From creation to production of a printed piece

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Abstract
If you are not a graphic designer, you probably do not realize what goes into the creation of the pages of the magazine you are reading. From complex jobs, such as putting together a magazine, to simple layouts, like a one page newsletter, there are several stages through which a project will pass as it moves from the designer's idea to the printed piece in graphic production. A knowledge of type styles, effective arrangement of illustration and text matter, drafting techniques, and today's new technology equipment is essential to managing the production of printed materials. This investigation is confined to each step of planning and the tasks involved in the design and layout stage and the image assembly stage in the photo offset lithography production method. I will also discuss the advantages of using computer equipment in graphic production.
FROM CREATION TO PRODUCTION
OF A PRINTED PIECE

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CHAPTER 1

Introduction

If you are not a graphic designer, you probably do not realize what goes into the creation of the pages of the magazine you are reading. From complex jobs, such as putting together a magazine, to simple layouts, like a one page newsletter, there are several stages through which a project will pass as it moves from the designer's idea to the printed piece in graphic production. A knowledge of type styles, effective arrangement of illustration and text matter, drafting techniques, and today's new technology equipment is essential to managing the production of printed materials. This investigation is confined to each step of planning and the tasks involved in the design and layout stage and the image assembly stage in the photo offset lithography production method. I will also discuss the advantages of using computer equipment in graphic production.

There are six stages in the photo offset lithography production, however. This paper will discuss only two of the stages. The focus of this paper is on the design and layout, and image assembly stages which produce the camera ready copy of the printed piece. Factors which affect the above stages concerned with today's technology, particularly with the Macintosh computer system and
software, are examined and suggestions for utilizing the advantages of the new technology hardware and software are made.
Statement of the Problem

Perry E. Jeffe, president of Jeffe Corporation, which offers computer-aided publications services, describes what we are going through right now in graphics production as a "turmoil in graphics" (Nelson, 1987). Not only is there a revolution in typesetting and printing equipment but also in design itself. The new design must accommodate itself to the new technology.

As the new technology advances, people not specifically trained in design are involving themselves in setting type, creating art and laying out pages. However, gradually these people will be pushed out from their jobs by typographers, art directors and designers who are trained in this new technology. Therefore, designers insisting on traditional approaches and avoiding the new technology will be at a disadvantage compared to more adventurous designers who welcome the changes. All of the promises of computer equipment, once mastered, will make things easier and faster in the workplace. The vital link between original and copy must be maintained by someone with knowledge of the graphics production stages, the production equipment and methods.
CHAPTER 2
Literature Review

Graphic arts starts with an idea and the need to communicate that idea to someone. To do this, the idea must be turned into an image (Hird, 1982). All the jobs needed to produce multiple copies of our written and pictorial language such as newsletters, books, business forms, brochures, greeting cards, and letterheads are some form of the graphic arts production. Whether it is a simple, one-page piece list or a large catalog for some giant in the mail-order field, a newspaper advertisement, or a bill board, printed material is vital to a company's survival (Hird, 1982).

With the availability of the personal computer and other computer graphics equipment and software, many graphic artists find themselves more involved in other roles in graphics production such as layout artists, photographers, and typesetters. Aldus offers PageMaker; Boston Software Publishers, Inc. offers MacPublisher I and II; Manhattan Graphic offers ReadySetGo; and Microsoft offers Typographer desktop publishers. All of these run on the Apple Macintosh and allow users to mix text and graphics with "what you see is what you get" (WYSIWYG) display (Nelson, 1987). With these applications, many printed materials can be produced easier and faster.
compared to the traditional tools used such as rulers, drafting tables, pens, pencils, dry transfer letters, X-acto knives, etc. and the best printout quality for desktop publishers comes from laser printers.

However, computers are still at least several years away from helping with the more aesthetic aspect of design, according to Steve Rosenthal, contributing editor of Desktop publishing (Nelson, 1987). The computer can help with the mechanics, but it is up to the designers to provide the direction. The nature of the original layout and paste up and the way it is composed will determine the final appearance and the effectiveness in transmitting a message of the printed product. In order to get the results the designers want, they must know the important stages in graphics production and have the working knowledge of the equipment and tools which are used in the production. When a choice of materials and equipment is available, the designers must be able to determine which is most suitable for their needs.

The printing process which is most commonly used to produce printed materials today is photo-offset lithography, printing from a flat surface. The originals are produced with a desktop publishing system that can be reproduced directly with a laser printer or used as the
camera ready copy to make an image carrier and reproduced by using the photo-offset lithography method.

