

## Electronic and Film Based Imaging Facts

FicheNet Imaging Solutions is a Service Bureau for Electronic **and** Film Based Imaging and while some of this information below may sound contradictory, we are simply trying to inform you, the end user, of your options. Both Film Based Imaging (microfilm) and Electronic Imaging (scanning) technologies have distinct advantages over one another, making your decision making process very difficult. If this page evokes debate or helps to generate ideas then it has served its purpose.

Every organizations needs are different, for some Film Based Imaging (more commonly known as microfilming) is perfect. Film Based Imaging is the safest, longest lasting and most cost-effective way to preserve and protect any kind of information. That's why it is still the medium of choice when used for off-site storage, document reconstruction and long term image preservation. For other organizations Electronic Imaging/Scanning is the only answer and is the appropriate choice for storing information to which rapid access is required. Lastly many more organizations are choosing a combination of both Electronic and Film Based Imaging that works perfectly as a "best of both worlds" solutions. This refers to our [ArkScan a Hybrid Imaging Solution](#) seems to be the perfect answer.

Please consult our [Retention Schedule](#) as a guideline if you have no idea about your document retention concerns, but don't use it as the final source, please check with your governing agencies as to your specific needs.

### Index of Topics

- What is Film Based Imaging/Microfilming
- Advantages of Film Based Imaging/Microfilm
- Film Based Imaging/Microfilm Quality
- Recovering Data (viewing) from Film Based Imaging/Microfilm
- What is Electronic Imaging/Scanning
- Advantages of Electronic Imaging/Scanning
- Scanning to Electronic Image Files
- Media Lifetime for Microfilm vs. CD's and DVD's
- Legality Issues
- Have your Film and CD's too! (ArkScan Specialty Imaging)

## What Is Film Based Imaging/Microfilm

Film Based Imaging is an analog storage system. Microfilm was developed in the 1800's, but did not get put to significant use until the late 1920's when banks began filming checks. When it was first developed, banker George McCarthy held the patent for the machine capable of creating microfilm.

The microfilm machine created permanent film copies of bank documents by using a special camera, which took pictures of documents with black and white film. The film records, or microfilm, were able to resist deterioration and helped save storage space. The microfilm could be viewed later through a special machine. In 1928, Eastman Kodak purchased the rights to the microfilm machine, which helped catapult it into the business market.

To make a microfilm, a special camera capable of photographing at a reduced scale is used. FicheNet Imaging Solutions use [TDC Documate IV Camera](#) Through the technology of these cameras, the document can be reduced 99% from its original size. The image is then printed onto a special black and white film, which looks much like the negative of a photograph. For businesses such as banks, news agencies, financial agencies, and government offices, microfilm can save massive amounts of space when storing information because it can be reduced to such a small size.

There are two primary forms of film used in the creation of microfilm: silver halide film and vesicular film. Silver halide is much like traditional film, and the image is transferred to the film with a process using silver emulsion on a polyester strip. Vesicular film, on the other hand, utilizes microscopic bubbles to create the image on the polyester strip. Vesicular film is inexpensive and can be exposed to daylight without being damaged. FicheNet Imaging Solutions uses Silver Halide film.

Several types of microfilming formats exist, including roll microfilm and microfiche. They are all based on high resolution silver halide B&W microfilm for the original master. Roll microfilm is either 16mm or 35mm wide film with microphotographs (micro images) of documents arranged sequentially along the length of the film. Microfiche is 105mm wide film cut to 148mm pieces. Each microfiche has rows and columns of micro images with a title across the top. The reduction of the micro image is the ratio of the original document size to the micro image size. The higher the reduction ratio, the more images can be held on a given piece of film but with less image detail (**resolution**). An example is an 8.5 x 11" document filmed at 24X reduction has an image size of .354 x .458" (8.5/24 x 11/24) or 9.0mm x 11.64mm. Most microfilm is in the range of 24X to 48X.

