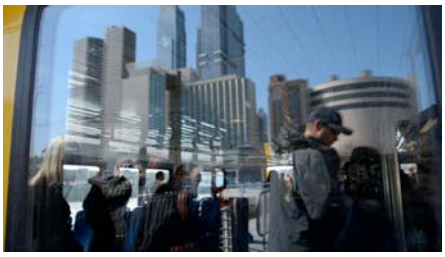
New York, New York, it's a wonderful town!..... through the new Nikon D800

By Alfonso Parra AEC

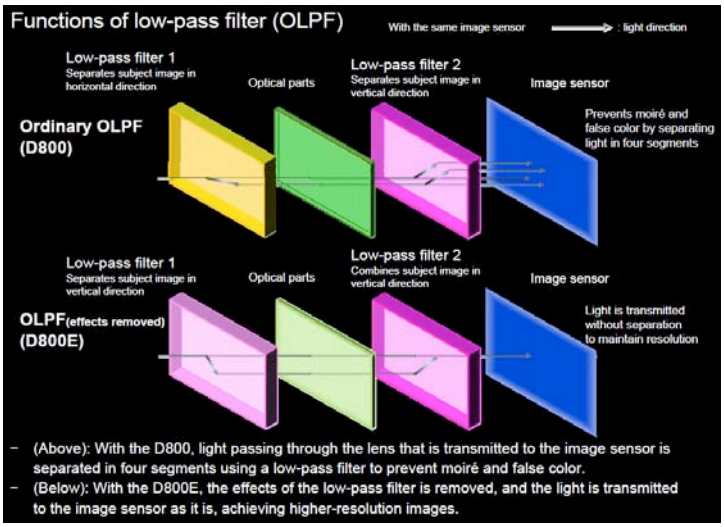
Last month we had chance to test the Nikon D800 camera during the Tour organized by the brand itself in New York City. Organization has placed at our disposal a camera and exceptional places in order to test its quality. We have to thank Nikon because such places were not the nicest for the camera, moreover, as we will see all along the article, they were visually very interesting places. In addition, we have relied on the extraordinary counselling of Javier Garcés, Product Manager of Nikon Spain.

Due to the peak that this kind of cameras has among both a large part of video fans and *low-cost* independent productions, we have only evaluated the video recording of the camera, and not what the camera actually is: an SLR still camera. We are not going to describe camera features because they can be found in the Nikon's official web page, however we want to highlight some of them, for example, sensor has 36,3 megapixels with a pixel size of 7 microns; which means that the camera will show a high sensitivity and little noise, as well as a minimum diffraction effect. Camera releases a progressive format up to 1080 with 24 fps, 25 fps and 30 fps at 24 Mbps. And it is doing this, seemingly, not because of underestimating rows and columns of the sensor pixels, but using all of them in order to build the HD image. Thus, the direct consequence is an unusual sharpness and resolution, as we see below in more detail. Another novelty to improve the image is the chance of recording in an external system through the built-in HDMI plug out of the camera; in addition, it has a headphone jack and a plug in of sound. Image is recorded on cards using B-Frame compression of the H264 standard in a MOV container. As we already know, this compression is very effective, although it does not provide exactly the best quality. Postproduction process is very simple, and files can be opened by whatever edition software. On this occasion, we have worked with Final Cut and Color. In order to make the montage we have carried on the original .mov files into Prores 4.2.2 HQ. Finally, we have used a zoom Nikkor lens 24-120 T3.5.

