Learning Objectives
After studying this chapter, you will be able to:

1. Identify different computer platforms.
2. Explain the characteristics of different types of storage devices.
3. Differentiate between various output devices.
4. Explain the processes used in text and graphics preparation.
5. Summarize the features of page composition programs.
6. Identify the techniques used in creating digital design files.
7. Explain the proofreading process.
8. Explain the preflighting process.
9. Compare types of production proofs.
10. Explain digital prepress workflow.

Digital Basics
The desktop computer has become the focal point of job creation and assembly of text and images into page layouts within the graphic communications industry. The computer and associated devices, in conjunction with the specialized graphics programs, are components in the digital prepress system, Figure 7-1.

A computer uses a binary system to process and store information in digital form. This means that the computer recognizes only two numbers or digits: 1 and 0. These digits represent two states, on (1) and off (0). The individual 1s and 0s are called bits, or binary digits, and can be combined into groups of eight digits to create a binary word, or byte. Since there are 256 possible combinations of 1s and 0s in an eight-digit byte (from 11111111 to 00000000), a special code was devised to assign a specific meaning to each combination.

Digital systems have penetrated every stage of the printing process: from formatting the author’s manuscript, to platemaking and running the press. Maintaining a smooth workflow requires the consistency of digital data throughout the production process. Sustaining consistency, as well as compatibility, requires that everyone involved in the production process have an understanding of digital media.

In a perfect world, every piece of digital equipment, as well as every computer program and file produced, would be compatible. Unfortunately, this is not the case. For this reason, many organizations, such as the American National Standards Institute (ANSI), the International Standards Organization (ISO), and the Joint Photographic Experts Group (JPEG), have created standards by which digital media and equipment must operate in order to be compatible. Due to the amount of information and the vast number of products available, this chapter covers general information that applies to digital prepress operations.

Digital prepress system: A computer-centered process that consists of preparing content, composing pages, and outputting the finished file.

bit: Binary digit. The basic unit of digital information.
byte: A binary word, or group of eight individual 1s and 0s.
The American Standard Code for Information Interchange (ASCII) provides a way to digitally store and process letters, numbers, punctuation marks, and symbols. When the letter C is pressed on a keyboard, for example, it is converted to a specific combination of 1s and 0s. Different combinations are assigned for the capital and lowercase forms of each letter. Once in digital form, the information can be processed by the computer's circuits and stored as digital or magnetic charges.

Regardless of size or complexity, a computer system has three major functions: input, processing, and output. According to Figure 7-2, computer systems also have some means of storing information, either within the system, in a portable form, or both. There are a number of different methods and devices used for input, storage, and output. They are described in the following sections.

### Computer Platforms

The platform of a digital prepress system is the computer system hardware used to operate various programs. Computer platforms include the elements necessary to create, assemble, and output data in the finished pages. Figure 7-3. Major computer platforms are PC (based on the Microsoft® Windows® operating system and the Intel® chip architecture), Apple® Macintosh®, and UNIX®. Once the platform is defined, software developers design and install corresponding software applications. Software is a computer program that initiates a specific function of the computer. Types of software include word processing, page composition, and graphics programs.

![Figure 7-3. Desktop publishing allows graphic designers to create and edit both text and art.](image)

Some file formats and devices are cross-platform, which means they can operate on or be used with different platforms. For example, a cross-platform word processing program allows a user to create and modify documents using different operating systems, if necessary. Ideally, all computer systems involved in creating and producing a document or project would use the same operating platform. When this is not possible, using cross-platform applications and devices reduces errors due to file conversion and makes the entire process more efficient.

### Macintosh®

The Macintosh® computer was introduced in 1984 and quickly became popular because of its ease of use and ability to generate high-quality graphic images. The Macintosh® system was designed around the concept of a graphical user interface (GUI), which allowed for easy-to-understand, on-screen graphic representations of computing tasks. At that time, competing platforms were based on the more difficult method of typing commands to perform tasks. This platform was central to the development of Desktop Publishing (DTP) Systems and continues to play a major role.

### Personal Computers (PCs)

The PC is the platform most often used in business environments. In the early 1990s, the original command-based operating system for PCs was replaced by Microsoft® Windows®, which was a GUI designed to give the PC the same ease of use as the Macintosh®. The introduction of versatile word processing programs, sophisticated illustration and graphics software, and powerful page composition software have made this platform a strong competitor to the Macintosh® for DTP applications.

### UNIX®

UNIX® is a computer operating system that was developed in 1969 by a group of AT&T employees at Bell Labs. During the late 1970s and early 1980s, the influence of the UNIX® system within academic circles led to large-scale adoption of the operating system by commercial startups, the most notable of which is Sun Microsystems, Inc. The Macintosh® OS X operating system is a UNIX®-based operating system.

Today, UNIX®-like operating systems are commonly found, in addition to certified UNIX® systems. Linux® is a UNIX®-like computer operating system and one of the most common open-source operating systems. An open-source operating system is a computer system that has had part of the source code released so third parties can develop programs. Being a free, open-source system, the Linux® source code can be modified, used, and redistributed by anyone. It is used as an operating system for a wide variety of computer hardware, including desktop computers like the Macintosh® OS X, supercomputers, video game systems, and embedded devices, such as mobile phones and routers.

### Memory Types

In addition to having a computer system capable of running programs, there must be some means of storing and transmitting data. Every computer system is equipped with a certain amount of physical memory, usually referred to as random-access memory (RAM). RAM is the short-term memory the computer uses to store information in process. Systems can be updated and memory capabilities can be increased to enhance computing efficiency.

Because most page composition files are very large, there are many types of storage devices available that accommodate large files. Storage devices vary in terms of capacity, physical size, access capabilities, speed, reusability, and integrity. Storage capacity is measured in kilobytes (1024 bytes), megabytes (1024 kilobytes), and gigabytes (1024 megabytes). A number of different types of devices have been developed to store and reuse digital files. Some of these devices use disks that contain magnetic tracks to hold the encoded data, while others laser write data onto specially coated discs. With the exception of the hard drive, storage devices make files portable, which allows a copy of the data to be loaded onto another computer.

### Hard Drive

Both external and internal hard drives are common today. Figure 7-4. A hard drive contains one or more rigid, non-removable aluminum disks coated with a magnetic material. When the computer is operating, the drive motor spins the disk and a read/write head moves over the disk surface, which contains densely packed magnetic tracks. The head is used to write, or magnetize, information to portions of the tracks as they spin past the head. The head can also read, or play back, previously stored information.

The amount of information that can be stored on a hard drive has increased steadily from fewer than 10 megabytes to capacities measured in gigabytes. Almost unlimited storage capacity is available with a configuration known as a RAID (Redundant Array of Independent Disks), which connects a number of high-capacity hard drives together. Figure 7-5. The connected drives act like a single, huge hard drive, which is an advantage when managing extremely large files involving graphics and text. Virtually all digital prepress systems have an internal hard drive.

The single most critical occurrence for a hard drive is when it becomes inoperable, or crashes. The adage of “It isn’t if your hard drive is going to crash, it’s when your hard drive is going to crash” should be taken very seriously. Optimizing the drive for operational efficiency and regularly backing up the data should be part of standard operating procedures.

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**Figure 7-2** This computer system configuration illustrates the three main functions of input (keyboard and mouse), processing (CPU), and output (monitor and printer).

**Figure 7-3** Desktop publishing allows graphic designers to create and edit both text and art.
CD and DVD Drives

The compact disc (CD) and digital video disc (DVD) drives have become standard features of desktop computers, with most equipped to write data onto the plastic disc. CD-R discs become "read-only" after data is written to them, and CD-RW discs are rewritable and can be recorded on many times. CDs range in capacity from 670 to more than 800 MB. The DVD was originally intended for use in the video industry, but has made its way into the graphic communications industry because of its very high storage capacity of 4.7 to 8.75 GB.

