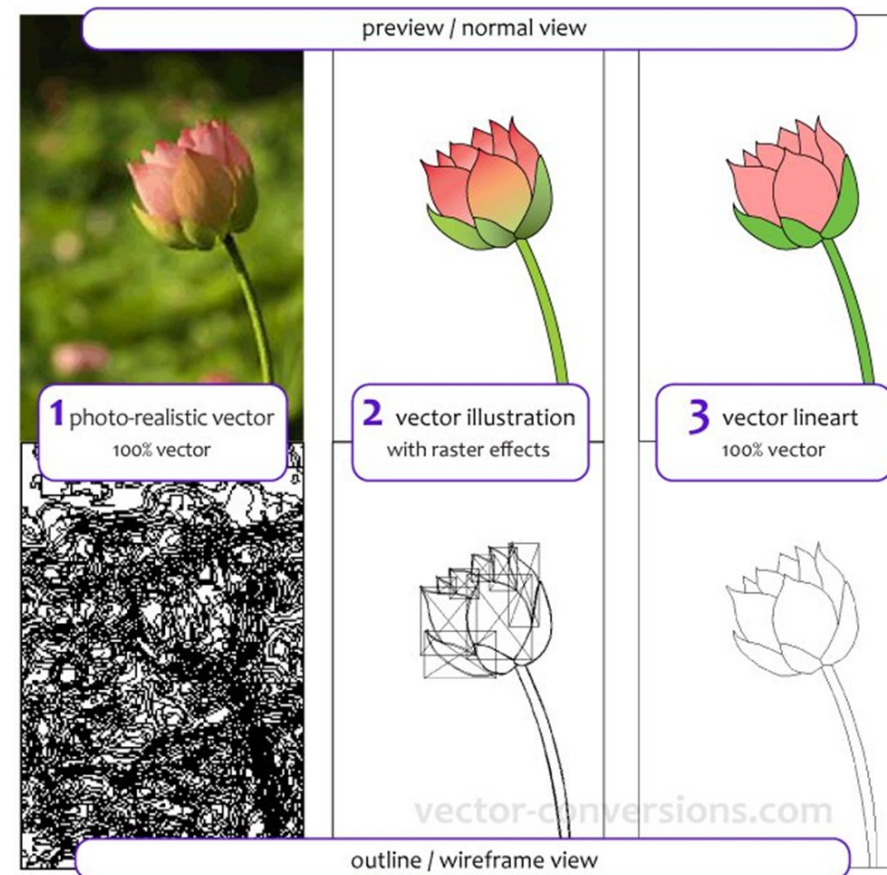
Instead of pixels, vector graphics use objects and lines (shapes) to represent images. Vector graphics can be scaled to any size without losing quality.

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.

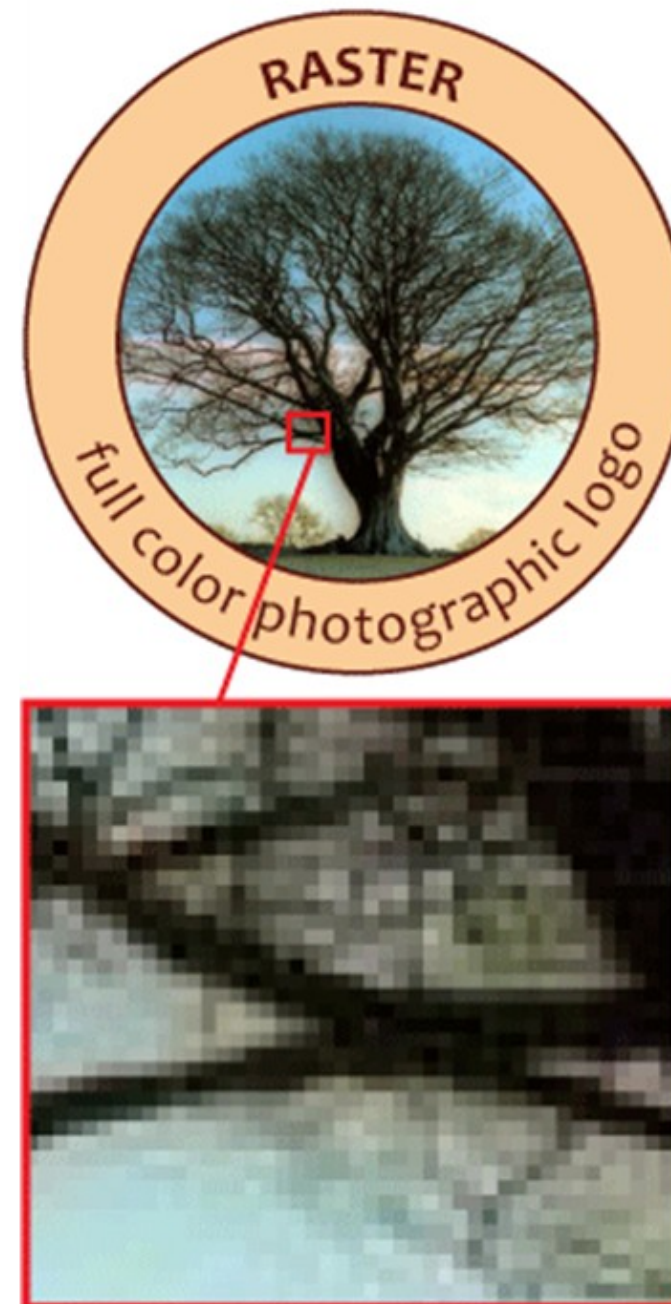
Large dimensions & detailed images equal large file size.

