

## HD Acquisition for SD Television –the role of Finaliser

For many years, film has been used as an acquisition medium for television. Despite the availability of good quality SD cameras and reliable tape formats ranging from digital Betacam down to DV, film is still often the preferred route. The reasons for this fall into several categories:

- 1.Desire for the Film look.
- 2.Increased resolution offering more freedom with shot selection later in the post production process.
- 3.Increased dynamic range allowing more freedom in later grading before transfer to tape

We will analyse each of these reasons and show that HD acquisition offers equal or better results when handled in the correct manner.

### ***The Film Look***

What is the film look?

A combination of factors make up the film look. Using a progressive frame camera is one of the most significant factors. Progressive images look very different to interlaced ones, where motion is 'Filmic' rather than 'Alive'. Most or all SD electronic cameras can only operate in interlaced mode. The tape formats will record progressive images but the cameras won't deliver them! The only practical way to achieve progressive shots is to post-process the images to 'de-interlace'. This is time-consuming and expensive and gives certain resolution and/or motion artefacts. Shooting on film naturally yields progressive images at the highest resolution.

All HD cameras offer Progressive OR Interlaced modes of operation. The HD Standard offers both P and I variants. This is confusing as a progressive camera will happily output its images on an HD serial cable running in an I standard. This mode of operation is now known as PSF (Progressive Segmented Frame) and is the same as 'old fashioned' video in the SD world when the images conveyed are progressive.

In conclusion:

HD camera acquisition offers the same temporal benefits as film.

### ***Resolution Issues.***

People argue about the actual resolution that film has in terms of equivalent pixels. The final result as displayed on television has a resolution of 720x576 pixels in Europe and 720x484 in USA. Pillarbox wide-screen formats reduce the vertical resolution further. A 35mm negative would certainly have information present at a resolution of 2048x1536 and possibly as far as 4096x3072. In theory this means that a zoom of  $4096/720 = 5.6$  is possible. However, grain effects will limit this to 3 or 4 times at the most. HD offers a resolution of 1920x1080. This offers a zoom capability of 2.6 with no grain effects. This zoom capability allows the active area to be selected during the post process. For example, a boom in shot can be removed, camera pans adjusted and shots stabilised. To achieve this, zooms of little more than 2 are required – well within the capabilities of HD.

## **Colour Depth**

The SD world offers 10 bit colour difference as means of conveying and storing images. During the grading process different amounts of gain are applied to achieve the desired results. The noise on the signal will often increase as a result. Subtle hue changes may become 'steppy' as resolution limits are reached. The same issues ultimately exist at any resolution. However, within a given area of the final image, the amount of information conveyed is proportional to the sum of all the pixels within that area.

For an HD image, down converted to SD the area change is  $(720 \times 576) / (1920 / 1080) = 0.2$

This causes the effective pixel depth per unit area of the image to increase by  $(1 / 0.2 = 5)$

There is therefore five times the dynamic range to play with during the grading process. This puts HD on a level playing field with an SD telecine with 12 bit ccd array.

## **Benefits of HD acquisition**

HD acquisition is competitive in these three areas. Now we should look at the advantages of HD over film or SD tape.

### **Lower noise.**

Although CCD cameras exhibit a degree of noise there is no grain. This offers a cleaner image – better for keying and colour-correcting.

### **Lower noise operation at low light levels.**

CCD array cameras offer a wide range of effective shutter speeds. The resolution and colourimetry remains largely unchanged even at low light levels. In contrast, The behaviour of film changes with different light levels, hence the need to change the film speed to compensate for different lighting conditions

### **Immediate results and verification of source**

Working in HD allows an almost instant replay of the recorded work. No waiting for reels to be developed, no rushes and no interpos prints.

### **Lower cost of media**

No developing costs. No expense of bringing back talent for re-shoots.

## Lower transport costs

Often overlooked when preparing the budget for film work are the costs associated with developing and viewing at different locations. This is often not budgeted in the 'cost of film'.

## Reasons for the reluctance to adopt

The Market has been slow to move to HD acquisition. A major factor has been the apparent increase in costs associated in the post production process. This has been due to manufacturers forcing a premium on to HD equipment.

There is now little technical reason for much cost difference between SD and HD systems – other than on storage based applications.

Typically the only HD-capable grading suites are telecine based. This has been due to the high cost of expanding SD systems to HD and the historical belief that grading is a film only process.

A facility may charge £600-700 per hour for an HD telecine suite. Most of the time is spent grading. This is not an economic rate for a long format drama or documentary. In comparison, SD tape-2-tape rates might be between £120-250 per hour. This has not been sufficient to justify use of high-end grading systems so much of the work has been completed on slower workstation systems.

The HD grading market for long format might command a small premium over SD. However, the HD room rates based around telecine are far too high.

It is expected that a rate of £500-600 could be commanded for HD grading based on a Finaliser system.

Edifis can offer a finance package for the purchase of Finaliser systems. Over a 3-year period a typical monthly repayment would be £4800. At the end of the 3-year period the customer owns the equipment entirely. Based on £500 per hour rates, just 10 hours use per month would be required to break even.

Long format drama is usually assumed to take between 4 and 12 times its final programme length to grade. A one-hour length drama would require at least 8 hours of grading – more likely much more.

This realistically means that one drama job per month is sufficient to pay for a Finaliser system. This makes a strong argument when looking at a typical scenario for an editing facility where they currently lose the grading work to another facility.