Flash Memory Cards

Flash memory cards are small, removable storage devices that have high storage capacity with fast access and retrieval speeds. Common examples of flash memory cards are CompactFlash® cards and USB flash drives, Figure 7-6. Applications for these devices include storing digital camera images, game system data, and audio files. Flash memory cards range in storage sizes from 8 megabytes to 32 gigabytes and have low voltage requirements. They are small in physical size, have fast write and erase speeds, and allow for easy file management.

Modem

A modem is an electronic device that converts digital signals into a form that can be transmitted over telephone lines, and from phone lines into the computer system. The technical name for this device is modulator/demodulator. Modems allow information to be sent from one computer to another, over distances great and small.

Scanner

Four types of scanners are used today to capture images: handheld, flatbed, film, and drum. Handheld scanners are small devices that are moved across the image area by hand. Flatbed scanners process images that are positioned on a flat glass surface or scan area that is stationary. The film scanner is intended to capture images of various types of film. The drum scanner scans images that are mounted on a rotating drum. Some types can quickly convert an entire page of type or printed material into digital form, Figure 7-7. Scanners are used extensively for image input. Scanners are discussed in more detail in Chapter 8.

Voice Recognition System

The premise of voice recognition technology is to use voice commands to control devices and to enter data simply by speaking into a microphone. Some of the major challenges in using this type of system include:

- Recognizing the voices of multiple users on the same system.
- Distinguishing homonyms, such as "there," "their," and "they’re."

As the technology advances, the use of this system will extend into common applications within the industry. Presently, voice recognition is limited to common computer commands.

Output Devices

Most computer systems are connected to a variety of output devices, including monitors, printers, and external processing devices. Some output devices produce physical material, often referred to as hard copy. Output devices can display, produce, or transfer information processed by a computer, such as monitors and printers.
copy. These include ink-jet and laser printers that produce copies on paper, and imagesetter and computer-to-plate equipment that outputs final film or printing plates.

Monitors

As content is entered using a keyboard or other input device, it is almost instantly processed by the computer and displayed on a monitor. The software used for word processing and page layout on computer provides a WYSIWYG (What You See Is What You Get) display on the monitor, Figure 7-8. Monitors used for page layout are usually large enough (17”–21” diagonal measure) to display an entire page, or even two page layouts.

In addition to display size, resolution and dot pitch are important characteristics to consider when choosing a monitor. The resolution is a monitor’s ability to show fine detail and is stated in the number of pixels lined up across and down the screen. A typical high-resolution monitor has 1280 pixels horizontally across the screen and 1024 pixels vertically; this is expressed as 1280 × 1024. The resolution of monitors used in graphic communications range from 1024 × 768 to 1600 × 1280, or even higher. Dot pitch is a measurement of the vertical distance between rows of pixels on the monitor. The distance is expressed in fractions of a millimeter (stated in decimal form), with the image quality becoming crisper as the fraction becomes smaller.

A color monitor uses the additive color formation, based on the combination of red, green, and blue (RGB) to form white light. This creates a problem for the desktop publisher who is trying to achieve a WYSIWYG color environment. Since colors are displayed in RGB, it is difficult to match the printed results of a subtractive color environment. In the subtractive color formation, cyan, magenta, yellow, and black (CMYK) inks are combined to produce the printed image. This means that full-color representations of images on a monitor and on a printed sheet are achieved through different principles. To overcome this problem, a color management system (CMS) is installed to provide a monitor display that is closer to a CMYK representation of the final printed product. This software provides a WYSIWYG (What You See Is What You Print) display.

Printers

For proofing text, graphics, and page layouts, a printer is used to produce a hard copy on paper. The resolution of a printed image is measured in dots per inch (dpi) and ranges from 300 dpi (or less) to 1200 dpi (or higher), depending on the type and quality of printer. In some cases, final copy or page layouts can be output by a high-resolution laser or ink-jet printer to achieve quality sufficient for short-run reproduction by lithographic or xerographic methods.

Ink-jet printers

Ink-jet printers form images by using a print head that projects tiny droplets of ink onto the paper surface and provide a resolution of 300 dpi or more. Positioning the droplet is carefully controlled. Ink-jet printers are often used to make color proofs of graphics and page proofs to show a client, as a color-accurate representation of the final printed product, Figure 7-9.

Laser printers

Laser printers operate much like a photocopier machine. A photocopier machine uses reflected light to create an image on a drum, while a laser printer uses a laser beam to create an image on the drum, Figure 7-10. The laser printer has a print engine that translates the output of the computer into a bitmapmed image for printing. A laser transfers the page image to a light-sensitive drum that has a positive electrical charge. As the laser light moves across the rotating drum, it emits the image drawn from printer memory. The polarity of the drum changes in the areas where the laser has transferred the image to be printed. Toner is a positively charged powder that is attracted only to the negatively-charged areas on a page to create an image. The paper with toner applied passes between heated rollers that fuse the powder onto the paper and produce a permanent image. Laser printers can produce images of 300 dpi and higher, and are typically available in both color and black-only models.

Imagesetter and Computer-to-Plate Devices

When high-resolution images must be output for commercial printing, an imagesetter or computer-to-plate (CTP) device is used, Figure 7-11. A digital WYSIWYG: A monitor display method used by word processing and page layout programs, in which the monitor displays a RGB representation of the printed output.

dot pitch: A measurement of the vertical distance between rows of pixels on a monitor, stated in decimal fractions of a millimeter.

additive color formation: Theory based on mixing red, green, and blue light in various combinations to create a color reproduction or image.

subtractive color formation: The combination of cyan, magenta, yellow, and black inks to produce a printed image.

color management system (CMS): An electronic prepress tool that provides a way to correlate the color-rendering capabilities of input devices, color monitors, and output devices to produce predictable, consistent color.

WYSIWYG: A monitor display method used by word processing and page layout programs that uses color management software to produce a CMYK representation of the printed output.

print engine: A small computer component inside a laser printer that translates the output of the computer into a bitmapmed image for printing.

toner: Positively charged powder that is attracted to negatively charged image dots to make up the printed image on a page.
output station consists of two parts, the raster image processor and the digital output device. The digital output device can be used to output high-resolution text and graphic images onto paper, plates, or directly to a digital printing press.

The raster image processor (RIP) converts all elements of a page or image into a bitmapped image at the resolution of the selected output device. The RIP interprets the page composition information for the marking engine of the output device, such as an imagesetter, platesetter, digital printer, or large format devices, Figure 7-12. Output problems are most likely to occur during the ripping process. It is usually the responsibility of the operator to troubleshoot these problems. However, if the files have not been properly prepared, they may need to be returned to the point of origination for correction.

Page Description Languages (PDLs)

A page description language (PDL) serves as the interface between the page composition workstation and the RIP. PDLs are used in digital publishing to identify all the elements to be placed on the page, their respective positions on the page, and the page’s position within the larger document, in a manner that the output device can understand. PDLs enable digital output devices developed by different companies to interpret digital files from any number of personal computers and software programs. Common PDLs include Adobe® PostScript®, Adobe® PDF (Portable Document Format), and Hewlett-Packard PCL (Printer Control Language).

An interpreter is a computer program used with output devices that receive the PDL page descriptions and translates them into patterns of dots for a printer or pixels for monitor display. After receiving a page description, the interpreter constructs a representation of the page to suit the output device. For example, the interpreter can determine whether the output device is a black-only or color printer, an RGB video monitor, or a 2400 dpi platesetter. Once these parameters are defined, the interpreter modifies its instructions accordingly.

