

Digital Int

a bridge to Digital Cinema

The digital intermediate process is growing rapidly as a 'starting point' for digital cinema, film, and home video output. A highly-regarded industry expert, Glenn Kennel, Senior Vice President and General Manager, Feature Film, for LaserPacific Media Corporation talks about what's involved.

Film



Digital Files



Video Tape



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files that come from the emerging cameras that have data storage, we can pull the files directly into the digital intermediate process. With our DI process, everything exists as digital files, so that becomes the equalizer.

On what happens next

In our process, we scan everything at 4K but then most of the time we conform and finish at 2K. At LaserPacific, we take pride in the quality of our color calibration, our color science, and in getting the highest quality image into the DI. So, for example, by scanning at 4K and converting to 2K, we get a sharper cleaner picture because we are over-sampling the original images and generating a very high quality 2K. Others who scan directly to 2K are not getting everything that may be on the original.

On the creativity of the digital intermediate process

In a traditional laboratory process, all you had control over were the Red, Green and Blue (RGB) printer lights. You could make a shot darker or lighter, or change its overall color - but that

On what a digital intermediate is

The Digital Intermediate (DI) process is a specialized form of the 'mastering' process. The original mastering process, which has been in use since the late 1970s when movies began to be prepared for home video distribution, was based on tape and traditional telecine equipment. Today, the DI process involves assembling, conforming, which is to say, cutting everything together based on instructions from the editor, and color grading files in a computer-based file system. The output of that process is a film internegative for release printing, a digital cinema master, and a HD home video master.

On how it begins

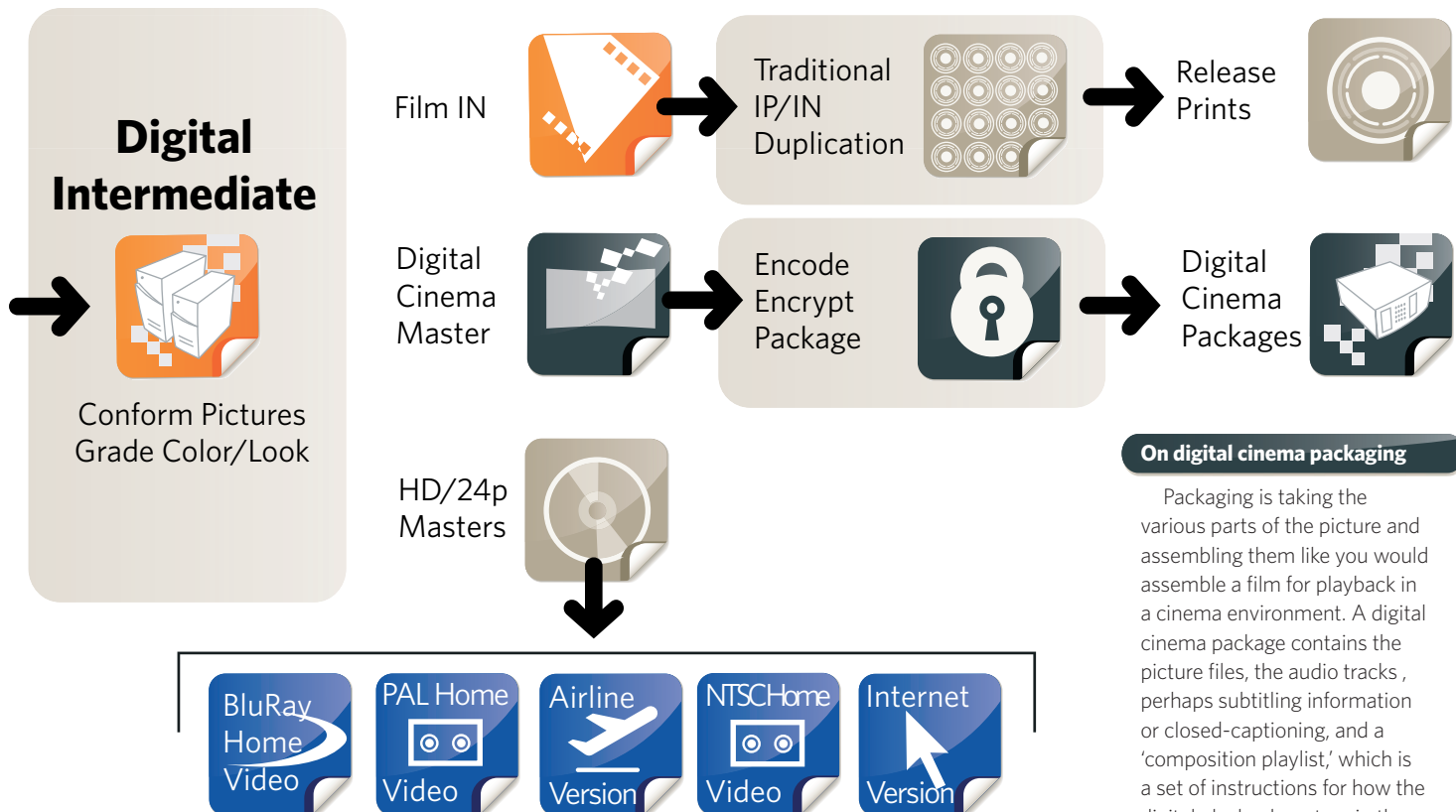
The process can begin with film, with digital files, or with video tape. But our starting point is the Edit Decision List (EDL).