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)**

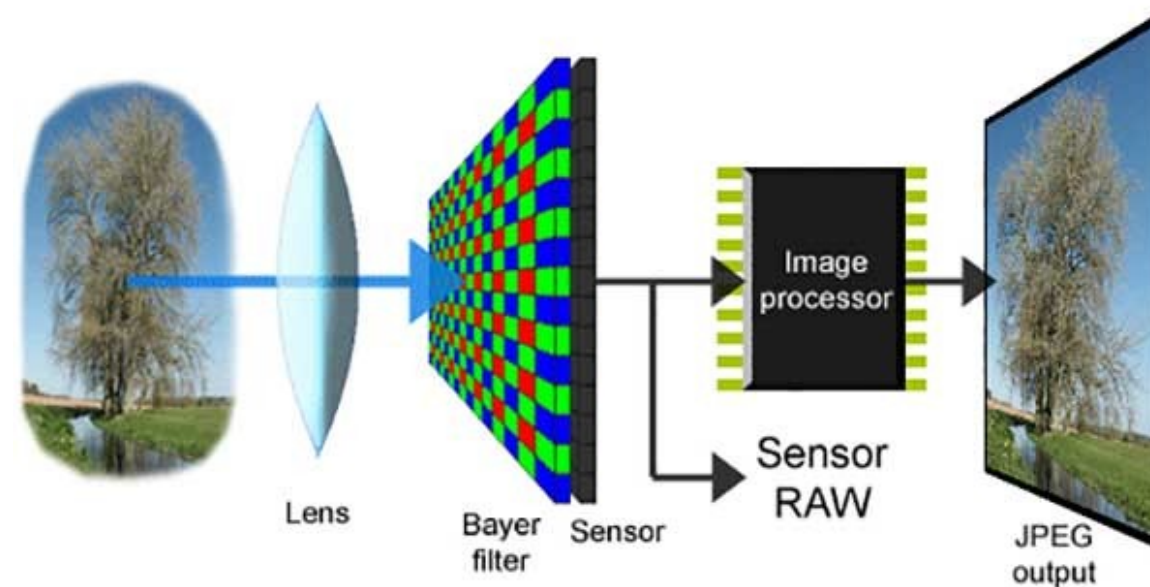


**CMYK**



## How a process Camera Works

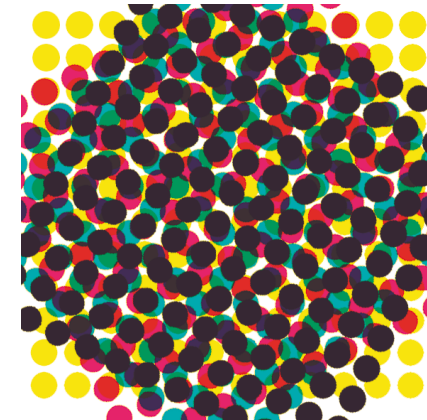
The original image is photographed through a "Process Camera". This works by photographing the image through colour filters which split the image up into three colours with a further one made up for black. Each separation is photographed through a fine mesh known as a halftone screen which splits



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.