Preparation of Content

Software used with digital imaging systems is classified by its role in the digital prepress process. This process essentially consists of preparing content, composing pages, and outputting the finished file to an imagesetter, a platesetter, or directly to a digital press. The software used in prepress work consists of word processors, draw and paint software, graphics editors, and page composition programs.

It is important to maintain the original text and image files when preparing content; make a copy of the original material and work from the copy. This ensures that the original material is available if data is lost or destroyed during prepress production, or if graphics must be drastically resized or modified.

Text Preparation

There are several options available when preparing text for the digital prepress process. The simplest method is to enter copy directly onto the page, while using page composition software. This is appropriate for materials that include only a small amount of text. When a large amount of text is included in a layout, it is better to compose the text using word processing software. Text may be scanned from a hard copy using an Optical Character Recognition (OCR) scanner, or imported electronically from a disc or through a modem connection. Once the text is electronically acquired, it is edited using a word processing program.

Word processing software is an efficient tool for creating and editing text. Originally designed for correspondence and similar tasks in the business environment, this software has allowed computers to replace phototypesetters in composing text for graphic communications applications. Many word processors are capable of formatting both text and graphics. However, it is considered better to use the word processor strictly for text entry and editing, instead of trying to create an entire publication with it. This is particularly true if the publication requires extensive text formatting with numerous graphic elements.

Word processors typically include proofing tools that allow the operator to detect and correct errors in spelling, punctuation, and word division. These proofing tools go beyond mere spell-checking, as they are usually capable of detecting incorrect, extra, or missing punctuation, incorrect hyphenation; improper abbreviation; missing or incorrect capitalization at the beginning of a sentence; doubled words; and much more. This is a small sample of what proofing tools can do to increase typesetting efficiency.

To assist in formatting the text when it is placed in a page composition program, special codes may be incorporated to identify specific text attributes, such as headlines, subheads, or body text, Figure 7-13. Depending on the word processing program, the codes may be called styles, tags, or another similar term.

Figure 7-13. Formatting of special attributes, such as different sizes and forms of headlines or various types of lists, can be done by applying styles in a word processing program. In this screen example, the Style drop-down list is shown.

When the text is imported into the page composition program, the code is recognized and the specified text attributes are assigned to the copy. Such attributes may include type size, leading, alignment, and indents. This technique saves many hours of work once the text has been placed into the page composition.

Graphics Preparation

Graphic images can be created and saved in a variety of ways. Digital images can be created using paint programs, draw programs, digital photography, and electronic scanning. The electronic images created are saved in one of many file formats. The file format used for graphics is a very important consideration, because it determines how much an image may be manipulated and how well it will reproduce. Digital camera and digital scanner operation are covered in detail in Chapter 8.

Some graphics editing is possible with paint and drawing programs, but more extensive and precise graphic images can be created and saved in a variety of ways. Digital images can be created using paint programs, draw programs, digital photography, and electronic scanning. The electronic images created are saved in one of many file formats. The file format used for graphics is a very important consideration, because it determines how much an image may be manipulated and how well it will reproduce. Digital camera and digital scanner operation are covered in detail in Chapter 8.

Raster image processor (RIP): A device that interprets all of the page layout information for the marking engine of the output device.

Page description language (PDL): A file format that describes a page’s layout, contents, and position within the larger document in a manner the output device can understand.

Interpreter: A computer program used with output devices that receive PDL page descriptions.
changes should be made with a full-featured image manipulation program, or image editor. Some of the most commonly used image manipulation programs include Adobe® Photoshop®, Macromedia® Freehand® MX, CorelDRAW®, and Adobe® Illustrator®.

Full-featured image editors allow almost any aspect of an image to be manipulated, including cropping, color and contrast, adding or removing visual information, and even combining images. See Figure 7-14. Experienced users of image manipulation programs can sharpen, blur, and smudge edges; mix, choose, and apply colors; paint, draw, work with multiple layers, clone, apply filters, create gradients and textures, adjust color, and print color separations, as well as composites. Many programs allow the user to restrict modifications to one area of a picture or to make picture-wide changes.

In digital prepress, graphics can be broadly divided into two groups, bitmapped images and vector images.

**Bitmapped Images**

Bitmapped images are graphics files that contain a map of pixels, each of which is assigned characteristics. See Figure 7-15. A continuous tone image (photograph) that has been digitized using a digital capture device is an example of a bitmapped image. In a simple black-and-white bitmap, one bit of information is assigned to each pixel: either it is on (black) or off (white). This information, in turn, determines where ink is placed on the paper when the image is printed. Graphics programs also store location information for each pixel, providing grayscale and color data. Each pixel might require eight or even 32 bits of information to describe.

**Working with bitmapped images**

Artwork created by a paint program is a bitmapped image. When using a paint program, Figure 7-16, the rows and columns of squares that compose the image are visible by zooming in on any given area. Color may be added or deleted by filling in or emptying each square on the grid. When working with bitmap images, the individual pixels are edited, rather than whole objects or shapes. Through these actions, the image size, shape, or colors may be modified.

When bitmaps are enlarged or reduced, the edges can become ragged because they are composed of squares that do not create a smooth line. This process is referred to as aliasing. **Aliasing** is the process by which smooth curves and other lines become jagged due to the reduced resolution of the graphics device or file. **Antialiasing** is a software technique for diminishing jagged lines, or jaggies. These stair-step-like lines occur because the output device is not equipped with high enough resolution to represent a smooth line. Antialiasing reduces the prominence of jaggies by surrounding them with intermediate shades of gray or color. Figure 7-17. Shades of gray are used for gray-scaling devices, and color is used for color output devices. Although this reduces the jagged appearance of the lines, it also makes them fuzzier. Many programs provide an antialiasing option that is extremely useful when placing text in an image.

Another method to reduce jaggies is called **smoothing**. Some printers accomplish smoothing by changing the size and horizontal alignment of dots to make curves smoother. Other printers reduce the size of those dots that make up a curved line to create a smoother appearance.

Some graphics programs incorporate an autotracing feature. **Autotracing** is a process for converting a bitmapped image into a vector image. Most autotracing packages read files in a variety of bitmapped formats (GIF and TIFF are very common) and produce a vector format file, such as an EPS. The conversion techniques used and the accuracy of the conversion process differs from one software package to another.

**Vector Images**

Vector images are represented as mathematical formulas that define all the shapes in the image, as well as their placement in a document. In computer graphics, a vector is a line that is defined by its start point and endpoint. A piece of line art generated by a drawing program is a vector graphic. Figure 7-18. A drawing program gives the designer control over shape, placement, line width, and object pattern. Figure 7-19. A **Bezier curve** is a vector graphic named after French mathematician Pierre Bezier. It is defined mathematically by two endpoints and two or more other points that control its shape, Figure 7-20. Nearly all drawing programs support Bezier curves. The two endpoints of the curve are called anchor points and the two middle points are called control points. The effect of the control points is to ‘punch’ the endpoints, causing these points to curve.

**anti-aliasing**: Software technique for diminishing the jagged edges of an image that should be smooth.

**bitmapped images**: Graphics files that contain a map of pixels, each of which is assigned characteristics such as color and brightness, to make up the image.

**aliasing**: The process in which smooth curves and other lines become jagged because an image is enlarged or the resolution of the graphics device or file is reduced.

