KONICA MINOLTA

Institut für Rundfunktechnik IRT

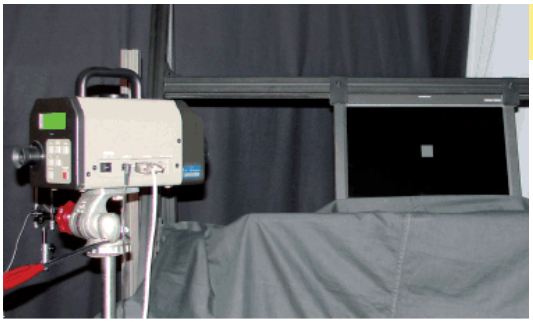
Exact measurements, trendsetting and with cutting edge technology

The Institut für Rundfunktechnik (Institute for Broadcasting Technology - IRT) has been responsible for the technical standardisation of the publicly regulated German television and radio broadcasting institutions, i.e. ARD, ZDF and Deutschlandradio, Austrian broadcasting station ORF and Swiss broadcasting and radio company SRG/SSR in the German-speaking part of Europe for more than 50 years, and has also represented their interests in the European Broadcasting Union (EBU). Located at the Bayerische Rundfunk (Bavarian Broadcasting Company) production site in the Freimann district of Munich, the IRT has been responsible for many pioneering innovations. Examples of such innovations that have taken place over the last few years are: the first fully digital HDTV transmission (1992), the development of the virtual studio (1996), the first 5.1 multi-channel audio transmission with DVB (1998), the development of the KEM microphone (1999), MPEG Layer II (2000), supply statement for the introduction of DVB-T (2003) and the first non-compressed HDTV recordings in 720p and eventually 1080p in 2004 and 2005. It is not just the publicly regulated broadcasting organisations that have benefited from the services of the IRT, but also many corporate customers from the communication and information technology area, and not least the TV viewers themselves.

Light measurement for technological progress

The technological requirements that are made of television change as a result of technological progress. The introduction of new flat panel monitors in studios (and private living rooms) means that the performance capability thereof also has to be investigated. The IRT has therefore worked on a study with 11 manufacturers and checked 15 class 1 monitors for equipping television studios with different display technologies and formats for suitability as measuring equipment for evaluating video signals in accordance with EBU Tech 3320.

This was required because technical and market developments have made it necessary to replace the existing CRT equipment and introduce “High Definition Television” (HDTV).
For this reason the IRT has had an extensive range of measurements performed to evaluate HDTV as a playback medium for the television company studios. The technological restrictions of modern LCD and plasma displays such as viewing direction dependence, light density, colour and contrast ranges and movement artefacts etc. were taken into consideration.



Measuring apparatus for determining the viewing angle dependence of the Konica Minolta CS-1000 spectroradiometer

Light measurement for technological progress

The IRT uses the Konica Minolta Sensing CS spectroradiometer for the rapid acquisition of precise measurement data. The performance capability of the CS-1000, for example, has made it the generally accepted standard in the specialist world for evaluating all important visual display parameters, and not just in the publicly regulated television area. “The visual spectral analysis of the Konica Minolta Sensing CS-1000 spectroradiometer provides a reliable basis for deriving all of the important photometric and colorimetric parameters that are needed to describe the visual performance capability of modern monitors”, explains Friedrich Gierlinger, project manager at IRT.

CS-1000

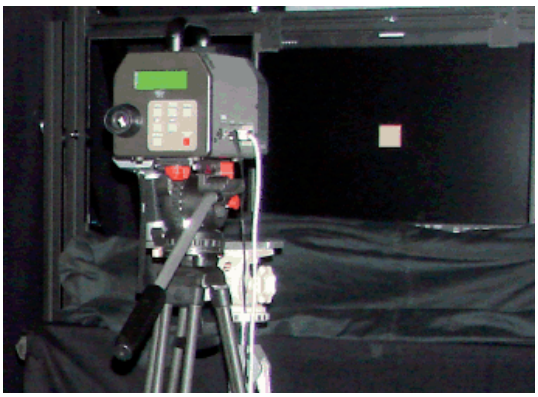
CS-2000

“This distinguishes it from many other measuring instruments in our area, which can only provide partial results”. The CS-1000 provides a wide range of performance features that simplify the measurements and also speed them up because they are all contained within one instrument. Thanks to its optimised spectral resolution with a half-width of <5nm with wavelength accuracy of 0.3 nm, it provides extremely accurate measurements during colour value analysis. “This means that we can calculate and derive all of the relevant parameters in a subsequent step…” adds Gierlinger. This happens “on the fly”, since the data is forwarded directly to analysis software that has been specially developed and written for this purpose. “The software is perfectly attuned to the data transfer of the CS-1000”, confirms the test manager (department name) and therefore makes work considerably easier in conjunction with the measuring instrument.

