

Taking 8mm Film to Hi-Definition

by Philip Vigeant



The most exciting thing about Super-8 in hi-definition is how well the material can hold up to larger screen sizes. For anyone who has seen 8mm with traditional projection, you know that the material can look very good blown up. At home when we were growing up, we had a very nice 6-foot screen that in a dark space could easily handle a projected 8mm image with great color, contrast, and sharpness. So why do these films that look so great on film look so marginal when you blow them up on a large screen such as a 40" plasma from a DVD?

To begin with, the resolution of the original 8mm film is closer to the 1920 x1080 lines of today's hi-definition than it is to standard definition video. How do I know this? Well, without being that scientific, simply by projecting a Super-8 film to about 6 feet next to a video projection of the same size. With the same image, anyone can easily see a huge difference. I then took a hi-definition scan at 1920 x1080 of the same Super-8 film and put it on a 50" plasma screen and compared it to the projected Super-8 image at the same size; it looks very similar.

Not until you experience 8mm in 1920 x 1080 digital resolution does it become crystal clear that the problem is not with the quality of the 8mm... but it's the scanning techniques and digital storage capacity. If you scan 8mm film to standard definition, you then have to digitally blow-up the video to get a larger picture. It makes sense that if you take a high resolution image like Super-8 and down-rez it to a low rez medium like video and then try to blow it back up to a higher rez screen like plasma, it's not going

to look that good. If you scan the image at 1080 you can capture the full resolution of the image and can then display that resolution on an HD monitor. Looking at 8mm film in hi-definition on a flat screen, you feel the true quality of the original and can experience the footage for what it is and for what it would look like projected as film.

If you're going to begin a new project for the flat screen market with Super-8, you may also want to consider the aspect ratio of your original. Super-8 was designed to be a 4:3 "square" image like traditional television. Flat screens are 16:9 rectangles. To produce Super-8 for this aspect, it is best to use a wide-screen Super-8 format like Max8. Max8 uses all of the film area available on a Super-8 film from the edge of the film to the sprocket to create a rectangular Super-8 master image. Starting with a rectangle makes it much easier to create correct framing for flat screen presentation.

If you already have a Super-8 archival image or want to film in traditional Super-8, you have a decision to make. You can scan to HD using a pillar box technique so that the full image on your film is in the center of the wide screen frame with matted sides. Or you can blow up your image so it

fills the wide-screen. This method will require either the top or bottom or both be cut so the square original can fit into a rectangle. Regardless of which method you pick or if you start with Max8 or not, it will all be amazingly crisp and clear in hi-definition.

Hi-definition means a lot more pixel information per frame—about 4 times the information of regular video. With this additional information capacity you can store more colors and greater degrees of contrast. But getting all the quality that your film has into digital takes a little doing.

The RANK M2 SCANNER and DA VINCI 2K:

Contrast and Color Correction:

The exposure of every scene on a piece of film will vary dramatically. Under-exposed film will have much of the shadow area crushed, over exposed will have much of the highlight blown out. The color in the original film is often wrong due to fading or incorrect original



Above: Shot with Max8 (a prototype modified Canon 1014) on Fuji Vivid 160 Tug. Neg Below: Same shot scanned and "zoomed to fit" a 40" plasma screen TV on Pro8mm's M2.



exposing. Even if the film is perfect, it is not perfect for digital. When creating digital from film you have to manipulate the process to maximize the look film has. Film has a much broader scale of contrast than digital—so much so that even poorly exposed film images can be manipulated to create good looking digital images. This is accomplished using various tools defined by the scanner and the color corrector. One such tool is the daVinci Color Correction system.

Because there is so much that can be done with the information, scanning

for a particular shot. The system is frame accurate so that hundreds of adjustments can exist for one scene and then with the cut to the next scene can all be change. The adjustment can also be programmed to change gradually and dissolve from one place to another. This is very complicated work and takes a lot of skill and training to be able to operate all these corrections and do it with the speed that is required to be cost effective.

Scene to scene color corrected transfers will produce the best results a film has to offer. It is the preferred way to archive film as well as getting the most from a new project. But if budget is a major consideration, film can also be transferred one light. In a one light transfer a general correction is set by playing the film for a time and getting an average adjustment for that footage. Then

the entire roll of film is transferred with this one correction as a base and adjustments on the fly up and down from this point; the operator can make minor adjustments as the film is being transferred.

The third type of transfer is a supervised session. During a supervised session you the customer can be present to dictate to the colorist where to spend time in the transfer, or you may want to create a distinct “look” for the footage. “The look” is a complex set of aesthetic decisions that culminate into a unique feeling for the footage.

Because the colorist has so much control over how film will look on digital, these skills can be put to work not only to fix but to create. Creating a look can be done using other mediums such as matching to

a still image. By sending in a still image to emulate during the transfer a colorist can match as best as possible the aesthetic zone. Often the look is created with just simple instructions such as: make the image flat or super contrasty; blow out the whites or crust the blacks; make it look like the 70’s old film, or as clean and colorful as possible. Transfers are often supervised for this reason because the director or cinematographer needs to see the film on digital and view the possibilities in order to make a decision. A supervised session is also a great place to learn more about film. It is an advantage for you to know as much as you can about these processes, but regardless of your session type, the transfer must be done by a skilled professional. However, your informed input will help you to get just the look you want.