**antialiasing**: Software technique for diminishing the jagged edges of an image.

**bezier curve**: A vector graphic defined mathematically by two endpoints and two or more other points that control its shape.
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The assembly of text and graphic images into the final page is accomplished using a page composer. The most widely used page composition software packages today are Adobe® InDesign® and QuarkXPress®. Although the specific operations are somewhat different, an experienced operator can use either program to combine text and graphics and create a file in PostScript®. A PostScript® file can be output to a laser printer, platesetter, or even directly to a digital press.

Digital Page Composition

The features offered by different page composition programs vary in details, but have many features in common. See Figure 7-21. A menu bar occupies the top of the screen, while scroll bars are on the bottom and one side. The scroll bars are used to shift the screen view up and down or left and right.

Pasteboard

A major portion of the screen display includes the page or pages being laid out and a work area, usually called the pasteboard. This area of the screen is used for temporary storage of layout elements (such as a piece of art or a section of typeset material) before moving them onto the layout page. The pasteboard can also be used to try out ideas for design elements, type treatments, and other composition changes.

Page Grid

The page grid, sometimes called a frame or baseline grid, is a nonprinted set of guidelines on each layout page. Guidelines for margins, columns, gutters, and other basic page elements are included in the grid. One important function of the grid is to align type horizontally when the page is arranged in two or more columns. The operator may choose to display or hide the grid lines.

Drop-Down Menus

By selecting one of the items on the menu bar, using the mouse or keyboard, a menu of choices extends down from the bar. These drop-down menus contain a number of choices that may be used to create or modify documents, Figure 7-22. The Page menu, for example, is used to insert, delete, or move pages within a document, and provides choices for quickly moving from page to page. Other common menu bar selections are File, Edit, Style, Item, View, Utilities, Window, and Help.

Some menus are context-sensitive menus—the menu that appears depends on the type of material being worked on. For example, the Style menu may display a list of choices that only apply to text when working with the text on a page. The list of available Style menu choices changes when working with an image on the page. Selecting some items in a drop-down menu prompts a submenu to display with additional choices, Figure 7-23.
Dialog Boxes

Selecting an item in a drop-down menu often opens a dialog box, which permits the operator to input additional information, Figure 7-24. This information may specify an action, input measurements, select colors, or apply a style. Some dialog boxes include drop-down lists, similar to submenus, which can be used to make a selection.

Palettes

A palette is a modified form of menu that can be resized and positioned on the screen to suit the operator’s preferences. A palette can also be set to display or be hidden. When displayed, it always remains visible, overlaying any other images on the screen, Figure 7-25.

Although there are more than six palettes available, the Tool palette is the most-often used because it allows the operator to perform many different layout functions. The Tool palette displays icons for the different tools available, including:

- **Item tool.** Select a box, line, or other item on the screen to be moved, resized, or reshaped.
- **Content tool.** Import and edit text and pictures. May also duplicate tasks performed by the Item tool.
- **Rotation tool.** Establish a point, and then rotate an item (box or line) around that point.
- **Zoom tool.** Enlarge or reduce the view of an item displayed on the screen.
- **Text Box tool.** Accurately position text on a layout. A submenu pops up to the side of the palette, which allows selection of different text box shapes.
- **Picture Box tools.** Available shapes, such as rectangular and rounded-corner, are displayed on the Tool palette. Selecting the rectangular Picture Box tool icon opens a pop-up menu with additional choices.
- **Line tool.** Draw a straight line at any angle. A pop-up menu allows selection of tools for drawing freehand line shapes.
- **Orthogonal Line tool.** Draw a line that is precisely horizontal or vertical on a page.
- **Line-Text Path tool.** Position straight lines of text at any angle. A pop-up menu provides other options, such as arranging text along a freehand-drawn line.
- **Linking tool.** Link text that is contained in two or more text boxes. This permits text to reflow freely from box to box or page to page, as dimensions or type sizes are changed.

Master Pages and Templates

The design of a document typically results in the repetition of certain attributes from page to page or section to section. Attributes such as column width, margins, page numbers, and headers and footers are often repeated. It is also common to have several dialog box: A page composition software feature that permits the operator to input information, such as specifying an action, inputting a measurement, or selecting a color.

palette: A modified form of a program menu that can be resized and positioned on the screen to suit the operator’s preferences.
different page formats within a document. The page geometry, typography, and other elements in each of these page formats can be set up as a master page, or template.

A template can be created that incorporates all the master pages and other formatting attributes. A new publication or page can easily be set up by opening the reusable template and customizing the page formats, as necessary. The main advantage of using a template is the increased productivity and less time spent recreating the same page information.

## Importing Text

Although text may be directly input and edited in page composition programs, documents of more than a few paragraphs in length are usually created in a word processing program. The text file is then imported into the page composition program and placed in one or more text boxes.

The text formatting (boldface, italics, tabs, indents, line spacing, and similar parameters) that was applied in the original word processing document may be retained when the text is imported if a text filter is used. Text filters are available for major word processing programs. If no filter is available or the imported material is unformatted ASCII text, formatting must be applied through the page composition program.

Style sheets used in page composition programs (and in some word processing programs) are formatting tools that combine a number of attributes. A paragraph style sheet can include such information as alignment, indents, leading between lines, space before and after the paragraph, and such typeface information as font, point size, and kerning. Usually, different paragraph style sheets are created to format specific elements of a document, such as body text, main headings, subheadings, numbered lists, lists with bullets, or illustration captions.

A character style sheet is more specialized and is typically applied to single letters, words, or phrases. A character style sheet might be used to set off all illustration references in the text, for example, by specifying a type font and point size that is different from body text. A major advantage of using style sheets is the ability to accomplish changes quickly and thoroughly. For example, changing the attributes of a heading style from centered 18-point Helvetica Bold to flush left 16-point Cooper Black takes only seconds, and changing the style would alter every occurrence of that heading in the document.

## Importing Graphics

Both bitmapped graphics created with paint programs and vector images created with drawing or illustration programs can be imported and placed in a picture box. Photographs are captured with a digital device, such as a camera or scanner, which converts them to a digital format. The digital file may then be imported to a picture box.

Once an image is in a picture box, it can be manipulated in various ways to suit the page layout. The image can be enlarged or reduced, cropped, moved around on the page, changed in color, or edited and altered in various ways. The amount of successful manipulation is affected by the format in which the graphic was imported. For example, bitmap images do not enlarge very well—as the image size increases, the pixels increase in size as well, which gives the image a jagged-edged look. When this occurs, the image is said to be “pixeled,” Figure 7-26. Graphic file formats are covered in detail later in this chapter.

### Drag-and-Drop Manipulation

Although keyboard commands are used for many functions of a page composition program, a mouse or other pointing device is commonly used for quickly and easily manipulating page elements. For example, a text box or picture box can be resized by clicking the mouse or pointer on a side or anchor point, and dragging the box to the desired size. In the same way, a section of text can be selected, dragged to a different place on the layout, and dropped into a new position. Material can be dropped off the page to the pasteboard for temporary storage or manipulation, or dragged off the pasteboard and dropped into the page.

### Color Separations

Instead of the physical overlays used in conventional paste-up to prepare material for color printing, page composition software produces separation plates for each color on a page. For example, a page with black type and an illustration of a large red apple would be put out as two separation plates. If a plate setter is used for output, one separation plate is generated for the black images and a second separation plate is generated for the red images. If the page contained a full-color photograph, four separation plates would be created; one plate each for cyan, magenta, yellow, and black inks. These four process colors are used in combination to print all colors. Color science and its relation to printing processes are explored in detail in Chapter 9.

## Font Formats and Management

Most applications that support text also provide a variety of fonts to choose from. The printer should use the same fonts as the original page composition, provided they can support them. The entire page composition can change if fonts are substituted. Font substitution can cause document reflow, bad word or line breaks, and loss of kerning and tracking.