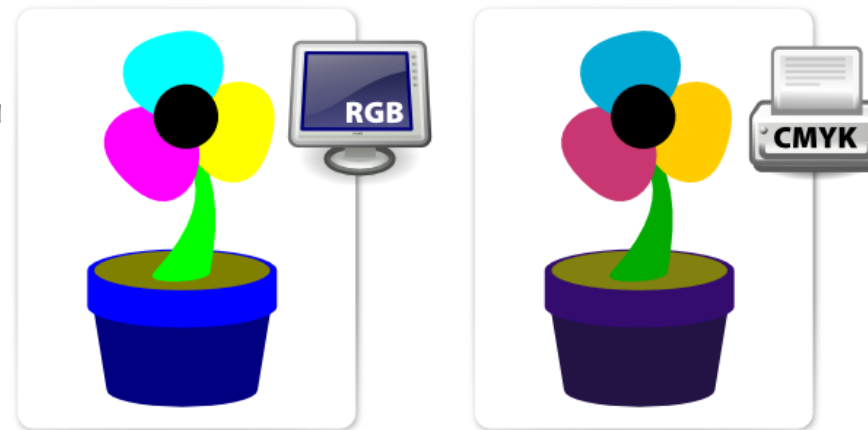
The resulting photograph for each colour will usually take the form of a "lith" which resembles a black and white negative except that it consists entirely of black dots. The other important factor in making the halftones is the direction of the dots. The screens used for converting the images into dots 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.



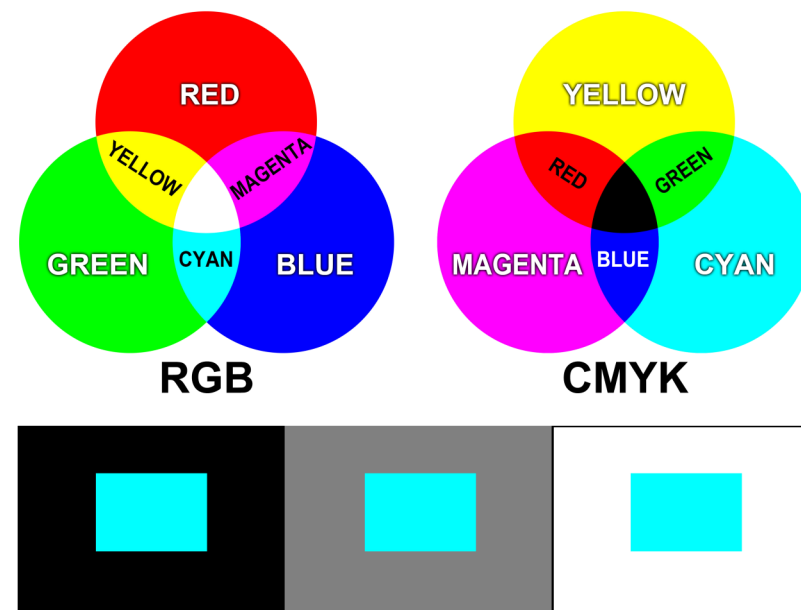
If you need to have your photograph printed by a commercial printer using 'full colour process printing', you will have to convert RGB files to CMYK, as a printing press uses the CMYK (Cyan Magenta Yellow Black) colour space.

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.