## Advantages of Film Based Imaging/Microfilm

Film Based Imaging or microfilm is the safest, longest lasting and most cost-effective way to preserve and protect any kind of information. That's why it is still the medium of choice when used for off-site storage, document reconstruction and long term image preservation. When kept in a temperature-controlled environment, it is rated to last 200 years - a crucial advantage in saving cultural documents. Some opinions hold that microfiche has been rendered redundant by the computer age, but this is not necessarily so.

The major advantages of microfilm include storage in a small space, stability of the format, and no special knowledge needed to read it. Microfilm is eye readable. All one needs is a piece of glass and the sun to read microfilm. NO computer hardware and NO software is ever needed to view microfilm. Microfilm is the ONLY fail-safe medium that can be read anywhere, at any time, by anyone. See [Recovering Data \(Reading\) From Microfilm](#) for more information. Because of its small size, microfilm can be archived in storage cabinets, saving floor space. Thousands of government documents are archived on microfilm for this very reason.

Microfilm is the only medium recognized by the Federal Government of the United States as a legally retained copy of the original in ALL 50 states. See [Legality](#) below for more information.

Microfilm is considerably less costly than electronic media for (2) two reasons.

Microfilm technology is consistent, it does not require continual hardware/software upgrades

A single photograph holds virtually an infinite amount of detail because it is not limited to DPI (dots per inch), as are digital imaging devices.

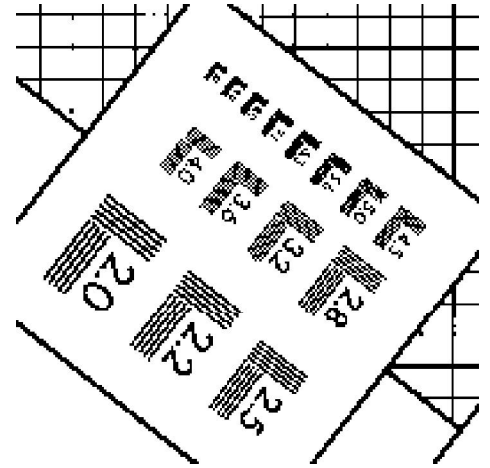
Recent history has proven that keeping up with continually changing digital technology is very costly.

Longest lasting medium available with a 200 year life expectancy. The Society of American Archivists reported: "Today's digital media should be handled with care, but most likely will far outlast the capability of systems to retrieve and interpret the data stored on them. We can never know for certain when a system has become obsolete." See [Microfilm Lifetime vs. CD's](#) for more information.

"We consider microfilm to be the only tested media for preservation, digitizing is fast and economical to distribute, but unless you update an image often, you're taking a risk, technology is changing to fast" said Julio Berrios, Head of the Micrographics Section of the Photoduplication Division, Library of Congress.

## Film Based Imaging/Microfilm Quality

In the microfilming industry, the primary quantitative measure of quality is measuring the resulting resolution of a microimaged [test-target](#). A specially printed resolution test-target is filmed. Vertical and horizontal groups of lines, spaced at exact distances, are viewed through a 100X microscope. A number next to each group indicates the number of lines per millimeter of the group (One 'line' is a black line with an equal sized white space). As the groups get smaller, the lines start blurring together at some point. The smallest group with clearly discernible lines, both vertical and horizontal, is the measured result (this number can be further multiplied by the reduction ratio to normalize between different reductions). The smaller lines-per-mm groups that can be resolved, at a higher reduction number (actually a smaller image) the higher the line pair resolution. The higher this number, the finer the detail that will be resolved on the microimages of your business documents.



Here's the formula again: [(Smallest discernible line pairs) x (the image reduction)] = (Line Pair Resolution)

FicheNet Imaging Solutions uses high end production [TDC Documate IV microfilm Cameras](#) (made by the Terminal Data Corporation) that sport lenses from Nikon, Carl Zeiss, Schneider-Kreuznach, and others. The TDC's are called planetary cameras, due to the fact that the documents and film are completely still while being filmed, as opposed to rotary cameras, where the documents and film are in 'synchronized motion during filming. Rotary cameras, which are much more prevalent in the industry, produce notably poorer resolution numbers. FicheNet Imaging Solutions does not use rotary cameras.