Transfer Speed:

Most professional film is shot at 24 frames per second. Most amateur film was shot at 18 frames per second. If you want the digital playback to have corrected motion, you must have the playback speed equal to the shooting speed. It is critical to tell the facility doing the transfer what speed you would like the film scanned at. If you don’t know what speed it was shot at, ask for a transfer at real time or at speed and the person doing the transfer will do their best to figure out what speed that was.

It is often critical to understand how film frames are converted to video frames for a given project. For this precision, another computer is used called a TLC (Time Logic Controller) and it is interfaced with the Meta Speed and the Scanner. Time Logic is very important in advanced film projects such as theatrical releases and more and more common with hi-definition work. Different formats and recordings types are used by different industries. If your materials might be used in a theatrical application 23:98 pfs would be used as it is the digital equivalent frame for frame and allows for easy return after editing back to film. In addition you might



Above: Filmed with Max8 Below: Same shot zoomed to fit.



is done typically done in 3 different ways: scene to scene, one light and supervised. A transfer done scene to scene is one in which an operator (colorist) will preview every shot on a roll of film and perform exposure and color corrections for each shot. These corrections are loaded into a computer that, when the film is played back, will adjust the result so that the digital image created from the film is as good as it can be for every shot. The computer is part of the daVinci 2K Color Correction system and can store 1000 scene changes and unlimited amounts of adjustments



Above: *The original film shot in 4:3 ratio on Kodachrome 40.*

Below: *Same shot reframed to hi-res ratio of 16:9 and zoomed to fit 40" plasma screen.*



need a Dual Sync Master; one in HD and one is SD that has precise time code relations so that an edit in one standard can be easily transferred. Time Logic controls these functions so that field accuracies can be maintained.

Framing:

With the advent of HD comes the great shift away from the 4:3 framing used by television for decades to the wide-screen images of 16:9. Framing is a great challenge for today's filmmakers because you have to predict where or how your project might be shown to maximize the quality. Theatrical films have been using wide screen for many years. Now we have the 16:9 dilemma for television. Televisions today support flat panel displays with 16:9 framing. This is a decision you need to make before you arrive at the transfer. All transfers made in standard definition have to live in the 4:3 space of SD. This can be manipulated by using anamorphic squeezing or matting the top and bottom to create a widescreen image on a 4:3 platform. In HD all transfers have to be in a 16:9 platform.

You do have the option of putting a 4:3 image in the center of the HD and matting the sides. Making this whole thing even more exciting, you can shoot film of different aspect ratios. 16mm, 8mm and Super-8 are 4:3 aspect ratio mediums. They can be expanded to either Max8 for Super-8 or Super16 for 16mm for a widescreen aspect ratio—for Max8, 1.58 aspect ratio, for Super16, 1.68. Both are wide but still need to be blown up slightly when making a perfect 1.78 (16:9) image.

If you have the option of shooting in the wider format, you can get a much higher quality result because with Max8 or Super16 the cameras have correct framing for 16:9 viewing and the blow-up needed to fill the 16:9 space is much less. If you do the math, Max8 gives you 20% more usable image over Super-8 when framing for 16:9.

One of the most important parts of the new M2 system is the new Max8 gate. This component was specially designed so that the optical center would cover the entire filmable area of an 8mm piece of film. The gate uses a prime lens optic to exactly match the Max8 format to the pick-up area of the scanner. It uses a compressed air filled chamber to support the film center during scanning so that no surface touches the film's emulsion and a flat scanning field can be created. In older scanners the only way to get a flat field was to put the film under tension. The new Max8 gate achieves this without the added stress to the film. In addition to handling Max8, Super-8 and Regular8 can be scanned.

The M2 scanner is equipped with digital scan control which allows for full X-Y & Z framing of any film. The frame can be moved left to right up or down in or out, rotated and

even flipped. This gives the colorist full control over the resulting frame achieved from any given frame of film. The framing is also a programmable function in the da Vinci 2K so that different framing can be set for different shots. The framing can also be transitioned during a shot to pan, tilt or rotate.

There are other aspects of transferring Super-8 to HD that you may want to ask about before you submit your film to a transfer agent.

You may be interested in Y-Front technology (a way of diffracting light through the film that makes scratches and dirt less apparent). Another facet worth noting is possible aperture correction, which may improve a film's sharpness.

Putting It All Together

The most important function of the transfer suite is to bridge the world of traditional Super-8 with the world of video, digital and now hi-definition. With these bridges filmmakers can use Super-8 in all modern visual application. If you plan ahead when filming, you can be prepared to go HD successfully.

Philip Vigeant, owner of Pro8mm, has extensive experience in every aspect of regular 8, Super-8, and 16mm film development, correction, and digital transfer.

*The company website is
www.pro8mm.com.*