The fonts must be included in the project files if the utility software, such as Adobe Type Manager (ATM), Adobe Type Reunion®, and Extensis Suitcase™, can help manage and collect fonts used in the original page composition.

### Font Utility Software

Adobe Type Manager (ATM) creates bitmapped fonts in any size or style from PostScript outline fonts. This provides WYSIWYG font representations on the screen. ATM also converts any missing font sizes and helps improve fonts printed on non-PostScript output devices.

Adobe Type Reunion® collects style variations in a pull-down menu and lists the style variations of a typeface together in a pop-up menu. Normally, the font menu displays active typefaces alphabetically by attribute, not alphabetically by name. Type Reunion® unifies a type family into a list that makes true typeface selection easier.

Font utility programs allow easier font activation or deactivation and enable the designation of font sets, or font lists. Font sets provide a quick list of the fonts used in a job, Figure 7-27. Font sets can be created for individual jobs and only the set needed may be activated.

Even though the page composition program may give a list of fonts contained in a document, they may not list the fonts used in imported EPS graphics. Therefore, you must record all fonts used in supporting files from the fonts sets because they are part of the page composition file. Fonts used within bitmapped graphics automatically convert into pixels and lose font information, so it is not necessary to record the fonts used within these files.
Fonts represented with vector graphics are called **vector fonts**, also known as scalable fonts or outline fonts. The best example of a vector font system is **PostScript**. The PostScript font characters have no specific size and are described as mathematical definitions of the outline. PostScript output devices render the characters as designated.

As with vector images, vector fonts retain smooth contours when slanted, rotated, or scaled to any size. However, converting illustration fonts into vector graphics or object outlines can create problems for small type sizes and large text blocks. For example, outlining small type can create shapes that are too complex to print. Converting text to outline also makes editing more difficult, because the text is changed to a graphic instead of a font.

**PostScript Type 1 Fonts**

PostScript Type 1 is a format for vector fonts where each character in a typeface is stored as a PostScript language program. Because they are mathematical formulas, vector fonts take up less space in a printer’s memory, and the quality of the characters is not affected when scaled to different sizes. PostScript Type 1 fonts can be rotated, outlined, or filled with patterns, and they produce smooth curves even at large sizes when used as display fonts.

PostScript Type 1 fonts are device-independent, which means that they can be used across a broad range of output devices. Any device that contains a PostScript interpreter can read PostScript Type 1 fonts. Although resolution varies among output devices, type generated from vector fonts is as sharp as the particular device can produce.

PostScript Type 1 fonts have two component files: a **suitcase file** for screen display and the PostScript **printer typeface file** for PostScript device output. These two components make a **PostScript Type 1 font**. Digital fonts require two files because the images on a computer screen are created differently from those reproduced onto paper. The screen font is a low-resolution pixel representation of the printer typeface, which does not allow for high-resolution output.

The suitcase file contains a set of screen font sizes and styles. Although the available sizes depend on the program, sizes usually range from 8 point to 72 point. Typical style choices include the primary font, italic, bold, and bold italic. Some font packages also include a variety of weights and widths. The printer typefaces are the actual PostScript files that define the shape of the letters through Bezier curve outlines. Every typeface requires a separate printer file to successfully output the composition.

**TrueType Fonts**

TrueType font technology was developed jointly by Microsoft® and Apple® as a cross-platform vector font. Although TrueType support is built into all Windows® and Macintosh® operating systems, they do not always translate well.

TrueType fonts have no specific sizes and work by combining the screen fonts and the printer typeface into one file (instead of the separate files used in PostScript). PostScript output devices must either convert TrueType fonts or substitute a PostScript font, which slows processing. If TrueType fonts can be imported successfully, they can provide many benefits in a cross-platform environment. Most prepress suppliers use PostScript Type 1 fonts as a standard, and may have limited TrueType fonts. To maintain a smoother workflow, it is best to avoid using both PostScript and TrueType fonts in the same document.

**Multiple Master Fonts**

Traditionally, standard type families had limited style variation. Adobe Systems Inc. developed multiple master fonts that allow variations to be created from a base design. Each multiple master font consists of the base font (the multiple master font itself) and one or more instances of the font, **Figure 7-28**. An instance is a rendition of the font that varies from other instances in one or more attributes, such as weight or width.

Multiple master fonts include one or more **design axes** for almost unlimited variations of typeface weight and width. A design axis is a variable typeface attribute (weight, width, style, optical size). The base font determines the range of variations available.

**Font Organization**

A filing system of fonts acquired should be developed on the computer’s hard drive. Having an organized filing system makes it easier to collect and send the fonts associated with a document, or to reconstruct a document if problems occur. Such a filing system helps prevent mistakes caused by using the wrong font, mixing font types, or mixing typeface publishers.

Create a separate font folder inside the system fonts folder and file each job font by its name. Use separate folders to avoid mixing fonts from different publishers. For example, there may be a font named Adobe® Garamond and one named Agfa® Garamond, **Figure 7-29**.

**Font Report**

Most printers recommend that you create a report to verify document fonts. Customers often overlook fonts used in PostScript files. To make this task easier, most current software can compile a document report, **Figure 7-30**. For example, QuarkXPress® can create a report that indicates the fonts used and lists the embedded EPS files. Adobe® Illustrator® also indicates the fonts used. Adobe® InDesign® CS3 provides a font report that lists every open font on the computer and indicates the fonts used in the active file.

**Preflighting Fonts**

When preflighting files, all necessary font components should be copied to disc. By using one of the software utilities mentioned earlier, you can turn off all the fonts on a system and load the fonts directly to a printer-ready disc. If any fonts are missing, a prompt appears when the files are opened. Some programs

![Figure 7-28. Settings for multiple master fonts can be modified within the program’s type management utility.](image1)

![Figure 7-29. TrueType and PostScript fonts may be identified by the icons used within the type management utility.](image2)

![Figure 7-30. The layout and design of font reports varies from program to program, but they often include additional file information.](image3)
For most types of data, lossless compression

### Creating Digital Image and Design Files

There are several items to consider regarding the files themselves when creating digital design files. For example, the file format selected determines the type of modifications possible to the file and the type of file compression used affects the storage, portability, and resulting quality of the file. All of these decisions depend on the design environment and requirements of the printer.

#### File Formats

Many different image file formats exist; each varies in the way images are saved, how images can be modified, and how well images will reproduce. File formats contain a number of important aspects, including image placement, resolution, color, and background.

#### Tagged Image File Format (TIFF or TIF)

The tagged image file format (TIFF or TIF) is a raster graphic file used for exchanging bitmapped images between applications. Depending on the source application, a TIFF file can allow lossless or JPEG compression. Compression is discussed later in this chapter. The format supports bitmap, grayscale, RGB, CMYK, and indexed color models. TIFF files can also be exchanged among several platforms, including Mac®, OS, DOS, PC, and UNIX®.

#### Encapsulated PostScript (EPS)

The encapsulated PostScript (EPS) is one of the most stable file formats used in delivery to a digital output device. It is less convenient than a TIFF, but usually provides more stable output results. EPS provides a very reliable format for graphic images because it handles both vector and raster images. The EPS format provides low-resolution previews for screen display and non-PostScript printing. The EPS format supports bitmap, grayscale, RGB, CMYK, spot color, and indexed color models. EPS files can be used in the [open press interface (OPI) system](#), which allows low-resolution images to be placed in a layout, but automatically replaces them with high-resolution image files for printing. If saved in ASCII data format, EPS pictures can be opened and read in a text editor.