Background density range of every roll is checked with a target density between 0.80 to 1.20, measured as visual diffuse transmission density in accordance with ANSI PH2.19. Background density applies to all images.

Each roll of first-generation silver gelatin microfilm is inspected for compliance, for resolution, density, processing quality, and general workmanship. Any images that, upon inspection, do not meet the requirements of these guidelines will be defined as re-works and will be refilmed.

## Recovery Data (reading) from Film Based Imaging/Microfilms

What did Galileo have in the early 1600's? Early telescopes and microscopes. They possessed the same magnifying technology used today to view microfilm (historical records show corrective lenses were being made at least 300 years earlier than that!). Magnifying lenses are one requirement for viewing micro images and a light source is the other (a screen can be thrown in for convenience). Do you think magnifying lenses will be obsolete in the near future? Likely not. Of course a light source is the other requirement. We all know that light has been around for a while. The bottom line is that there has been for quite some time, and will continue to be, the technology to recover or read information from microfilm.

Current microfilm recovery technology: Readers and Reader-Printers

- A Reader allows viewing of microimages at full original size (at least eye-readable size) on a screen. A Reader is little more than a light source, a lens, and a viewing screen.
- With a Reader-Printer, a micro image can be printed back directly from film, to the original size on paper, as easily as using a copy machine! For your convenience, FicheNet Imaging Solutions offers page printing (blow back) services as well as sales of new and used microfilm Readers and Reader-Printers.

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## What Is Electronic Imaging/Scanning

Electronic Imaging is digital storage system. Digital = data processed using binary numbers (0 and 1) through on/off impulses. Imaging is a combination of software and hardware that allows users to capture analog (paper or film based) information from a number of sources. This step is performed by some form of scanner. A scanner measures reflected or transmitted light from the analog image, assigning numerical values to the colors or tones in the image to create a digital copy. With the image "translated" into a series of numbers, they are then stored digitally (.tif, .pdf or other format) on a computer system in the form of a computer hard disk or other electronic media such as a CD-ROM, DVD-ROM or magnetic tape, and can be retrieved in seconds with a few keystrokes. Users can retrieve, copy, fax or e-mail these documents quickly and efficiently to multi-users throughout an organization without ever leaving their desks.

Whether you're looking for a single desktop or a multi-user environment, document imaging is an invaluable tool for controlling, managing and sharing critical information within your organization.

## Advantages of Electronic Imaging/Scanning

Electronic Imaging is the appropriate choice for storing information to which rapid access is required. Imaging helps to strengthen company-wide decision making. Customer records, financial reports, production statistics and product configurations documentation all have an influence on how your company manages its information. This information is what drives a company's ability to make sound and effective business decisions. Electronic Imaging enhances your company's flow of information. With data stored electronically, you no longer need to measure document retrieval in hours or even in days. Everyone across your enterprise can have access to the information, from numerous workstations, in a very fast and in an efficient manner of time, empowering them to formulate strategies and tactics based on solid, timely information.

Imaging also enhances your customer service in the same manner. Customers receive the best service when you can quickly access complete and accurate records of their account. Maintaining this same level of accuracy is difficult and time-consuming in a paper-based environment. With electronic imaging, an accounts payable department, for example, can reduce response turnaround times; when a vendor calls with questions about an outstanding bill, information is readily available.

Electronic imaging reduces costs associated with hard copy storage, distribution and on-demand printing. (as does film based imaging) However electronic imaging enables the users to fax or e-mail documents much more efficiently than microfilming storage.

Electronic imaging enables on-line access to important company documents from anywhere in the world. Sales people or managers in the field can quickly access the most up to date pricing information or a client's archived order form via the Internet and electronic imaging.

Imaging doesn't require any special viewing or printing equipment. (i.e. microfilm viewers or reader printers) to view and recover your documents. You can take advantage of your existing network servers, CD-Rom drives and printers.