The six stages of the photo-offset lithography consist of design and layout, image assembly, photo conversion, image carrier, image transfer and finishing (Hird, 1982). Each stage of the production requires certain specialized jobs. The most important stages of the six stages listed above are the design and layout and the image assembly which require the designers to make plans and judgements of a layout before completing a camera ready copy. The designers must have knowledge about the design principles, be able to use type of text and illustrations appropriately and paste the design element together manually or with a desktop publishing system. Waste of time, materials, and work force are the most common concerned factors in graphics production.

**The Design Principles**

As a designer you need to understand some basic design principles before you prepare a set of layouts. The best designers also take their inspiration from outside their profession. Their study of fine arts and the world around them carries over to the decisions they make about the printed piece. However, consciously or unconsciously the designers tend to work by a set of basic design principles. The five principles discussed in this
paper consist of balance, proportion, sequence, unity, and contrast. These principles apply to all forms of art, not just to design (Nelson, 1987).

The most obvious of the principles and the least important, which is balance. The principle states that what is put on the left half of a page must weigh as much as what is put on the right half of the page. There are two kinds of balance which are bisymmetric and asymmetric. The elements of a bisymmetric balance (formal balance) of a layout are centered horizontally and an equal amount of each major element unit is placed on either side of the imaginary center line. A designer who is over conscientious about the balance principle can take an easy way out by centering all the elements of the layout. With a little more effort, however, the designer can achieve balance that is asymmetric (informal balance) and more interesting by placing the graphic elements in relationship to each other. The designer can put a big picture on either side of a page closer to the imaginary center line than a smaller picture on the other side. The designer can hold the design up to a mirror and check it in its reverse flow. This will quickly dramatize any lack of balance.

The decision of the designers in selecting a functional and attractive plan for the page depends on the
amount of copy to be placed on the page and also on the purpose of the material being prepared. The proportion principle must then be applied to the layout. There are several standard page proportions used in education, business and industry. For example, index file cards have the proportions of 3 by 5, 4 by 6 and 5 by 8 inches. Photographic enlargements are usually 5 by 7 or 8 by 10 inches. The proportion most used by the business world is 8 1/2 by 11 inches (Dennis & Jenkins, 1983).

In designing publications, a well known system of proportion is called the Golden Section discovered by the ancient Greeks (Nelson, 1987). This involves a diagonal line of a rectangle that shows the relationships among the proportions. The square, or a page with equal width and height is not usually used for two dimensional graphic materials. The designers would avoid 1 to 1 ratio because it does not suggest movement or change which becomes boring to the readers.

The third principle is the sequence. Most readers ordinarily start at the top left of a page or spread and move to the bottom right. The designers can easily arrange the graphic elements so that the reader can read from left to right and from top to bottom, but it limits design flexibility. However, the reader also has a tendency to move from big to small, from black to white,
from color to noncolor, and from unusual shape to usual shape which gives the designers the ability to direct the reader to begin reading the design anywhere, moving to the left, the right, the top and the bottom, in a circular motion, or diagonally, whatever way the designers wish.

The designers can also direct the reader through the use of lines, real or implied, which carry the eye to the next element that the designers want the reader to follow. For example, the curve of an arm or the edge of a building can be used as an imaginary line to direct the reader's eye. Sometimes, the designers may not have any other choice for handling sequence than actually numbering the design elements as in a step by step illustrated article on how to put something together.

The unity principle simple states that without seeming crowded, the graphic elements of a layout should look as if they belong together. The designer should push the white space to the outside edges of the layout since large amounts of white space in the center can send the elements in all directions. The whole effect of the layout must be that of one unity, of harmony. The illustrations and the type must be complementary and arranged so that each single element has its place.

Contrast is a useful way to make copy elements stand out. The designers should decide what elements of a
layout are important and what they want the reader to see first. As a general rule, "All display is no display" (Dennis & Jenkins, 1983). If all elements of the page are large, underlined or in color, none of them will stand out. The designers can achieve contrast or give an item emphasis by making it bigger, blacker, more colorful or more unusually shaped than anything else on the layout. The designers can also get contrast by making all other items point to the "wanted" item or otherwise by making it seem out of place (Nelson, 1987).

The Layout

At the outset, a client will convey to the designers what is needed. For example, the description may be a four-page, black and white promotional brochure. The client will hand the designers the copy or manuscript that must be set in type and illustrations that must be integrated in some logical fashion with the type. The designers study the material and make some quick sketches until they arrive at some possible way of handling the arrangement (Demoney & Meyer, 1982).