## What is the difference between CMYK and Pantone Colours?

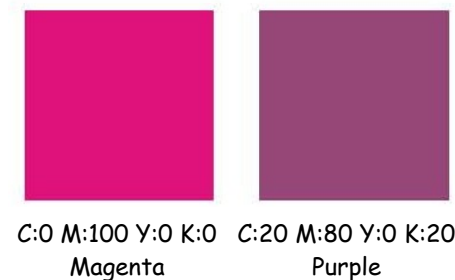
**CMYK** and **Pantone** are two different colour systems to describe the printing process of your finalised graphics work. CMYK or 'four colour process' printing has become the norm of late as consumables, idle machinery and the dominance of internet mediums force costs down. To simplify CMYK printing, 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:

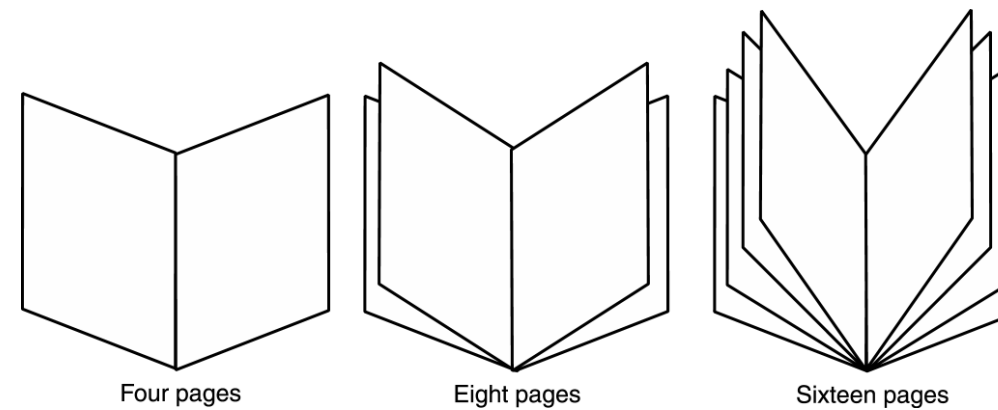
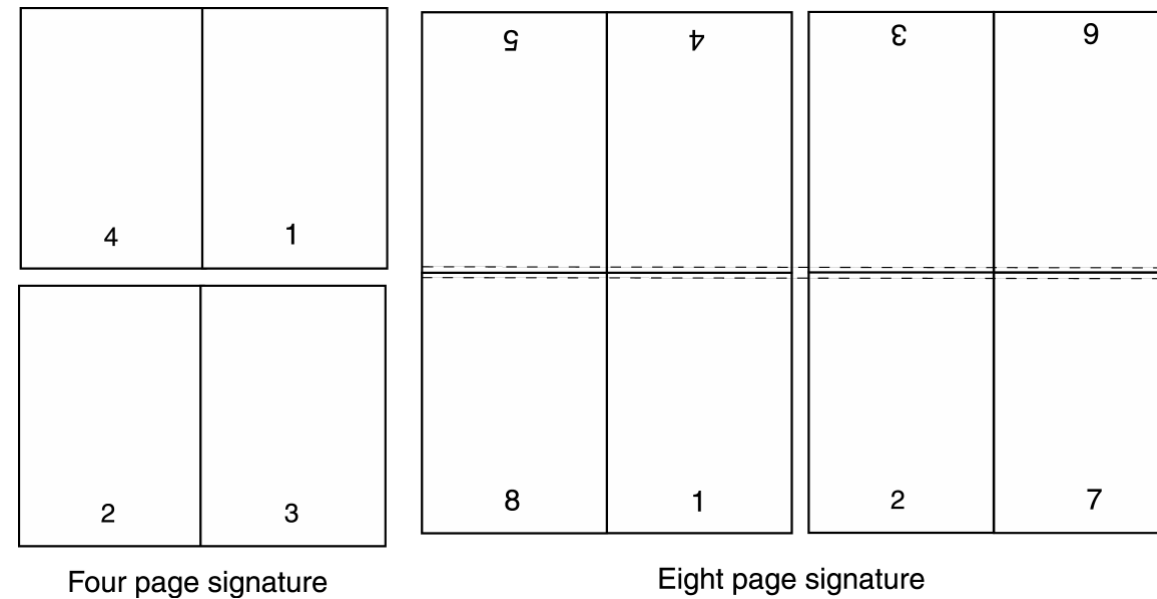
Size	MM
RA0	860 × 1220
RA1	610 × 860
RA2	430 × 610
SRA0	900 × 1280
SRA1	640 × 900
SRA2	450 × 640