#### Windows® Metafile (WMF) and PICT

The Windows® Metafile (WMF) is a graphics file format on Microsoft® Windows® systems. The PICT file format is a Mac® graphics file that is most commonly used with the Mac® OS QuickDraw software. Both WMF and PICT formats can hold bitmapped and vector images. Many non-Windows® platforms are able to utilize WMF files, but PICT files must be converted to be used on non-Mac® systems.

#### Desktop Color Separations (DCS 1.0 and DCS 2.0)

The desktop color separations 2.0 (DCS 2.0) file format is an EPS graphic saved as a single file that can include up to six plates (cyan, magenta, yellow, black, and two spot colors) and a master image. The desktop color separations 1.0 (DCS 1.0) format creates five separate files, one for each process color (CMYK), and a data or master file. The DCS format supports grayscale, RGB, spot color, and CMYK color models. DCS files print faster than standard EPS files and can contain both bitmap and vector graphics information.

#### Graphics Interchange Format (GIF)

The graphics interchange format (GIF) supports raster images and only handles up to 256 colors. GIF files offer lossless data compression, which makes them particularly effective for drawn images, animations, and images used on the Internet. Lossless data compression will be discussed later in this chapter.

#### Portable Document Format (PDF)

The Adobe® portable document format (PDF) has become a standard for electronic document distribution throughout the world. PDF is a universal file format that preserves all aspects of a native file, regardless of the application or platform used to create the PDF file. Anyone using Adobe® Reader® can view, navigate, and print the file exactly as the author intended.

Unlike the complex, continuous stream of data in PostScript files, PDF files are simple, compact, vector files. They process quickly and can be sent across the Internet or a network for remote proofing or printing. PDF files are also page-independent, so single pages can be replaced or altered without reprocessing the other pages. Page independence also allows printing pages in any order from a single file. The PDF file is also self-contained, meaning that the file has all the fonts and other resources needed to image it.

#### File Names

File naming conventions are often overlooked, or even ignored. However, carefully naming files helps keep work organized. Whether creating a standard in-house convention or following recommendations from a printer, the file format must be consistently applied.

Computer platforms and programs are subject to their own conventions. Even though some of the latest operating systems allow file names up to 255 characters, file names should be limited to fewer than 20 characters with a three-character extension.

Other general rules for file naming include:

- Use only alphanumeric characters; symbols should be avoided.
- File names should not begin with a space.
- Each file name should be unique.
- Use the appropriate file extension to identify file type, such as .tif, .eps, or .pdf.

To avoid confusion, revised files should not be submitted with the same name as the original file. If you are using OPI software, however, it is important that the file names remain the same as the original. The file name serves as the link to the high-resolution image, and changing the file name requires that the link be reestablished, which causes delays.

#### File Compression

Before sending digital data to a printer, most publishers compress, or reduce, the size of the files. Some programs automatically compress the file when it is converted and decompressed when it is viewed. Compressed files require less storage space, allow more efficient data management, and can be transmitted faster because redundancies and other unnecessary elements are eliminated from the original file.

### Lossless Compression

A [lossless compression algorithm](#) refers to a data compression process in which no data is lost. The PKZIP compression technology is an example of lossless compression. The files are often referred to as ZIP files and typically have .zip as the file extension. PKZIP files with an .exe extension are self-extracting files, which can be unzipped simply by opening the file. Decompressing either of these types of files is called unzipping.

For most types of data, lossless compression techniques can reduce the file size by about 50%. Lossless algorithms used for image compression assume that the likely value of a pixel can be inferred
from the values of surrounding pixels. Because lossless compression does not discard any of the data, the decompressed image is identical to the original.

Other common lossless compression methods are the Huffman method, Lempel-Ziv-Welch (LZW), and run-length encoding (RLE). Both the Huffman and LZW methods of compression are techniques where adjacent bits are replaced with codes of varying lengths. For example, this technique would encode the fact that zero occurs 20 times, rather than using 20 zeros. This information would use 4 bytes instead of 20. Run-length encoding (RLE) encodes digital data to reduce the amount of storage needed to hold the data without any loss of information. Each coded item consists of a data value and the number of adjacent pixels with the same data value. In other words, strings of the same character are encoded as a single number. This is a very efficient way of encoding large areas of flat color used in line work and text.

Lossy Compression

A lossy compression algorithm refers to data compression techniques in which some data is lost. Lossy compression methods attempt to eliminate redundant or unnecessary information. Most video compression technologies use a lossy compression. This improves the speed of data transfer, but causes slight degradation when the image is decompressed. Lossy compression techniques include quantization, Delta Pulse Code Modification (DPCM), and JPEG. Quantization is a filtering process that determines the amount and selection of data to eliminate, so data can be encoded with fewer bits. DPCM measures one set of bits and then measures differences from that set. The differences are then encoded into fewer bits. Lossless compression is preferred for printed images because each time a lossy compression is applied, more information is lost. The loss of data may not be noticeable on screen, but will be very noticeable in high-resolution printed output.

The JPEG file format was created by the Joint Photographic Experts Group, in collaboration with the International Standards Organization (ISO) and the Consultative Committee for International Telegraphy and Telephony (CCITT). The JPEG format was designed to establish an international data compression standard for continuous-tone, digital still images. JPEG compression is an open-system, cross-platform, cross-device standard that can reduce files to about 5% of their normal size.

JPEG is based on the discrete cosine transform (DCT) algorithm, which analyzes each pixel block, identifies color frequencies, and removes data redundancy. This algorithm requires the same amount of processing to either compress or decompress an image. JPEG compression can incorporate other algorithms, including quantization algorithms and one-dimensional, modified Huffman encoding.

JPEG is a popular standard for images used on the Internet due to its extreme compression capacity and ability to support 24-bit color. The JPEG file format allows the compression ratio and reproduction quality to be controlled at the point of compression. Selective compression enables users to specify different compression levels for the various elements within a single image. For example, EPS color image files embedded in a digital document result in a very large file. EPS-JPEG compression creates files for page composition software that are significantly smaller than standard EPS files. Images vary in the amount of data that can be compressed without affecting the visible quality. Experiment with quality settings to determine the maximum compression settings that do not perceptibly alter appearance. Since data is lost in each compression/decompression cycle, use JPEG compression at the maximum quality setting and only on final images. Figure 7-32.

![Figure 7-31](image1.png)

**Figure 7-31.** When saving a file using the JPEG compression option, there are several encoding options available.

**Figure 7-32.** JPEG compression should be used at maximum quality to preserve the integrity of the data being compressed.

Proofreading

A proofreader has the very important job of making sure the final product meets the standards of expected quality and professionalism. In larger publishing and printing facilities, people are hired with expertise in proofreading. In smaller facilities, a variety of people may have this responsibility. Every printer, especially in a small plant, should be able to read proofs. The proofreader must be a meticulous person and have the ability to accurately check individual letters in words, as well as look for combinations of letters. Proofreaders cannot scan a page, but must study each word separately. If proofreading is done poorly, the highest quality paper, best printing methods, excellent content, and other favorable aspects of the product will be ruined.

**Proofreader’s Responsibilities**

The typical duties of a proofreader include:
- Check the spelling of all words.
- Ensure word divisions or hyphenations are correct.
- Verify that the style is consistent.
- Make certain that the size of type, line length, and spacing specifications are followed.
- Check that copy has not been omitted or repeated.

Proofreader’s marks are widely used symbols that single out and explain copy changes or errors, Figure 7-33. The symbols are used to show when something should be taken out, added, or changed.