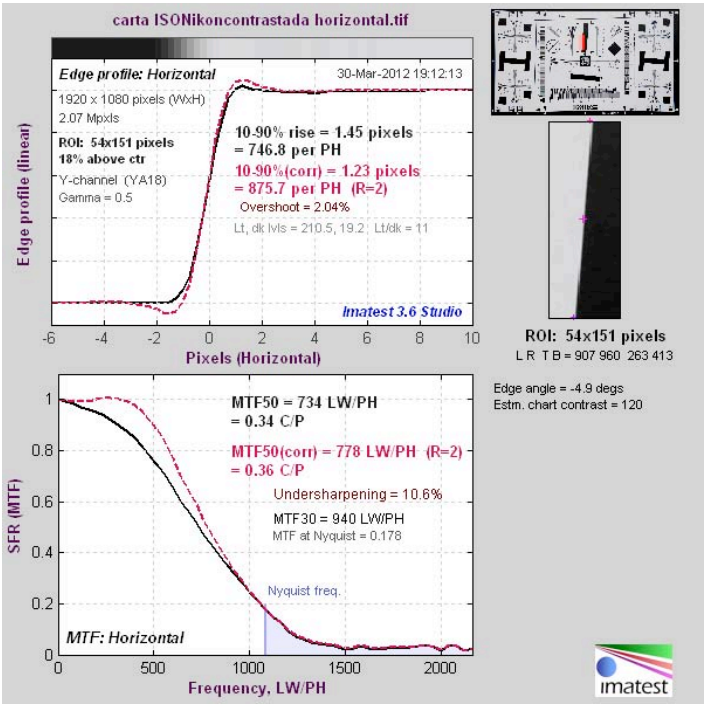
Our camera Tour began with its presentation, following the screening of a short film directed by Sandro and photographed by Anthony Arendt (http://www.youtube.com/watch?v=E3doNm4bH7U). Both of them shared with us their experiences with the D800 during the film shooting, and then we could ask them any kind of questions. Journey went on with a boat trip over the Hudson River to finish it later in the Astor Place Theater, where we saw the Blue Man Group's performance; an obscure place, full of contrast. Next day, we recorded the Statue of Liberty and Manhattan from the helicopter; again, it was not a simple situation, since it is not easy to distinguish lines of the skyscrapers. As soon as we landed, we visited the oldest boxing club in New York; finally we went to the Mecca of graffiti, 5 Pointz, where we could see graffiti artists go into action, even some of us tried to imitate them with the aerosol. The day finished with the rap sounds by the 5 Pointz's members. In short, two days went a long way, on which the camera was put in any kind of awkward situation.



Resolution



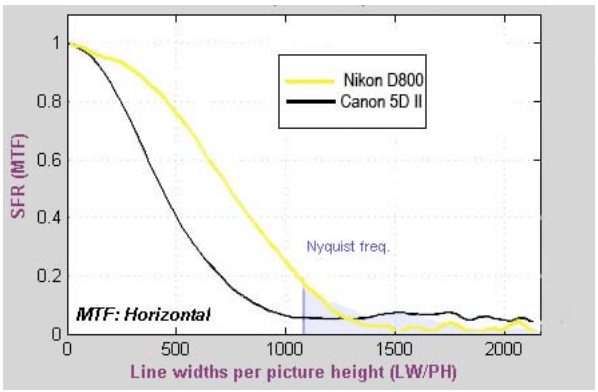
OLFP's effect to D800 and D800E cameras. Image from http://www.dpreview.com/previews/nikonD800/3 courtesy of Nikon



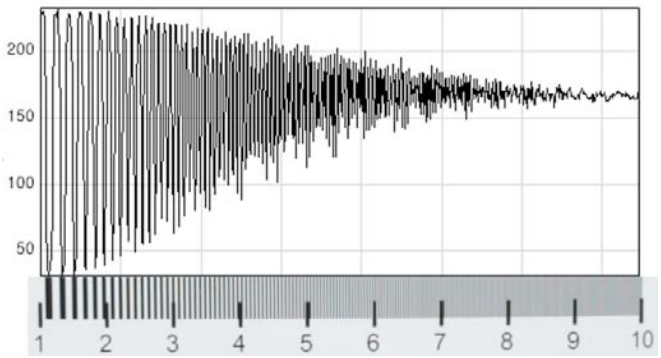
Camera releases a 1920x1080 and a 1280x720 image at progressive format, in other words, it is a HD camera. As we know, the image size is nothing to do with the resolution, so firstly we have photographed an ISO 12232 resolution chart and a Putora chart; and then we have them evaluated. We were surprised by the nice sharpness of the image, with a MTF curve really HD broadcast. The camera which we have tested has built-in OLPF filters as opposed to the E model where these were eliminated in order to get a larger resolution. This last model has additional built-in software to remove Moire.

