

COLOR NEWS 2/2020

Display calibration

REC.1886 vs. REC709

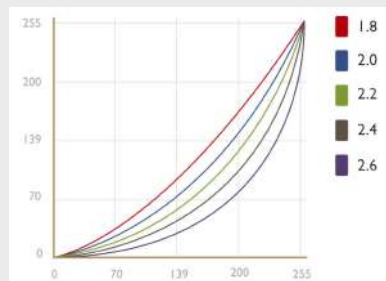
Rec. 709 is a common term to describe the color space used in HD video mastering. The Gamma curve for displays was never defined though. In the "updated" version, REC.1886 finally the display gamma is defined as 2.4.

Gamma

Gamma refers to the relationship between video signal and light output. Or in other terms how bright the image is displayed. A Gamma of 2.2 is brighter than a Gamma of 2.4...

- SRGB Gamma = 2.2
- REC.1886 Gamma = 2.4
- DCI P3 = Gamma 2.6

Different Gamma curves:



Dear friends,

I actually did not expect to find the time for my second newsletter so early. But let's say Corona made it possible. This newsletter is about the so important world of calibration for display devices. I am sure we all had a few experiences with films that look different from what we have expected or seen while grading it in a controlled environment. But there is light at the end of the tunnel with the correct calibration.

What is the correct calibration?

Thankfully organisations like the SMPTE or ITU put a lot of work in developing standards for cinema and tv. In the next step it is the manufacturers (Sony, Christie, Panasonic, Apple, Barco, Samsung....) task to implement those standards in their display products. But sadly they very often fail to do so. You can put ten different displays from manufacturer "XYZ" next to each other and they might all look different. Going further, even sensor chips from the same production line =, produced on the same day might vary a bit and so produce a different looking image.

And let's not forget the 60 cm problem.

Yes, very often the problem sits 60 cm in front of the screen and adjusts the settings wildly. (irony off).

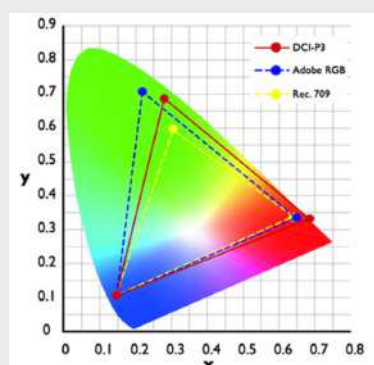
To sum it up: there is a need for calibration and it has to be according to the standards of ITU and SMPTE.

How to calibrate?

It needs a combination of a generator to create patterns on the display, a probe to read the values and a software to measure and adjust them to the right levels. A calibration kit starts around 3,5K USD and can go easily up to 20K USD. But beware of cheap probes. They do mostly more harm than good. Futureworks is offering a free of cost calibration for regular clients.

RGB primaries

The RGB primaries have their exact coordinates within the chromaticity diagram. REC. 709 and SRGB share the same primaries. DCI P3 for cinema has different primaries. The colours within the triangle describe the color gamut and are the ones which a display should be able to reproduce.



DCI-P3

DCI-P3 is the colourspace which is used for grading for cinema projection. It features a wider color range than REC. 709 and the peak white should be 14 foot lambert with a Gamma of 2.6 and [the white point is set to 6300 Kelvin](#).

DCI-P3 should not be mistaken for Apples new P3 Display colourspace which uses a 6500K whitepoint (REC.709) and the SRGB Gamma of 2.2.

In which intervals should we calibrate?

Professional Grading monitors arrive calibrated by default from the factory. But that's what you can expect from a 20-30K USD monitor. But even here we see a shift in brightness and color after 6 month. That's why in Futureworks we check and calibrate all monitors once a month. For consumer LCDs like the LG series (e.g. LG C9) we go with the Netflix recommendation of 90 days max. The process itself takes one to two hours for SDR and HDR.

But how will the end consumer see it?

He will see it according to his display. A LCD TV will look different from an Oled TV, an Apple device, different from a Samsung phone or an android tablet. So it is senseless to grade for one display only, because in doing so it would go haywire on another. There must be some reference, which is a calibrated grading monitor. As a colorist I have to take in consideration that consumers might see it to contrasty on their displays. Ergo, I have to control highlights and shadows to a sweet spot of nice contrast and safe enough for consumers.

How to judge on a phone or tablet?

To be clear - it is always a compromise. Personally I think apple products with a 70% brightness level are not that bad. But what file are you seeing? Which codec and compression? We discovered, that some messenger services compress and therefore change the color of videos and still-images a lot. The best solution is downloading the file and watch offline in a good video player.

For live remote grading though, Futureworks offers a very accurate solution incl. calibration service.

What about cinema calibration?

The international standard luminance(brightness) is 14 foot lambert (ftl) for a projected peak white. The projector bulbs are losing light intensity after a few thousand hours and so need constant re-calibration. Cinemas try to squeeze every last hour and so we can estimate a very low peak luminance of 7-10 ftl in India. Prestigious festivals and cinemas in other countries might range around 12-14 ftl. It makes sense to adjust the brightness different for for the domestic and international **release**.

Note:

Calibration is a very technical topic which needs a deep understanding of color science and workflows. To make it understandable for non-engineers I have shortened the technical terms to a minimum

In case you missed the first newsletter on HDR and DolbyVision:

[Newsletter 01/2020 HDR](#)

Contact:

andreas.brueckl@futureworks.in

www.vimeo.com/colorgrading



IMDB: [Andreas Brueckl](#)

Booking:

Swapnil Dhawre,

Marketing Futureworks Media:

+91 98698 61986

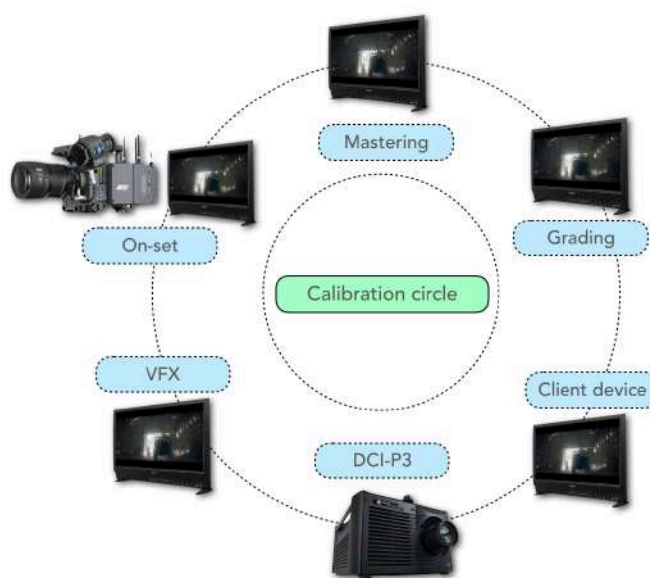
swapnil.dhawre@futureworks.in

Futureworks calibration team.

Calibration is a key element for a flawless end to end delivery. We are regularly sending our key technicians to calibration workshops.



Workshop, 2019 Bangkok



Please stay healthy and sound and let us look forward to great jobs and new chances after Covid-19.

Yours sincerely,
Andreas Brueckl

