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If You've Been Told Your Film Is "Extinct," Maybe You Need A Second Opinion

by **Tim Knapp** (President, Reflex Technologies, Burbank, CA 91502; Phone: 818-859-777) <tim@reflextechnologies.com>
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When you open a can of archival film and smell "vinegar," you're smelling the cellulose acetate film base decomposing; chemical degradation of film base is an irreversible process.

The Acetic Acid in the film base can react with the gelatin in the image layers and the dyes (in color film) causing the emulsion to soften and the image to deteriorate. Vinegar syndrome can cause "cloudiness" on the image; over time, it can make film sticky — so it's difficult to unwind — or brittle. The film will also shrink — and at different rates — more at the outer edges and less in the center, with individual frames becoming cupped or curved. Poor storage conditions or poor handling procedures can aggravate the situation.

The result is that some archival film is in really distressed condition to the point that others consider it "extinct," meaning it's beyond extracting useful images from it. At **Reflex Technologies**, we have more than a century of film experience on staff — and we simply couldn't accept the fact that films carrying unique visions from the past would never be able to be viewed by future generations. And we believed that archivists couldn't accept that either.

At the same time, we knew that highly-deteriorated film should be handled as little as possible; it should be digitally scanned once and returned to the vault, which means the scanner should capture all the information it might ever need and do it in such a way that it did no damage to this often-fragile film.

When we found that the scanner we needed wasn't available, **Reed Bovee**, our chief engineer, set about to invent it. He started from a filmmaker's point of view.

Most current scanners are largely refinements of what's been available before; ours involved rethinking the entire process from the first principles. Others do a fine job on well-preserved film; we designed ours to handle film in the most distressed conditions

imaginable. Others improved small things, but we wanted to improve *everything*. It took five years, but we have multiple patents for the new technology.

The **Reflex** scanner is really seven different systems coexisting together. There is an air-handling system, a self-tensioning system, a film drive system, an imaging system, an illumination system, a data output system, all controlled by a software system and all in a durable enclosure with lockable, air-tight doors through which operational components can be accessed and serviced when needed. We can take any film in any condition and we can scan it and deliver the end results in a way that has fewer artifacts than any other scanner in the market.

The SmartGate replicates a film camera gate, so even if a splice is misaligned, the gate is able to compensate for the variable film width and hold the film steady. If the film is twisted, the aperture plate is long enough to hold it flat while it's being scanned. The aperture opening is oversized so the film can be scanned beyond the edge of the image to compensate for the fact that in every film camera the aperture relative to the film is in a slightly different position. With this ability to scan full frame or full aperture, we can also record edge code information or even soundtrack information because those are contextual elements that often need to be recorded to be faithful to the original film.

Archival film is often shrunken, which means the perforations may be progressively out of alignment and sprockets would tear the film as it passed over them. We use an optical sensor to detect the perforations, and we trigger off the trailing edge of the perforation, which tends to be more pristine than the leading edge. With a sprocketless drive, we can handle film that has shrunk up to 20 percent. We transport it with continuous motion, using only one

ounce of force over special silicon O-rings on a precision shaft, so there's less stress on brittle film.

The very high-resolution camera has a "global shutter," which means that every pixel fires simultaneously. There are no mirrors, filters, or prisms — nothing but air between the film and the lens. And for illumination, we're using an LED strobe unit that provides high intensity with low energy, absolutely uniform flash-to-flash consistency, and very stable color temperature.

The unique **Reflex** scanner provides un-compressed and compressed video files in AVI, MOV, WMV, RM, and others and full resolution stills in BMP, JPEG, JPEG2000, TIFF, DPX, and other formats. The original film can confidently be returned to the vault, while the images it contains can be made more "useful" by making them more "accessible."

So far, there has been no film that the **Reflex** scanner couldn't handle, including those that were "potato chip brittle" and others that were shrunk and twisted and missing perforations. But while the scanner was built to handle the "worst of the worst," it can also produce exceptional results scanning the "best of the best." There is no scanner that's gentler on film or comes closer to replicating the image quality it contains. Even films smelling of acetic acid. 🌿



*If you want to see the **Reflex** scanner, ask questions, have a discussion, see examples of our work, or get more information, visit www.reflextechnologies.com or call **Tim Knapp**, President, **Reflex Technologies** at 1-818-859-7770. We understand digital, so you don't have to. But we're filmmakers at heart; we share your passion for making your archives useful.*

As President of **Reflex Technologies**, **Tim Knapp** brings more than thirty years of experience in the motion picture industry. Prior to moving to Hollywood, **Tim** held technical roles in product development, product engineering, and quality management at **Kodak** in Rochester for 18 years. While in Hollywood, he managed production, post-production, and distribution areas of the imaging business for **Kodak**.

Tim joined **Reflex Technologies** after serving as Vice President, Sales and Marketing at **Technicolor Entertainment Services**. His **Kodak** and **Technicolor** experience has given him a unique and solid foundation in all aspects of film and digital imaging technology.

He is an Associate Member of the **American Society of Cinematographers**, an active member of the **Association of Moving Image Archivists**, and a member of the **Society of American Archivists**. **Tim** and his family live in Thousand Oaks, CA. 🌿

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there in 1990 and 1991. I remember meeting **Anthony Garnett**, a rare book seller and friend of **Chuck Hamaker**. **Anthony** showed us his huge elegant house which was really a bookstore. That's when I met the wonderful **Mr. Howard Lesser** and **Jay Askovich**!

Amazingly the **Charleston Conference** lives on into its 35th year! Meanwhile, this issue of **ATG** includes a review of a book by one of our main 2015 keynoters, Professor

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