Next, we show the MTF curve made through Imatest: value at 50% is roughly 734 Lw/Ph; standard correction of detail used by the program (dotted red line) is roughly 778 Lw/Ph.

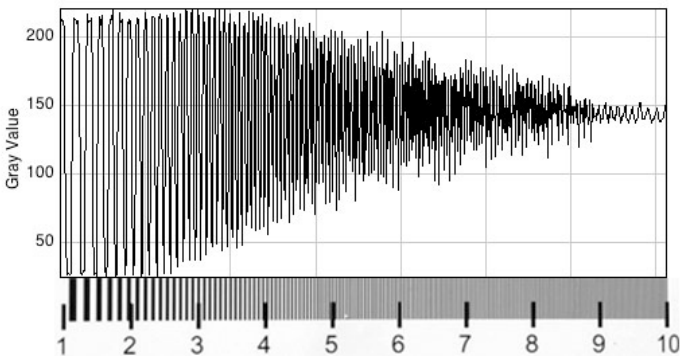
We are going to compare this sharpness with the one provided by Canon 5D Mark II at the time. Our intention simply is to understand better the results. As we can see with the two curves in comparison, D800 shows larger "bell", thus the image will be not only sharper but also will have more texture.



Let us see the same comparison, but reading profile of the resolution lines.



Canon 5D Mark II



Nikon D800

We can see the difference of contrast range under different frequencies; it is larger with the Nikon D800 than with the Canon 5D Mark II.

This good result is in line with the image quality that the HDSLR cameras are able to show, far from the resolution provided by the camera itself working as still camera, as we can see with our Prêt-à-Porter chart in comparison.

Video. *Still image.*

On the still photo, we can see not only larger image sharpness but also a better texture, as well as the lack of Moire, as opposed to the video image.

The D800's sharpness realizes on the next images, for example, the high degree of detail in the blonde hair (left image), as well as on the right image we can see details of both photos displayed on the wall and upholstery and wooden textures.

Let us see two more examples.

We can see quite sharply the vertical lines of the skyscrapers and the back light figure of water motorbike drivers splashing water. The back of this sharpness is the Moire. We have seen it not only on our charts of fabrics but also generally on a lot of frames of Manhattan's skyscrapers, by land, by sea and in the air. As an example, the next frame should be enough.

One of the more significant features of the camera is the possibility to get out image signal through HDMI and plug in an external recorder, without the typical compression of the H264. It improves certainly the image quality; however it means also an extra investment far from being economical. Anyway, we have only used cards provided by the camera as recording system. Although camera allows a good compression handling, it should be pointed out that we have seen the ring effect (ringing) around some lines of the skyscrapers with sky background, as well as a bit of posterization on the deepest shadows. On the other hand, we have not seen significant banding effect at grading. In addition, even though we can still see artifacts (skew and gelatin effect) made by the Rolling Shutter, they are quite corrected if we compare, for example, with the Canon 5D Mark camera.

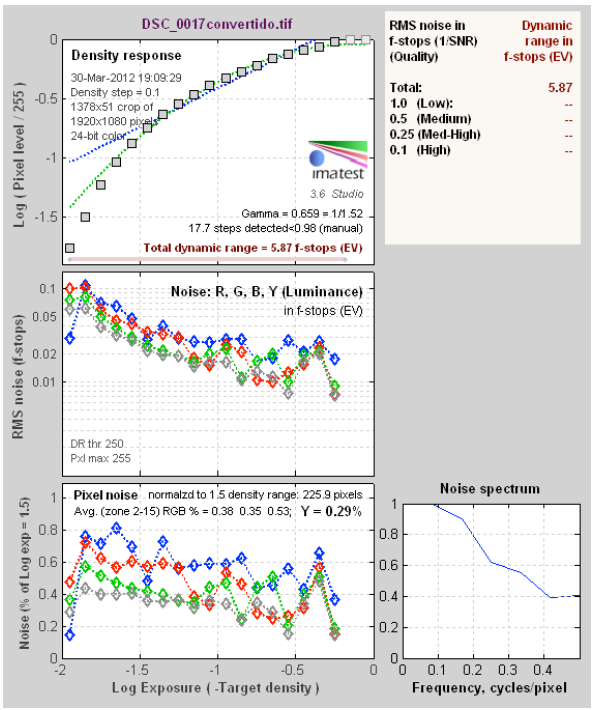
Speaking of artifacts, we have also seen high chromatic aberrations.