**Proofreader’s marks:**

- **Proof:** Any copy or art that is checked before going into print.
- **Proofreading:** The process of checking for typesetting errors and marking them for correction.
- **Selective compression:** A compression option that allows the user to specify compression levels for different elements within a single file.
- **Lossy compression algorithms:** A mathematical formula for image compression in which data in an image that is least perceptible to the eye is removed.

*Chapter 7 Digital Prepress*
The appropriate proofreader’s mark is placed in the margin of the page to indicate the type of correction to be made, Figure 7-34. This system is an efficient means of showing the compositor the location of the fault and the desired correction. Proofreading marks must be written ... to the marks in the border. Sometimes, an extra sheet of instructions may be attached to the copy or page layout.

**Proofreading Methods**

**Comparison proofing**, or one-person proofing, is done primarily to find such major problems as copy deletion, incorrect sequence, or copy duplication. It is most suitable for small jobs with little copy. Using this method, the proofreader scans through the proof once to check for obvious errors or changes. The proof is then placed next to the manuscript, and the proofreader traces along the lines of the proof with a pen while reading. Placing a直畫edge across the copy and moving it slowly down the page is also helpful. To be consistent, the proofreader must always compare the proof with the copy, not vice versa.

**Two-person proofing** requires the reader to work with an assistant. This is the most common proofreading method when accuracy and speed are important. It is frequently used with larger jobs, such as a textbook. The two people are referred to as the reader and the copyholder. The reader follows the printed design proof (or computer screen display) to check closely for errors. The copyholder follows the original manuscript. Usually, the two take turns reading to each other. Each word must be carefully pronounced and the reading pace must not be too fast. The reader must have time to scan the letters of each word, check punctuation, style, and other items.

A special jargon or language often develops between the reader and copyholder. For instance, some readers pronounce each capital letter as “cap” and each period as “peer” to denote the beginning and end of a sentence.

**Spell Check Programs**

A spell check program, also called a spellchecker or proofing program, is incorporated into the majority of word processing software. Depending on the operator’s preference, the program automatically checks the spelling of each word as it is typed, or all the words in a document when typesetting is complete.

A spell check program compares words in the document with those in the program dictionary. If a word is spelled incorrectly, a correction is suggested, Figure 7-35. The typesetter can accept the suggested spelling or may enter the proper spelling to be applied to the document. Spell check programs also permit unusual spellings or technical words to be added to the program dictionary.

Spell check programs can be very helpful to production speed and quality. When properly used, they can greatly reduce typos and make the correction cycle much more efficient. A proofreader must still review the copy. However, with fewer typing errors, more attention can be given to checking style, illustration references, sequence, and other important content and typesetting aspects.

**Preflighting**

In addition to generating various types of proofs before sending files to a printer, the files should be preflighted. Preflighting is an orderly review of files to identify items that could cause problems at the output or prepress stage. To make sure preflighting goes smoothly, discuss file format and preparation with the printer while the project is still in the design stage. Knowing their requirements ahead of time will save both time and money.

According to the Printing Industries of America (PIA), some of the most common problems with the files customers provide are:

- Missing or incorrect fonts.
- Missing or incorrect trapping.
- File defined with incorrect color (RGB vs. CMYK).
- Scans supplied in wrong file format.
- Graphics not linked.
- Incorrectly defined or under defined bleeds.
- No laser proofs supplied.

Figure 7-33. Some commonly used proofreader’s symbols are presented in this chart. Although many of the symbols are considered standard, there may be some variation from company to company.

Figure 7-34. This is an example of how proofreader’s marks are used to identify and correct copy problems. Note the caret placed at the point of error, and the correction symbol written in the margin.

Figure 7-35. This spellchecker highlighted a word in the text and displayed it in a separate window. The most likely correct spelling is shown in the **Change To:** box, but one or more additional suggestions are often presented, as well.
Preflight Technician

The preflight technician uses digital imaging technology to achieve the planned requested job. When using this technology, the preflight technician takes the electronic files that are given to him or her by the customer and checks them for all aspects of completeness. It is very similar to the checklist a pilot goes over before the plane takes off; the formalized preflight manual checklist makes sure everything is in order. Therefore, the preflight technician tasks are critical to the elimination of output problems of the electronic files. Prelighting software can speed up the process. Sometimes checklists and software are both used by the preflight technician.

Some of the responsibilities of the preflight technician include making sure submitted discs are not damaged; ensuring discs are readable; checking in-house font availability; checking for missing material on submitted discs; checking for correct size indications; checking for proper trapping and adequate bleeds; and checking for font problems. All these preflighting tasks ensure the digital job is ready for the intended output device. The ability to work closely with the customer and other departments is imperative.

The preflight technician should have formal postsecondary graphic communications training in digital technology; an associate degree is often stated as a requirement in the job description. It is also beneficial to be familiar with the printing process and production workflow. Prelighting technicians must have good communication and basic problem-solving skills, be comfortable with the pressure of deadlines, and be proficient with computer applications.

“Students entering the graphic communications discipline need to have a variety of skills for employment in our ever-changing industry. They need to be versed in the practical application of traditional web and offset printing, digital printing, prepress and pressroom software, print management, and to have a firm understanding of the Internet and how it relates to the printing industry.”

Tony Mancuso
Typography Unlimited, Inc. (TUI)

- Missing graphics.
- Resolution too high or too low in customer-supplied scans.

After the documents or pages have been created, proofed, and corrected, they are ready to send to the printer for output. At this point, the production department can begin prelighting. Prelighting begins with printing out color separations and composite hard copies. The printer can refer to these copies if problems are encountered with production, pagination, color, or even text flow.

Once the separations and composites are printed, all the graphics should be linked. All page composition programs allow the user to select link or reference options as the art is imported. In QuarkXPress®, for example, all the graphics in the document are linked to the Quark® file unless the art was created with the drawing tools in Quark®. There are many benefits to linking art files. If all the graphics are embedded in a document file and one piece of art is corrupted, the entire project can be lost. When the art files are linked instead of embedded, only the corrupt piece of art needs to be recreated.

When prelighting files, check to ensure every graphic used in the file is on the disc. If a graphic file is missing, the art will print as low-resolution images or bitmap placed placeholders. Include the original art files in a separate directory for linked graphics that are in a non-editable format. Print a list of all files included on the disc(s), as well as how many discs are included for the project. Prepare a checklist to help verify that all graphic, font, and color components are present and correct.

After the basic prelighting is complete and proofs have been output, create a letter that outlines the software and fonts that were used to create the files, trapping requirements, print specifications, and any other pertinent information, Figure 7-36. Prelighting also requires checking fonts and the color palette. Font formats and management are covered in the previous section. For detailed information on color management, refer to Chapter 10.

Figure 7-36. If the printer does not provide a standard submission form, design a file submission form and file list that includes the basic information shown in this sample.
Production Proofs

Depending on the complexity of a project and previous arrangements with the printer, a number of proofs must be reviewed before the job goes to press. Proofs serve as samples for the customer and guidelines for the press operators. Proofs can be made directly from digital files, viewed online, or run off on a proof press. Cost variations often determine the type of proofs requested at different stages of prepress production. The most commonly used proofs today are soft proofs and digital proofs, Figure 7-37.

Soft Proofs

Soft proofs are electronic files that represent what the final printed page will look like. These proofs may be press-ready files created using the project composition files submitted to the printer. Soft proofs may be delivered via e-mail or accessed on the Internet, and are most often saved as PDF files. Soft proofing jobs have become a common industry practice, as it takes advantage of information technology to save the time and expense involved in producing printed proofs. Additionally, the client is able to review proofs in a significantly shorter time frame and may instantly approve pages or send comments through e-mail or a secure Web site.