So, with film, we go back to the original camera rolls, pull out the Keycode information, put the camera original on a scanner and turn the selected frames into digital files, which then go into the digital intermediate process.

If the original is video tape material, it's just a matter of translating the EDL back to timecode of the original tapes, and loading those tape shots into a file system. Or, if we begin with



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change had to be applied to all frames in the shot, and it was applied to the whole frame. With digital tools, you can adjust color of course, but we can also adjust contrast or sharpness. And we can do it all in any number of frames or even in a local area of a frame.

On the acceptance of the digital intermediate process

This transition from traditional film finishing to digital finishing has happened very quickly. Five years ago, maybe 10 percent of the movies were finished digitally; in a few years, it will be 100 percent. Because, with one process – digital intermediate – we can deliver film for a film release, we can deliver a digital cinema master for screens with digital projection, and we can, with just a small amount of extra work, create an HD master for all the home video formats. So it's a one stop shop. And frankly, we're delivering a higher-quality product

and a more consistent product across all those venues; film exhibition, digital exhibition, and the home market.

On encoding the file after the DI process

For digital exhibition, we start with a Digital Cinema Master and we encode it. This involves converting it into the color space used by digital projectors and compressing it using JPEG2000 compression technology. JPEG2000 is the digital cinema standard because the 'digital cinema package' can contain both a 2K layer and a 4K layer, so it can play back on a 2K or 4K digital projector.

Compression is reducing the size of the digital cinema package so you can transmit it more efficiently. The trick is to do it in a way that doesn't reduce the quality of the

picture. Motion pictures contain lots of redundant information, so if you're smart about the way you reduce the number of bits, you can still represent the picture on the big screen without losing quality.

On encrypting the digital cinema master

Encrypting is scrambling the bits for security to ensure that the frames can't be copied and distributed unlawfully. To 'open' an encrypted file, you require keys, which allow the decoder to descramble the bits and reconstruct the picture. A lot of thought has gone into the architecture of the playback system so the digital cinema package can only be opened and displayed on authorized systems. Without keys, the package is worthless.

On digital cinema packaging

Packaging is taking the various parts of the picture and assembling them like you would assemble a film for playback in a cinema environment. A digital cinema package contains the picture files, the audio tracks, perhaps subtitling information or closed-captioning, and a 'composition playlist,' which is a set of instructions for how the digital playback system in the cinema should assemble and play all that. And, because the industry has standards for how those packages are assembled, the finished package can be loaded and played on any industry-compliant server.

On the future

This digital intermediate process is both creatively and practically driven. The typical DI color grading session takes 80 to 120 hours and I don't expect the time frame to get much shorter because creativity expands to fill the allotted time. We could grade a movie digitally and make it look every bit as good as it did in the traditional lab process in a few days. But nobody is happy doing that now because they know they can do so much more. And, at LaserPacific, we're doing a lot more in digital color grading than we ever used to, work that used to be handled in an effects facility.