To convey their thoughts to the client, the designers create three kinds of layouts as they develop the general idea from one of several concepts to a final, precise indication of how the printed piece will appear. These three steps of presentation are thumbnails, roughs, and
comprehensives. Whether the designers use one or all of these for a job depends on their approach and on their rapport with the client.

Thumbnail sketches serve three main purposes which are to record ideas that might be forgotten, to see how an idea looks and to compare the ideas. These miniature sketches can be done in very informal ways. They are design shorthands, permitting the greatest latitude and flexibility for considering the overall design elements.

The second step in the layout stage is preparing a rough layout. A rough layout has two main purposes. It makes the designer choose one of the several sketched ideas. The designer may also decide to combine elements from two or more of the sketches. The rough layout will present their final decision. Also it lets the designer refine the final ideas. Illustrations of the layout in the rough should show more care and detail than the thumbnail-sketch illustrations. The rough should give a good idea of what the finished product will look like. The designer will study the rough layout, make additions or changes by applying the five design principles which are proportion, balance, contrast, unity, and rhythm.

The comprehensive layout is the master plan or blueprint of the finished product. After the designers have made all the necessary decisions, the comprehensive
layout will be marked with all information needed to complete the printed product. The designers will use an overlay sheet which contains all information the production personnel need to put together the finished product, to keep the layout itself free of instructions.

The information on the overlay sheet consists of the kind, size and style of type for each group or element of the layout. It shows the type position if specific margins or line lengths are wanted. The compositor should be able to measure the position of the words or lines from the layout. Specific information about the illustrations and photographs of the layout will be indicated and where the camera-ready illustration copy is available or where the photograph can be obtained. If several colors are used, the color can be used by each colored element of the layout. The kind, finish, weight, color and size of paper and the number of finished copies wanted will also be included in the content of the overlay sheet.

**Typography**

The consideration in typography is readability. Some typographers make a point of distinguishing between readability and legibility. Legibility has to do with the ease with which the reader distinguishes one letter from another and readability has to do with the ease with which the reader takes in a column or page of type. Readability
also has to do with the way the story or article is written which will not be discussed in this paper.

The designers must know the factors which affect the readability and play the typographer's role. The following factors are from a typographic standpoint (Nelson, 1987):

1. The style of the typeface. Familiar styles are usually the most readable.

2. The size of the typeface. Within reason, the larger the face, the better.

3. The length of the line. Comfortably narrow columns are better than wide columns.

4. The amount of leading between lines. Most body sizes can use at least one and probably two points of leading.

5. The pattern of the column of type. It should be even toned.

6. The contrast between the darkness of the type and the lightness of the paper. The more contrast the better.

7. The texture of the paper. It should not be intrusive.

8. The relationship of the type to other elements on the page. The relationship should be obvious.

9. The suitability of type to content. The designers should exploit the "personality" of types.
Categories of types

Many typefaces come in both body and display sizes, some come only as body types and others come only as display types. Type in a small size (up to 14 points) is body type and type in larger sizes (14 points or more) is display type. Body and display typefaces can be broken down into several broad categories which are roman, sans serif, slab serif and ornamental (Nelson, 1987).

The roman has two distinguishing characteristics which are thick and thin strokes and serifs at the stroke terminals. There are also old style, modern and transitional romans where the differences are in the strokes and the way the serifs are blended into the letters.

The sans serif types, on the other hand, are essentially of the same strokes thickness and they do not have serifs at the terminals. More recently, the sans serifs with slight differences in stroke thickness and with a slightly squared look are called the gothics or grotesques.

The slab serif types have even-thickness strokes as on the sans serifs and serifs as on the soman types.

The ornamental types are those that do not belong in any of the first three categories. These are the text or black letters (old english), the scripts which are
intended to look like handwriting and the gimmic letters
(make to look like logs, pieces of furniture, etc...). 

There are also hundreds of subcategories in each of the major categories described above. These subcategories or families of type come in more than one weight (light, regular, bold, ultrabold) and more than one width (regular, expanded, condensed). Eventually, the designers will develop strong prejudices against many typefaces, and strong preferences for others. They may conclude that only a few will fit their publication. Personal preference influences choices of typefaces. However, there are other factors which affect the choice of typefaces also. These factors can be the history of a typeface, its aesthetics, the personality of the face, the mood of the article, and the age level and station of the audience (Nelson, 1983).