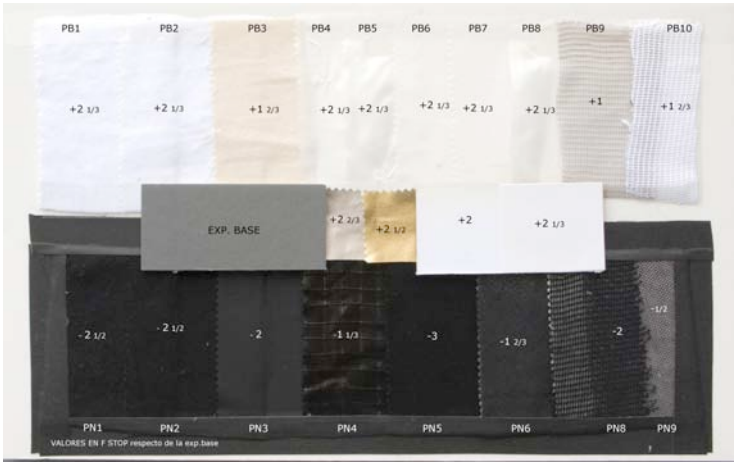
Dynamic Range

As well as other HDSRL cameras, we have not expected a high dynamic range. Analysis of the Stouffer strip through Imatest has given a total value of 5.87 using the *Neutro* scene (according to manufacturer, it applies a minimum processing to obtain natural results). We should call the attention to the low noise level (at ISO 320, less than 0.1 f stops in the deepest shadows, Imatest's middle graph). Thus we will be able to use high sensitivities in any circumstances. Range of ISO values go from calibrated ISO 100 until 6400, although we can use other larger ones up to ISO 25600. During our trip in New York we have used different ISO values depending on location, from 100 in outdoor locations until 6400 at the Blue Man's performance, going through 1000 in the boxing club.

Noise level is very similar to the one provided by Canon 5D MarkII

Our *Death* chart shows a bit more range.





Reflectance values from the different samples regarding middle gray

Let's see the exposure strip on the left. Every exposure is graded in order to match overexposures and underexposures with the base exposure. We have graded to middle gray in order to make it neutral, adjusting blacks and whites. We have used ISO 320 at 25 fps and an exposure time of 1/50 s. We have checked the strip in both cases: by one light and grading.

By one light

With the base exposure we can see well any texture, both whites and blacks.

We can see Moire on PB3 fabric and also on the black band around blacks.

With -1 underexposure, we can still see texture of blacks, even on PN5 (now at -4) we can still see the velvet.

With -2 underexposure, we can still see the PN1 texture, although with a bit of posterization.

With -3 underexposure, textures of PN1, PN2 and PN5 are totally lost, however the noise is very low.

With +1 overexposure, whites are in their limit, they have lost part of texture, although they are not totally clipped.

With +1 2/3 overexposure, details of whites have totally disappeared.

Grading every exposure

With -1 underexposure, we can recover without problems both texture and sharpness from any black, however PN5, now at -4, is close to loose them. Due to the compression PN1 shows some posterization effects. PN3 shows Moire.

With -2, PN1, PN2, PN3 y PN5 show a lot of chroma noise and loose totally their texture, they are between 4 stops and 5 stops bellow middle gray.

With -3, the whole texture has disappeared and noise is very significant mixed up with compression effects and Moire.

