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ABSTRACT

Preservation efforts for an increasingly digitally oriented future have turned to advanced and improved methods of preservation on microfilm, which has a life expectancy of more than 500 years when properly prepared, stored, and managed, and can support a wide range of digital access systems. Computer controlled cameras can provide significantly higher resolution than cameras previously used for microfilming materials. High resolution microfilm can be easily scanned into digital formats, retains more resolution than current scanning technology can capture, and precludes a dependence upon a fast changing digital environment. Another critical factor for easier and higher quality scanning is narrow film density range. In addition, continuous tone filming (CTF) process successfully captures continuous tone images of photographs, negatives, prints, and heavily illustrated materials and adheres to preservation standards. Vendors of preservation filming services have focused recent service enhancements on reducing the cost of putting material on film. However, the preservation reformatting goal of every library, archive, museum and historical society needs to be to prepare preservation microfilm for the digital present and future. To simply reformat endangered materials into a form resistant to scanning or one that complicates scanning is a serious disservice to scholars and researchers of the future. (Author/SWC)

The Commission on Preservation and Access

ED 403 911

PRESERVATION FILM: PLATFORM FOR DIGITAL ACCESS SYSTEMS

by
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This report is one of a series exploring new technologies for preservation and access. Previous Commission publications on film and digital technologies include: "Opto-Electronic Storage – An Alternative to Filming?" by Dr. Hartmut Weber, in *Commission on Preservation and Access Newsletter*, February 1993; *A Hybrid Systems Approach to Preservation of Printed Materials*, by Don Willis (November 1992); *Electronic Technologies and Preservation*, by Don Waters (June 1992); and *Preservation of New Technology. A Report of the Technology Assessment Advisory Committee* (October 1992).

The entire world of scholarship and research, with significant leadership from the library community, is committed to the belief that our information future will be far more digital than it is even in today's environment, replete as it seems to be with computers and telecommunication services. A month does not pass without some development which promises to help manage our burgeoning databases more effectively, provide easier access to their contents, or provide more compact storage or high transmission speeds and greater transmission band width.

In this context, a growing group of professionals in libraries, archives, museums, historical societies, and similar organizations are equally committed to finding the most efficient ways to preserve that information created in the past which is in danger of loss through embrittlement of the medium upon which the information is recorded or through intensive use of the medium. Most of the attention has been directed toward preservation of the printed word, though graphic images, photographs, negatives, and prints are receiving increasing attention as is information preserved in magnetic and optical media. These preservation efforts are intended to preserve information for future use, a future, as noted, which will be increasingly digitally oriented. Hence, the preservation medium selected must have the capability of supporting a wide range of digital access systems.

Initial preservation reformatting efforts were focused entirely on microfilm as the medium of choice. For the last ten years or more, attention has been directed at the potential alternative media might have for preservation purposes. Rigorously precise studies indicate that the 500+ year life expectancy of microfilm, when properly prepared, stored and managed, far surpasses any other medium in terms of

longevity and ability to accurately reformat information. No other technology is yet in a position to challenge film as a preservation medium for print on paper materials. While it is useful to continue the evaluation of possible alternatives, the majority of the preservation community continues to view microfilm as the only truly long term preservation alternative.

The equipment used for most preservation filming since its inception in the mid-1930's has been the Kodak MRD line of cameras. This workhorse of the preservation filming community was not significantly altered during its 50+ years of service. Indeed, and now unfortunately, the preservation standards specific to filming, including the RLG Guidelines, have been established with the MRD cameras in mind. In fact, the standards push the operating limits of the MRD. This becomes particularly important in the area of resolution where the minimum acceptable resolution for preservation purposes is 120 lines per millimeter. If we are serious about preparing our preservation film for the digital future, we must reach beyond that minimum in order to capture as much detail as possible.

Late in 1989, Kodak announced that it would no longer manufacture the MRD and would not replace it with any alternative 35 mm microfilm camera. Bad news for the preservation community. However, there are alternative cameras for the high quality required to capture images for future generations.

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Firms such as Gratek (England), Elke (England), Zeutschel (Germany), and Schautt (Germany) all produce cameras superior to the MRD. Probably the premier example of alternative cameras is a small firm in Garmisch-Partenkirchen , Germany, Herrmann & Kraemer, which builds its own cameras in order to achieve the quality results they expect. As Kodak abandoned the 35 mm camera field, Herrmann & Kraemer began to manufacture cameras for sale. The Herrmann & Kraemer (H&K) camera is an order of magnitude superior to the MRD and to many other competing cameras as well, though there is a premium in terms of price to be paid for this quality. It is a computer controlled camera with incredibly fine adjustments for illumination, reduction, exposure time, all coupled with the finest optics available. Resolution, even when not completely adjusted, is 40% better than the MRD and with some careful tuning, can produce resolutions which are more than 60% better, in the 200 lines per millimeter range.