According to Herbert Spencer, "Objective research has produced few dramatic results" about selecting typefaces which contribute to greater reader efficiency (Nelson, 1987). The research verified some of the finding about typefaces. All caps slows reading speed and also occupies up to 50 percent more space, italics are harder to read than uprights, very short and very long lines are hard to read, and unjustified lines do not hurt readability, especially now that we are getting used to them. Every
designer has a favorite typeface, and one designer's favorite may differ radically from another's. However, most designers could agree on the following typefaces which form the standards against which other types are measured. A basic seven, as far as Roy Paul Nelson (1987) is concerned would include the Baskerville, the Bodoni, the Caslon, the Craw Clarendon, the Garamond, the Helvetica and the Times Roman.

The Illustrations

The principles of design that govern the arrangement of type and illustration on a page also govern the placement of figures, props, and background within an illustration. Illustrations are commissioned by the designers who want them for one or more of the following reasons: to create a mood for a cover or feature, to merely decorate a cover or feature, to amplify or explain what is in a title or headline or what is in the text, or to fill space when words fall short. Every illustration, from the crudest cartoon to the finest photograph or painting, should be well designed. They should make a story or concept more vivid and not more complex, which could confuse the readers since the art could compete with the text (Nelson, 1987).

The designer should make sure the photographer fully understands the assignment and knows how the pictures will
be used, whether for illustration or essay purposes. However, more and more designers these days are expected to take their own pictures or perform illustrations. The designers or photographers should apply the design principles in shooting the photographs or creating illustrations to fit a story or an article, because the composition of an illustration in graphic design has the same principles as in a layout. It is natural that the designers, working closely with the photographers, should begin to do their own shooting and have the working knowledge of the photographic techniques. For example, if the designers want to emphasize the height of an object, they must shoot the picture from a worm's eye angle and to show an item in context with its surroundings they must shoot the picture from a bird's eye view (Nelson, 1987).

Often a photograph does not tell the complete story unless the designers know how to handle the photograph. Sometimes cropping is necessary to better display the object. However, the designers should not cut photographs into odd shapes as many inexperienced designers do thinking that squares and rectangles are "monotonous" and odd shapes have more impact. These designers make the mistake of thinking that the readers are more interested in the shape than in the content. As a general rule, the designers should avoid photographs that are cut into
circles, triangles, or stars. But, if the designers want some added impact on the photographs, they can crop the photographs into extremely wide or tall rectangles.

Line art is another form of illustration besides photographs. The term "line art" is used to describe art that is black or white with no gradations in between. Therefore, note all art drawn in line is line art. An example, art works created by a pencil are not necessary line art, because the graphite marks contain shades of tone that graduate from black to gray to white, depending on the degree of pressure applied (Demoney & Meyer, 1982).

Continuous tone art such as photographs or arts drawn that have gray areas or shades must be converted to halftone or screened to be able to use in the photo offset lithography production, because the printer's film only registers black and white.

**The Paste-Up**

The highest level in the layout process is the paste-up. The designers who make the paste-up usually work from a comprehensive layout which shows the location of each element and gives the size of the final reproduction. The designer or paste-up artist may use rubber cement or the waxing process to fasten the design elements which consist of reproduction proofs of text and any actual size line art, into place. Photographs can be handled in either of
two ways. They can be prescreened and pasted down with the type as though they were pieces of line art, or they can be shot separately as halftone negatives and "stripped in" by the printer. However, it is less expensive to place as many elements as possible on a single base.

A Paste-up is the copy for photographic reproduction in photo-offset lithography production (Silver, 1973). The condition of the copy often affects the quality of the printed item. When doing paste-up work, the designers should be particularly concerned about exact and even spacing. The paste-up should be carefully checked for accuracy. Type matter should be proofread and all elements of the copy must be located in proper location to the other elements.

Protecting the paste-up copy is almost as important as preparing it. All copy should have an overlay sheet which can be either tissue or bond paper to protect the copy from smudging (Demoney & Meyer, 1982). Time, effort and expense are wasted when copy is damaged, soiled or destroyed before it is used.

However, to many designers in the industry now, all this talk about the paste-up is more history than advice. The new technology in some graphics production service makes paste-up preparation more accurate, easier to change, and basically more simple. The computer
technology such as desktop publishing system, makes possible the laying out and pasting up of pages on video screens.

**Desktop Publishing**

The big revolution in graphics production involves the computer and the technology it encourages. This technology includes systems that allow the combination of text and art on a video screen; scanners that convert continuous-tone art (photograph) to digital halftones; digital typesetters and laser printers (Bove & Rhodes, 1987).