## 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 is 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

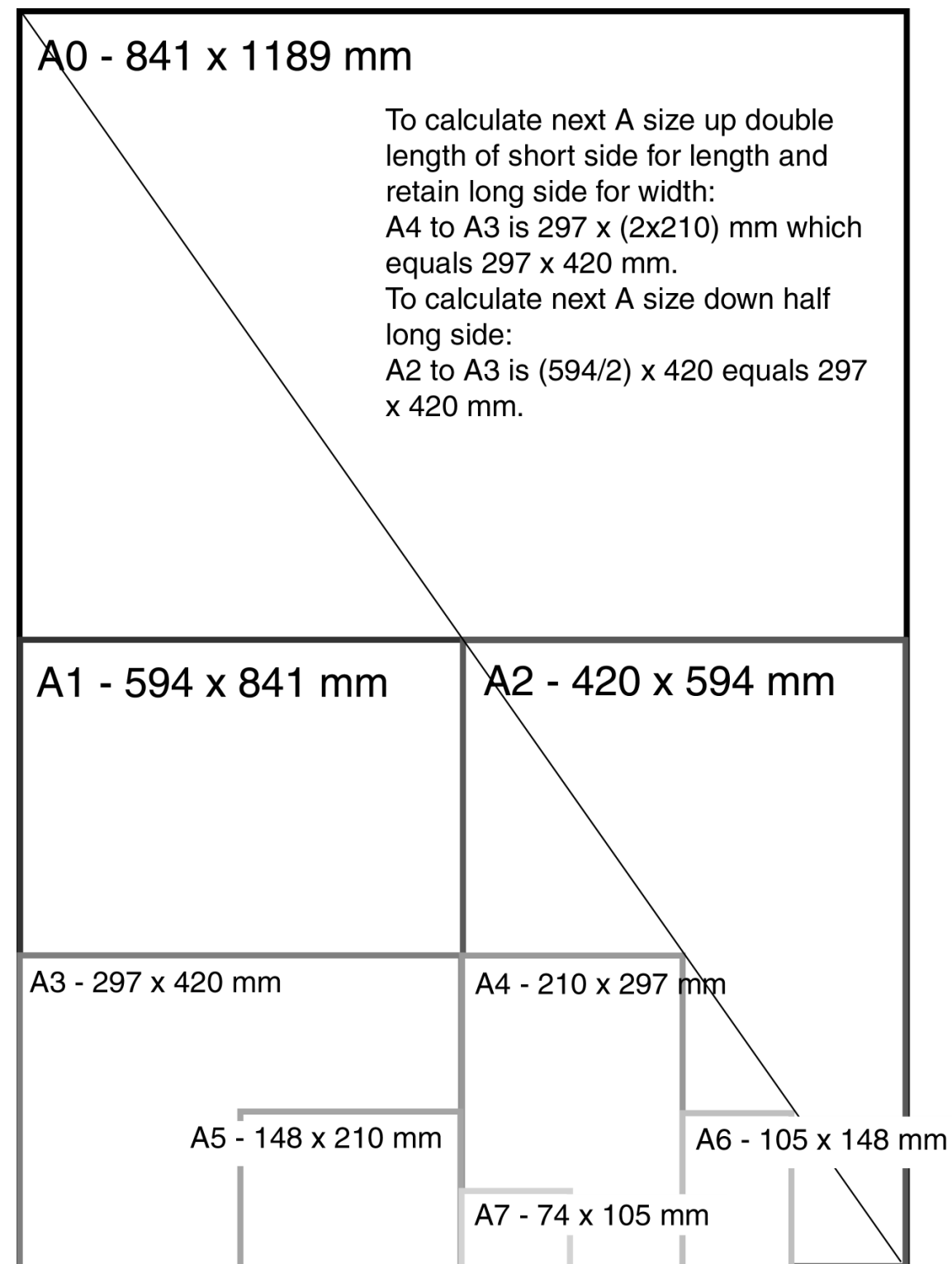
Matt, rough paper useful for book printing.

### 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 re-cycled 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.