Online soft proofs are posted and managed using Web-based applications specifically developed for electronically proofing documents. While each printer may not use the same interface, the functions and tools available to proof a job are similar from one application to the next. Some of the common Web-based proofing applications are Kodak InSite, eProof, inMotion, and proofHQ.

Digital Proofs

The two most common types of digital proofs used today are laser proofs and ink-jet proofs. Laser proofs are printed onto paper using electronic files. They are produced by an industrial laser printer and may be in black and white or use four colors. They are an inexpensive type of proof. However, the quality is said to be less than that of ink-jet proofs.

Ink-jet proofs are produced by a printing process that generates four-color proofs directly from the digital files. Ink-jet proofing is often used as a contract proof, replacing the press proof. The color simulates what will be produced on a press. However, there is often no halftone dot, so conventional screening problems such as moiré patterns cannot be predicted. Ink-jet proofs can be presented early in the proofing process because they are very inexpensive.

Matchprint® Digital Halftone has become an industry-standard halftone contract proof. The actual digital file that will be used to create the printed pages is sent to a precalibrated ink-jet printer to produce a proof. This enables accurate evaluation of the file for trapping, moiré, and other conventional printing problems.

PDF Workflows

With the growing use of technology in the graphic communications industry, as well as the increased concern for environmental issues, soft proofs are becoming more widely used than digital proofs. Soft proofs reduce the use of paper in multiple rounds of checking proofs. They eliminate the use of ink and the creation of any VOCs in the production of printing proofs. There is also no transportation involved since soft proofs are sent over the Internet. While some companies are concerned about the quality of soft proofs, others have found that with monitor calibrations, the on-screen page should match the printed page. Companies have found soft proofs to be a more efficient alternative to hard copy proofs because of the turnaround time and ease of use. For more information, see www.pniec.org.

The PDF file format allows incorporation of an extended job ticket. An extended job ticket is an electronic document that contains all the instructions required for processing a job. Figure 7-38. It includes customer information, proofing directives, trapping, imposition and ripping parameters, and even finishing and shipping instructions. The job ticket specifications can be easily viewed and modified by everyone who has access to the file.

The PDF file is practically an ideal preflighting tool. It all the necessary elements are not present at the time of file creation, the user is warned. PDF files also provide a single file for viewing, distributing, archiving, editing, and printing small file sizes, and a built-in preview. PDF files can access many types of files including EPS, TIFF, PICT, QuarkXPress®, PageMaker®, and PostScript® from applications on both Macintosh® and PC platforms.

Job Definition Format (JDF)

The Job Definition Format (JDF) is a file format that automates the printing workflow, from design to production, and was developed through a partnership between Adobe®, Agfa, Heidelberg®, and Man Roland. This file format is based on Extensible Markup Language (XML) and provides a standard format that is compatible with any JDF-enabled equipment.

JDF files are similar to an embedded electronic job ticket, in that they can contain information on the document designer, fonts used, images contained, stock type and size, ink colors, bindery instructions, and other static data. In addition, the file may contain instructions for JDF-enabled devices used in the production process, including ink fountain settings on a press and the configuration of bindery equipment. Throughout the production process, the

PDF Workflow

In a PDF workflow, the PDF file is used to create the film or plates needed by the print production facility. The PDF file contains all of the necessary information, such as the fonts, graphics, images, text, and document layout. No further proofreading steps remain to be completed by the production department. Portable document software typically saves a document bitmap, the ASCII text, and the font data. Even with compression, most PDF files may be many times larger than the native file.

Digital Prepress Workflow

The changes resulting from the transition of conventional prepress methods to digital have brought about many workflow enhancements and radically changed the processes in the prepress department.

Comparison proofing: A proofreading method done primarily by one person to find such major problems as copy deletion, incorrect sequence, or copy duplication.

Soft proofs: Press-ready, electronic files that represent what the final printed page will look like and are most often PDF files that can be viewed on a computer monitor.

Ink-jet proofs: A type of job proof that provides four-color proofs generated directly from the digital files.

Job Definition Format (JDF): A file format based on Extensible Markup Language (XML), which provides a standard format that is compatible with any JDF-enabled equipment.
information and instructions contained in a JDF file may be manually amended to allow for adjustments or additions, such as completion dates, delivery schedules, and client contact information. This technology expedites production, reduces errors that occur in the processes, and automates the workflow of print production. Other workflow solutions that are designed to optimize print manufacturing processes include Kodak Prinergy™, Agfa:Apogee Suite, Heidelberg® Prinect®, and EFI OneFlow®.

Summary
Today’s prepress professional must be knowledgeable in both traditional graphic arts techniques (such as fonts, mechanical trapping, and color separations), and strong computer skills (including the ability to navigate intranet and Internet networks). Today, a single prepress professional is capable of performing the duties of several conventional prepress personnel from only a few years ago. These expanding skills and responsibilities will continue to grow as new technology and workflow techniques enhance prepress functions, and extend into all graphic communications processes, including press and bindery operations. In the near future, a single prepress operator may be able to control a print job, from creation to fulfillment, with commands from a single computer workstation. The possibility of this type of change emphasizes the importance of digital and workflow technology, and will further change the career opportunities and skill requirements in the graphic communications industry.

Review Questions
Please do not write in this book. Write your answers on a separate sheet of paper.
1. List the three major functions of a computer system.
2. A computer processes and stores information using the _____ system: a series of 1s and 0s.
3. Explain the function of computer software.
4. What is a cross-platform device?
5. List three different storage devices and describe the characteristics of each.
6. What do the letters WYSIWYG represent?
7. Explain the purpose of color management software.
8. What is the function of a raster image processor?
9. Define page description language and give examples of common PDLs.
10. Explain the difference between vector images and bitmapped images.
11. Two software techniques for diminishing jaggies are _____ and _____.
12. A(n) _____ is a vector graphic that is defined mathematically by two endpoints and two or more additional points that control its shape.
13. Which of the following is not a common feature of the computer screen display for a page composition program?
A. Scroll bars.
B. Pasteboard.
C. Scanner port.
D. Menu bar.
14. List five tool icons commonly found on the tool palette of page composition programs.
15. A reusable _____ contains all the master pages and other formatting attributes that make up a multipage document.
16. What is the purpose of a style sheet?
17. Explain the purpose of font utility software.
18. What are TrueType fonts? How do they differ from PostScript fonts?
19. Name three image file formats and describe the characteristics of each.
20. What are the general rules to follow when naming files?
21. What is the difference between lossless compression and lossy compression?
22. A(n) _____ is any copy or art that is checked before going to print.

Suggested Activities
1. Prepare a workflow chart of a typical digital prepress department.
2. Select a product you want to print that includes line work and photographic images. Choose the computer platform to operate the software you will use to prepare the prepress project documents. Explain your equipment selection.
3. What ergonomic factors should be considered when setting up a computer workstation?
4. List the computer programs commonly used in your school and explain the unique features of each program.
5. Make an appointment to visit the prepress department of a printing plant. Describe the preflight plan used by the prepress personnel.
6. Research various printing facilities and make a list of the job titles found in the prepress department.

Related Web Links
The International Cooperation for the Integration of Processes in Prepress, Press, and Postpress Organization
www.cip4.org
CIP4 brings together vendors, consultants and end users in the print communications, graphic communications industry, and associated sectors to define future versions of Job Definition Format (JDF), to study user requirements, and to design a JDF Software Development Kit (SDK).
Merriam-Webster Online: Proofreaders’ Marks
www.merriam-webster.com/mw/table/proofrea.htm
A table of commonly used proofreaders’ marks and the meaning of each.
Printers’ National Environmental Assistance Center
www.pneac.org
Resources include information on soft proofs in the printing industry.