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## Scanning to Electronic Image Files

Page 1 of 9FicheNet Imaging Solutions uses [DocuScan 2610W](#), [PhotoMatrix Series 6000](#) and [Cannon DR-9080C](#) paper scanners to scan directly from paper files. We use either 200, 240 or 300dpi when scanning directly from paper and use [post scanning image clean](#) up software to perform tasks such as despeckling (image clean up), rotating of images, image cropping and others maximize file size. We then can convert these files to [PDF](#) perform basic or comprehensive data entry or import into our customize [Barracuda Image Retrieval Software](#) to perform very complex data entry and for end user image retrieval.

FicheNet Imaging Solutions utilizes sophisticated film scanners to scan directly from microfilm to image files with virtually the same result, and in some cases improved results, as scanning from the original paper. How is this possible? First, a microfilm image, filmed at FicheNet Imaging Solutions, possesses far greater detail than is typically sought for a scanned image in the business world. As a matter of fact, if a document is scanned to resolve the detail held in a 24X micro image, filmed on one of FicheNet Imaging Solutions TDC cameras, it would require at least 1200 DPI (Optical Dots Per Inch) as a very conservative estimate. Most business documents contain acceptable detail when scanned at 200 DPI (with a far smaller file size - see our page on [DPI Selection](#)). Second, certain filtering effects occur in the filming process, naturally, that can smooth inconstant images, like printed characters on a business document. When the film is scanned, the sharper-contrast smoothed image has been known to improve optical character recognition (OCR) and [PDF conversion](#). Also, special filters can be applied during the filming process that can drop out colored background shading or colored fill-in-the-blank boxes. This can reduce file size and improve OCR and pdf conversion especially on handwritten documents such as surveys, entry forms, etc...

## Microfilm vs CD/DVD Lifetime

Silver halide microfilm is much like traditional film, and the image is transferred to the film with a process using silver emulsion on a polyester strip. This is the longest lasting medium available with a 200 year life expectancy.

Gold Archival CD-ROMs are made with gold one of the most reflective robust elements on Earth. Most CD/DVDs are made with a silver reflective layer. By using gold instead, degradation from oxidation does not occur. These recordable CDs and DVDs contain a patented Phthalocyanine dye formula, which offers maximum resistance to the effects of light, humidity and heat. Some manufacturers boast that their Gold CD/DVD's can last up to 300 years.

One article on accelerated aging of CD's pegged the life span of CD's at about 25 years. CD-R's, with actual gold in them which is one of the most reflective robust elements on earth. Gold based cd's do not degrade from oxidation and last longer than mass produced CD's that use aluminum (looks silver) as the metal recording surface (aluminum corrodes faster). Microfilm, on the other hand, measures its life span in centuries when properly produced and stored. Will you and I still be using the current generation of CD's in 25 years? or even 5 years? How will you transfer your precious images to the next generation media if needed? Why not use the high resolution images contained on microfilm that you have safely stored away? With FicheNet Imaging Solutions [ArkScan](#) technology you can go ahead and use today's electronic imaging technology and have piece of mind knowing a high resolution eye readable microfilm archive exists for conversion to the new technology, whatever it turns out to be. Will you allow your images to go the way of the 8-track tape, 8-inch or 5 1/4 floppy disk? Don't mention the zoo of tape standards. By the way, microfilm and CD-R's, which we record your documents on at FicheNet Imaging Solutions, are not affected by magnetic fields. Visit our [Storing and Caring for CD-ROM and DVD-R's](#) or [Storing and caring for your master microfilm](#) pages for more information.

## Legalities of Film Based and Electronic Imaging

### Film Based Imaging/Microfilm

A microfilm image has been for decades, and still is, a certified legal copy of a document, once the original is gone (the standard practice in micrographics is to destroy the documents once they have been microfilmed - FicheNet Imaging Solutions has the paper hydropulped and recycled).

All government agencies and courts accept microfilm images as if they were the original (again, if the originals are gone). There is good reason to have this trust in microfilm. To this day, it is virtually impossible, or at least cost prohibitive, to alter a microfilm image in a way that is undetectable. Once microfiche has been imprinted, it is unalterable and cannot be changed. Can you say that about a scanned image? Not without a rather sophisticated coding or encryption scheme implemented. Even then, certain sophisticated computer hackers are sometimes looking for new challenges. Do you want the only form of your data to be their challenge?