Exact data for new standards

Obviously, the performance capability of the latest class 1 flat panel monitors does not yet meet all of the requirements that the EBU made in its previous directive Tech 3320, which originally applied to CRT monitors. “None of the class 1 LCD and plasma-based monitors that are currently available on the market meet all of the existing EBU performance data criteria. To be honest, they are only met if the measurements are taken in an optimum viewing direction in relation to the monitor”, says Gierlinger about the apparent weaknesses of the latest television technology, which were determined by taking measurements with the Konica Minolta Sensing spectroradiometer.

Together with his team, he has developed his own measuring apparatus for this purpose that can measure from the different directions that are required (see photo). The results that were obtained speak for themselves. Considerable colour fluctuations occur, even with small angle variations. This was revealed by the measurements that were taken with the Konica Minolta Sensing CS-1000. “In some cases the colour temperature jumps from 6500 Kelvin (i.e. standard light temperature D65) to approximately 13,000 Kelvin. This falsifies the colours dramatically. The picture then has an extremely bluish tinge”, says Gierlinger.



Chromacity coordinate determination on 15 EBU colour charts with the Konica Minolta CS-1000 spectroradiometer

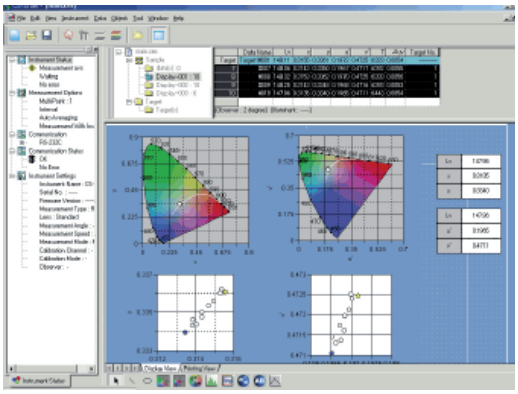
With CRT monitors the position and direction from which a TV director looked at a screen did not use to be quite so important: The pictures always reproduced the colours in the way that they arrived at the monitor as a signal. In order to evaluate a studio recording it was therefore sufficient for the director to see all monitors from one position. He could always rely on the reproduction of the picture. It was sufficient for evaluation and was therefore a fundamental part of his direction. However, the ideal position of the director in relation to the monitor is decisive for picture reproduction with the new generation of class 1 flat panel monitors. If the director is standing at the wrong angle in relation to the monitor, the relative colour location changes, the white point changes etc. to differing extents, resulting in an undesirable colour shift. The director would see different colours outside the optimum viewing angle range, which he would also evaluate differently. “A correction to the picture by the director would lead to erroneous image value settings.

This would result in different colour reproduction on different monitors and endless corrections to the picture values" continues Gierlinger. Even slight tilting of the horizontal picture axis by + or - 15° leads to a colour shift, as the measurements taken with the Konica Minolta Sensing display measuring device revealed. Because of the high level of measuring precision of this study, the limits of the current class 1 monitors were sounded out when they were used in the TV studio. Adaptation will therefore be unavoidable. This particularly applies to the introduction of the high-resolution television, which should take place by the end of 2009.

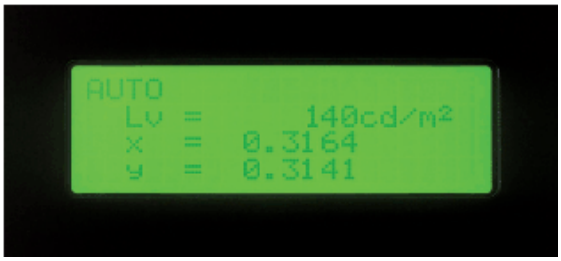
Here a sort of pincer movement is taking place between consumers on the one hand and the industry and film and TV production on the other. Because all films are now made digitally and in high resolution – even older films are being converted to this format. A technical development that has asserted itself and is now used in amateur film-making as well. Many modern SLR cameras can take pictures in HDTV format, even though they were designed as so-called still cameras for taking individual pictures.

Addendum

Since the middle of 2009 the IRT has continued its class 1 monitor study with the new Konica Minolta Sensing CS-2000A spectroradiometer. The CS-2000A has even more sophisticated measuring optics than the CS-1000. These can record extremely weak light signals. The CS-2000A is therefore particularly suitable for extremely "low luminance" measurements that can hardly be achieved by the best high-end displays. The CS-2000A works with a contrast range of 1,000,000:1 and, as probably the best ultra-low brightness analyser in the world, even makes it possible to detect extremely small light densities of 0.0005 cd/m² with a measuring angle of 1°.
The reduction in mechanical and electrical noise factors and the use of freely selectable measuring angles give the CS-2000A previously unheard-of precision and are also the guarantee of reliable measurements for future display technologies.



White point determination in accordance with the EBU standard template with xy and u'v' colour charts



Konica Minolta CS-1000 spectroradiometer evaluation display with background lighting

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