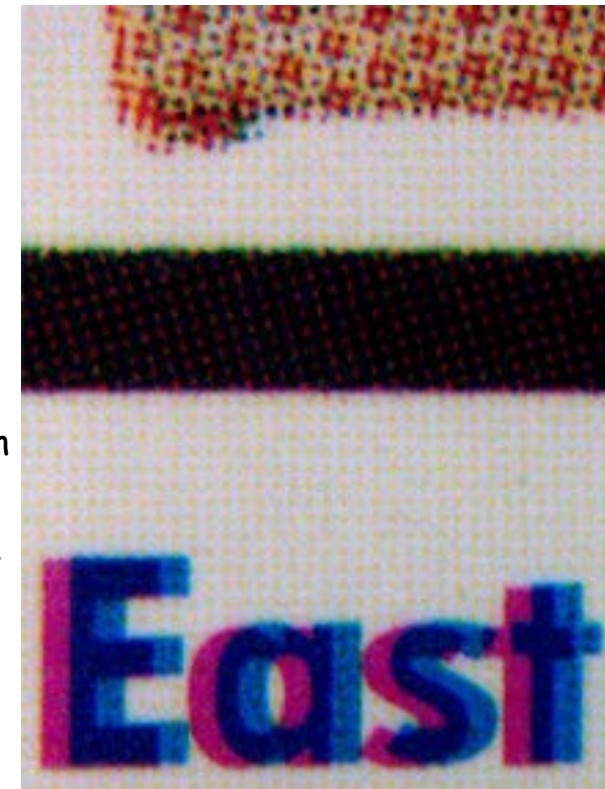
Exaggerated example of a mismatch of **CMYK** registration

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.

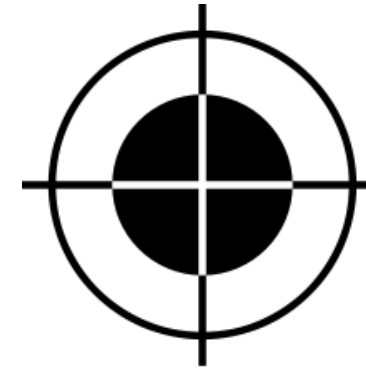
### **Pin-hole**

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.

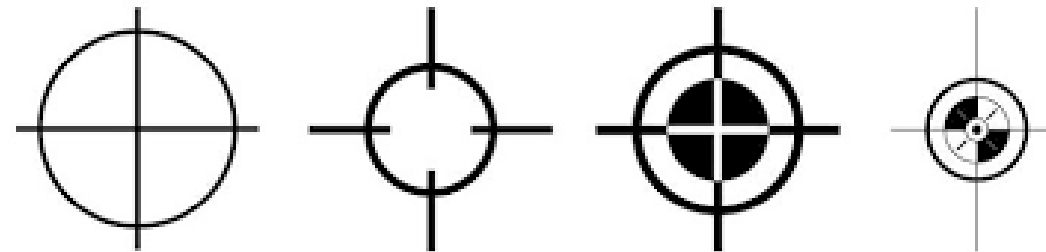
## Eye-balling

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



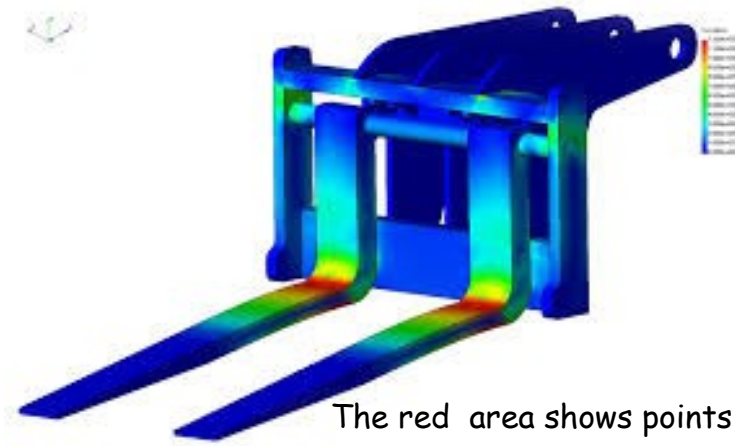
## Digital Testing (FEA, Finite Element Analysis)