### Electronic Imaging/Scanned Images

Are scanned document legally accepted?

In the United States, two uniform laws clearly establish the basis for admitting records maintained on document imaging systems into evidence: The Uniform Rules of Evidence [US 128-0060-00 to 0170-00] and The Uniform Photographic Copies of Business and Public Records as Evidence Act (UPA) [US 1128-0020-00]. Both laws would admit duplicate records into evidence if they accurately reproduce the original. The document imaging technology is a duplication technology similar to photocopies, microfilm and facsimile. The four best-known reproduction techniques - photocopy, microfilm, facsimile and electronic image management or document imaging - exhibit the same three characteristics.

**Image Capture.** A photographic, scanning or other process to identify and capture the image of the original document.  
**Image Manipulation.** A photographic, electronic, photostatic or other process that transforms the captured image into a format for storing and reproducing the image.

**Visible Reproduction.** A photographic, photostatic, printing, or other process that converts the manipulated image into visible form. A document imaging system, for example, utilizes an electronic scanner for image recognition, computer software, memory and optical disk storage for image manipulation and graphic terminals and laser printers to make the image visible. An document imaging system is therefore similar to other reproduction technologies.

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State agencies usually write their own regulations to implements records archival laws. This data is much to extensive for FicheNet Imaging Solutions to list here.

### For current CA State Laws about electronic imaging contact:

State Archivist California State Archives  
1020 O St., Sacramento CA 95814  
Reference Desk: (916) 653-2246  
General Information: (916) 653-7715  
FAX: (916) 653-7363  
E-Mail: [ArchivesWeb@ss.ca.gov](mailto:ArchivesWeb@ss.ca.gov)

or try [CalRIM](#) - California Records & Information Management

If you are not in California you will need to consult the appropriate officer at your State Government office for information.

Continued on page 9...

...Continued from page 8

### Some Regulatory Compliance Links

- [HIPAA](#) - Health Insurance Portability and Accountability Act (HIPAA) of 1996, Public Law 104-191
- [Sarbanes-Oxley](#) - The Sarbanes-Oxley Act (officially titled the Public Company Accounting Reform and Investor Protection Act of 2002 and commonly called SOX and Sarbox)
- [Paperwork Reduction Act](#) - Paperwork Reduction Act (44 U.S.C. 3501 et seq.)

### More Standards Links

- [AIIM](#) - Association for Information and Image Management
- [ARMA](#) - Association of Records Managers and Administrators
- [ANSI](#) - American National Standards Institute
- [ISO](#) - International Standards Organization
- [NSSN](#) - National Standards System Network

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## Have Your Film and CD's Too!

If microfilmed images exist of your scanned documents, you can always verify a scanned image against the microfilm. FicheNet Imaging Solutions exclusive [ArkScan](#) technology offers both image files on CD and a 16mm roll microfilm\* archive of your business documents. Also, a simple to complex index can be provided, in your required formats such as .DBF .MDB .TXT , etc., on removable disks or CD/DVD. This index can even be filmed and be part of your film archive. FicheNet Imaging Solutions custom Barracuda Image Retrieval Software can be tailored to meet your needs. We at FicheNet Imaging Solutions can even name the image files themselves with the indexes, in some cases, so a CD can just be browsed in Explorer or an open dialog box to find your documents.

TIF files - If you have Windows 95 OSR2 up to but not including Windows XP, a double click in Windows Explorer® is all it takes to be viewing your document images. Early versions of Win95 and Windows XP users will require the purchase and install of a the program "ei Stream Imaging for Windows" (it is the same program, however for some reason Microsoft did not include this program on Windows XP.) Microsoft Explanation is [<HERE>](#) and this program can be downloaded [<HERE>](#) The program cost is around \$169.00 US Dollars.

PDF files - can be easily read by using Adobe Reader available for free. Barracuda Image Retrieval Software does not work with pdf files.

Get Acrobat Reader 

\*105mm microfiche archive available at slight additional cost.