The importance of high resolution film is based on the rule of 25.4. There are 25.4 millimeters per inch. Scanned resolution is evaluated in dots per inch. Scanning at 1,000 dots per inch sounds like wonderful resolution until one divides that 1,000 dots per inch by 25.4 to produce a comparison to film resolution. The result, for those of you without immediate access to a calculator, is just under 40 lines per millimeter! Those who would suggest that we need to scan first, run up against this 25.4 rule very quickly. If they can scan at 1,000 dots per inch, and few can at this stage, the conversion to film, which can be done, will produce a film resolution of less than 40 lines per millimeter. On the other hand, film of 200 lines per millimeter is the equivalent in inches of over 5,000 dots per inch (200 times 25.4). Thus, the preservation community, committed as it obviously is to preserving our intellectual heritage for future use, needs to make a commitment to high resolution film which can be easily scanned into digital formats, retains more resolution than scanning technology can presently capture and precludes a dependence upon a fast changing digital environment that can leave pioneers with the unfortunate and expensive task of recapturing information in the next digitally based technological innovation. For these reasons, the preservation community must opt for the highest quality microfilm that can be produced.

A second factor which is critical to facilitating scanning of preservation film for digital access systems is the issue of density variation within a reel

of film. Preservation standards allow a relatively wide range of densities on a reel of .20 density points. However, the narrower the range of densities on a reel, the more readily it can be scanned without making adjustments for swings in density. There is at least one system that is specifically designed to produce preservation film with narrow density ranges, ExpoSure™ developed by MAPS The MicrograPhic Preservation Service, Inc. A US patent was awarded for ExpoSure™ in 1992 and it has resulted in even higher quality preservation film by coupling the high resolution inherent in the H&K with extraordinarily narrow density ranges (often less than .05 density points) on any given reel of film. These two characteristics, high resolution and narrow density ranges, resulted in film that is far more easily scanned into a variety of digital formats. Anecdotal evidence suggests that film with narrow density ranges and high resolution can be scanned with significantly fewer adjustments during the course of the scan.

Normal microfilm is a high contrast recording medium that was never designed to capture halftone or continuous tone material, photographs, negatives, prints, and heavily illustrated printed material. But, it is possible to link the capabilities of the new high resolution camera to a newly available continuous tone filming (CTF) process that successfully captures continuous tone images with great fidelity and adheres to all preservation standards. Continuous tone filming is not new, but previous techniques either used non-preservation film bases (acetate) or suffered from loss of resolution both during original image capture and during duplication. CTF technique suffers from neither of these limitations. Resolution occasionally exceeding 200 lines per millimeter is achieved using this technique. While there is some loss of resolution during duplication, it is often not measurable; that is the resolution as measured from the standard test target remains the same. One measure of quality is that third generation CTF images have been taken to a reputable photo shop and high quality paper prints produced.

The preservation community now has a range of options available in order to prepare preservation film for digital access systems. Cameras of superior quality are available, though not widely deployed as yet. Part of the reluctance to deploy new generation cameras is their cost and the lack of active demand for higher resolution. Further, as long as the acceptable density range for preservation film is as broad as it currently is, we are preparing film that will require constant adjustment during scanning operations, adjustments which will force the cost of such scanning to rise. Until the market, that is the preservation reformatting market, demands higher quality, it will be less widely available than it is now.

Digital access systems are proliferating and can be found in nearly every institutional venue in which preservation programs also exist. Some film to paper printers use scanning technology to capture the image before it is transferred to paper. Film of primarily textual material is being scanned into CD-ROM products and as the quality of film improves and more heavily used material is filmed, more and more CD-ROM products will be produced from film. CTF film has now been shown to produce superb images using Kodak's Photo CD system, from which images can be captured by any number of software programs for distribution on floppy disks or distribution over a telecommunication network. This brand new option for preservation quality graphic images promises to open completely new access systems for graphic and text images.

The importance of high resolution film is based on the rule of 25.4

Vendors of preservation filming services have focused their recent service enhancements on ways to reduce the cost of getting material onto film by offering prefilm search services, material preparation, print master storage, post film cataloging, etc. All of these services have an essential role in seeing that the most material is reformatted with available resources. However, we often lose sight of the objective, serving the information needs of the future, and concentrate on doing things as quickly and cheaply as possible now. If those current decisions result in preservation products that serve only immediate needs and fail to serve the longer term information needs of the future, our decisions will be viewed as very expensive ones by those who follow us.

The preservation reformatting goal of every library, archive, museum, and historical society needs to be to prepare preservation microfilm for the digital present and future. We can not afford to preserve materials more than once. To simply reformat endangered materials into a form resistant to scanning or one that complicates scanning is a serious disservice to scholars and researchers of the future.

The Commission on Preservation and Access is a private, nonprofit organization acting on behalf of the nation's libraries, archives, and universities to develop and encourage collaborative strategies for preserving and providing access to the accumulated human record.

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