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

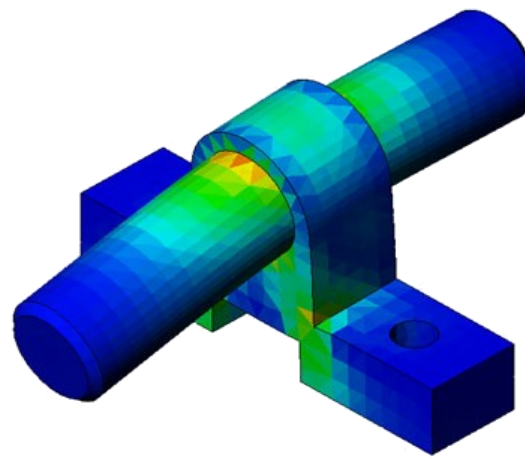
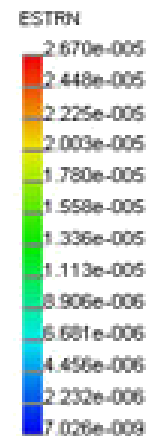
It is also referred to as **Digital Prototyping** and very basically explained allows conceptual designs (new designs), the ability to virtually explore a complete product before it's built. Industrial designers, manufacturers, and engineers use Digital Prototyping to design, iterate, optimize, validate, 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.



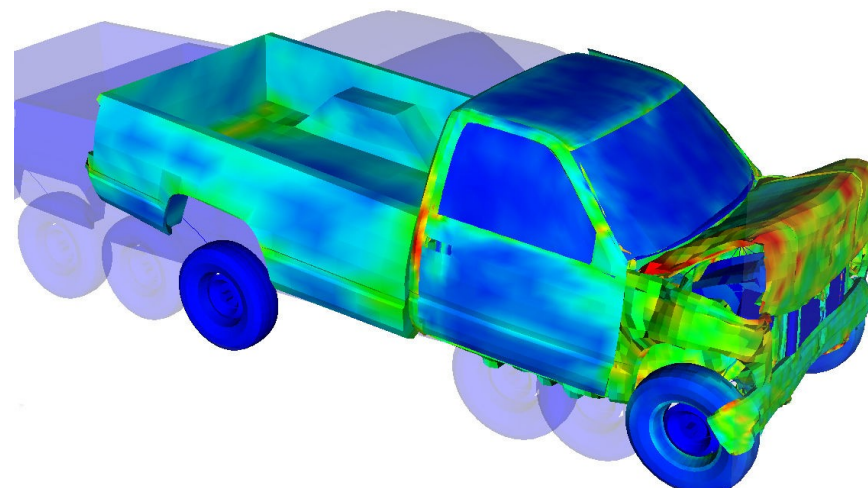
The red area shows points of great stress. Followed by yellow and blue being the least stressful areas.



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

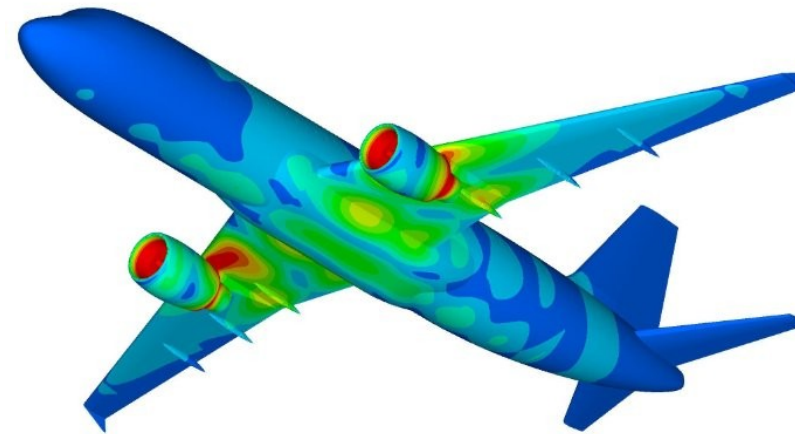
Instead of needing to build multiple physical prototypes and then testing them to see if they'll work, companies can conduct

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.

## 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.

### Point light

A point light emits light in all directions from its position.

The user specifies the point light location.

Think of a light bulb.

Point lights are used for general lighting effects.

Point lights are used with spot lights for lighting effects.

### Spot Light

Gives a directional cone of light.

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.

### 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).