

Test & Measurement

Colour checking

GUNNER BAEKGAARD, product manager at DK-Technologies, reports

As long as film production has been in colour, adjustments of colour tones and appearance have been a major issue when combining takes from different cameras and under varying light conditions. With conventional film material, it was done by means of correcting the filtering and chemical processes.

When film production moved to video, new technologies had to be used. Now grading could be done electronically and the comparisons were made on precision CRT (Cathode Ray Tube) based monitors. Careful steps were taken to ensure consistent quality: the monitor had to be colour balanced but also had to be placed in a well defined colour neutral environment.

From being a job for a few experts with 'golden' eyeballs, the technology introduced at the beginning of the 90's made it possible to make accurate and user friendly colorimeters for setting up the CRT. The Philips PM5639 was cost effective and one of the major players in this field, and in 2001 DK-Technologies acquired the rights to this product. Alternatives to the colorimeters are spectroradiometers which attract a much higher price tag.

Nowadays, a lot of film production is shot in high definition video and, if needed, converted into film. Still, the CRT is the preferred reference for very critical colour grading and whereas the adjustments are routine all the pitfalls are well known. In colour balancing, you normally only need to adjust the low level and the high level. The CRT guns track almost perfectly between the low and high light.

However, as we're all aware, flat panel screens (plasma and LCD) are entering our homes and there is also a desire to replace the bulky CRT, for example in OB-vans, for less

critical use. With progress in flat panel display technology, and the increase in its market share in the computer sector through to monitors in the broadcast industry, there continues to be a necessity for controlling colour fidelity, just as for CRTs.

The LCD monitor has many advantages: light output in excess of 400 Cd/m², large screen size, etc., but as knowledge grows about the LCD, people become aware of the problem areas.

Some of the constraints of LCDs are restricted viewing angle, response time, poor tracking of the 3 'phosphors' and no real black. The gamma curve of some LCD devices has S-type characteristics. However, this non-linearity can be cancelled using an LUT (look up table) in the LCD drive circuitry. When evaluating the gamma curve and the grey scale, a grey scale should be used.

Stability of both luminance and chromatic parameters are also an issue. The light output from an electro-luminescent back panel slowly reduces over time, even when observed over a few days, it is measurable. Intensity at switch on is often much lower than the steady state after a couple of hours.

The technology used for white backlight may decrease the colour purity, because the colour filter cannot completely separate the wavelengths of the R,G and B signals from the backlight source. The colour performance for the LCD is produced by a combination of the backlight and RGB filter responses, which is also a field where improvements are expected.

DK-Technologies has overcome the difficulties in setting up LCD monitors by developing an LCD-probe, which complements its CRT probes. The same technology base is used, but has been adapted to suit the requirements for measuring LCD's. The measuring angle is reduced from an almost $\pm 90^\circ$ spherical characteristic for the CRT sensor to a narrow $\pm 10^\circ$ viewing angle. The probes communicate with standard RS232 interface, which makes it easy to integrate into automatic alignment systems for LCD monitors.

The LCD version comes in different grades: a stand-alone system with its own display unit, a system for industrial use, and finally the probe alone. The latter enables users of the CRT analyser (PM5639/00) to expand the measuring options just by purchasing the probe (firmware for the display unit follows on order). Users familiar with the CRT version will quickly become experts in using the LCD version.