In 1970 Life magazine was using an Editorial Layout Display System (ELDS) which was a 7,000 pound electronmechanical optical system with a screen, a tabletop instrument panel, and some powerful transistorized equipment (Nelson, 1987). Using projectors and computers, the system edited, recorded, and printed layout on demand. The designers received immediate visualization of various layout ideas in full color and in actual size by mounting all elements of the layout on 35 mm slides and slipping them into the machine. With the capacity of holding ninety-nine slides, plus a basic library of typefaces and a layout grid, the designers used an instrument panel to arrange the design elements into
position, enlarge them and also crop any of them to fit the copy.

As the technology advances, text and graphics can be created in electronic form with a personal computer, mainframe, portable computer, etc., and stored in files on disks. Printed text and graphics can also be converted into electronic form by retyping, redrawing or using a scanner. The greatest benefit of electronic text and graphic form is that they can be sent to a layout on a video screen, therefore paste-up can be done without messy glue or wax.

Many big companies do their own typesetting and printing as part of their business set up, which is called desktop publishing systems. A system can consist of a personal computer that is connected to a printer or it can be set up with many computers, a mainframe and other computer equipment on a larger scale. The goal of a desktop publishing system is to automate as many of the respective tasks, involved in the publication design which were discussed earlier, as possible. Paste-up with desktop publishing systems has a major advantage over manual paste-up in that changes are not only possible but also easier to accommodate. Page design can be easily performed on personal computers and printed with laser printers as design elements can be moved around by using
the "mouse". Text and line art can be precise and revisable in electronic form which makes editing and copyfitting more easy to compare than the manual paste-up.

Text added or deleted and art enlarged or reduced are all part of the copyfitting process. Manually, the copyfitting process involves finding the number of characters which the designers can fit in a particular space on a layout with a typeface that they want to use. With the on screen layout, counting the number of characters by using the traditional steps in copyfitting or character-count chart is no longer necessary, because the computer can automatically count the characters. It also allows the designers to change the size of the columns and the typefaces, and paragraph format can be modified in seconds. Proofreading can be done directly on the screen layout through the use of electronic form dictionaries.
CHAPTER 3

Summary

The purpose of this investigation was to determine the knowledge and skills the designers must have in executing the design and layout steps in graphics production today. I also investigated the desktop publishing systems to see how they would help the designers in their jobs. In this chapter I will briefly summarize my findings.

The designers are arrangers. Their ultimate criteria are the looks, not the meaning. However, on many publications the designer, the art director and the pasteup artist are rolled into one person as I am experiencing on my first job as a magazine designer. The designers must be able to work with photographers and illustrators. Some artists and photographers need a lot of direction and others are more imaginative. It is up to the designers to select those photographs that are usable and perhaps to ask that others be retaken.

Practicing designers do not pay a great deal of attention to the design principles. Perhaps they could not state them if asked. This is because applying the design principles to a publication is not as simple as indicated in this paper. It may have occurred to you that the principles are contradictory. For instance, how can
you have unity when you insist on setting up one item to contrast with others? And does not use of unequal space divisions break up the sequence? The challenge in the list lies in knowing when to stress one principle, and when to stress another. Therefore, when one principle does not seem appropriate, the designers should not hesitate to abandon it.

There are courses in graphics production in many high schools and universities today which provide the students with a basic skill in graphic arts. However, the integration between the computer graphic equipment and graphics production in the schools is not yet in large scale because of the financing problem in purchasing expensive desktop publishing systems. Most of the students are still using traditional tools and materials.

As the technology advances, it has a great effect on those people who are involved in the graphics production area. With the advanced graphic production equipment available today, one person can carry a project from the beginning to the end much easier and a lot faster.

To be able to compete in today's job market, the designers must have both the skills in designing and the ability to utilize the desktop publishing system. They must be able to choose the appropriate desktop publishing system and software to be used in designing and laying out
printed materials. The designers must know which software is good for word processing, creating graphics and illustrations, etc. The competition of many computer software manufacturers helps create better software applications everyday, therefore the designers must research and keep up with the changes of the technology.

The computer makes the pasteup job a lot easier than doing it manually. However, the designers must understand the limitation of the software they are using, because not all of the software are working the same. The designers also must understand the printing processes which will keep the designers from asking the impossible of the printer as some effects created by the computer can not be printed with a particular printing process.

Making intelligent decisions in choosing the most appropriate desktop publishing system and software is an important factor in getting the right tools for a graphic production project. However, the designers must realize that the most important task of all is that the designers must be able to create a design and put together an effective layout by applying the design principles, choosing typefaces and illustrations for a graphic communication project.
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