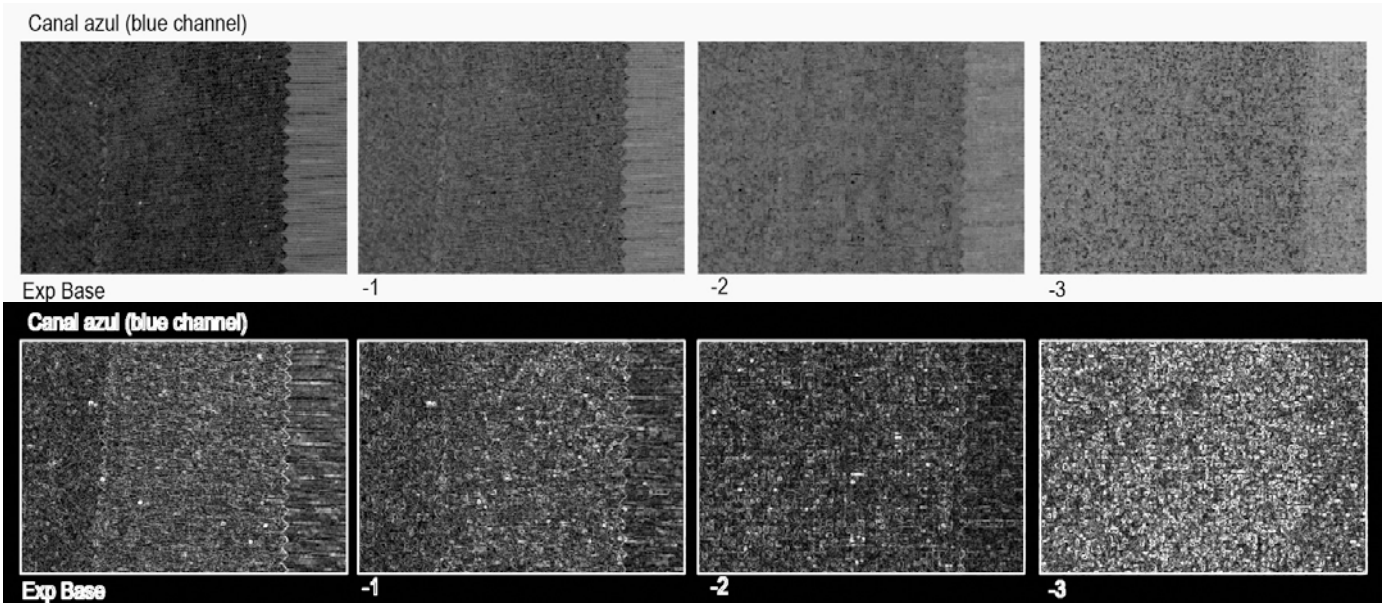
With + 1 overexposure, fabrics keep still certain texture and whites are not totally clipped, however we have lost sharpness and detail, for example, on PB6 and PB7.

With + 1 2/3, every white are totally clipped without possibility of recovering neither texture nor detail.

From the *Death* chart evaluation, we can conclude that the captured total DR is a bit more than 7, and the useful DR is around 6, roughly a 1/3 stop more than the value provided by Imatest. Above middle gray, we can place range around 3 stops, although we can keep details at high lights up to 2 ½.

Below middle gray, useful range is around 3 ½, although we can see some detail up to 4.

In order to see better the limit bellow gray, we show a cutting of samples of the black fabrics PN1, PN2 y PN3 through blue channel.



With -1 underexposure, values of the samples are at -3 and -3 ½ respectively, we can see texture of fabrics yet, as well as their sides. Underexposed image in 2 stops shows clearly lost of texture on PN1 and PN2; however we can still see slightly the side in between. This DR is smaller than the one provided by Canon 5D Mark II; it was up to 1 more stop of DR under the *Neutro* configuration and ½ more under the *Normal*.

Of course, the noise is different through the three channels, but we have chosen the blue one because it is usually more visible on it. Let us see a particular example.

ISO value 1000 at T4

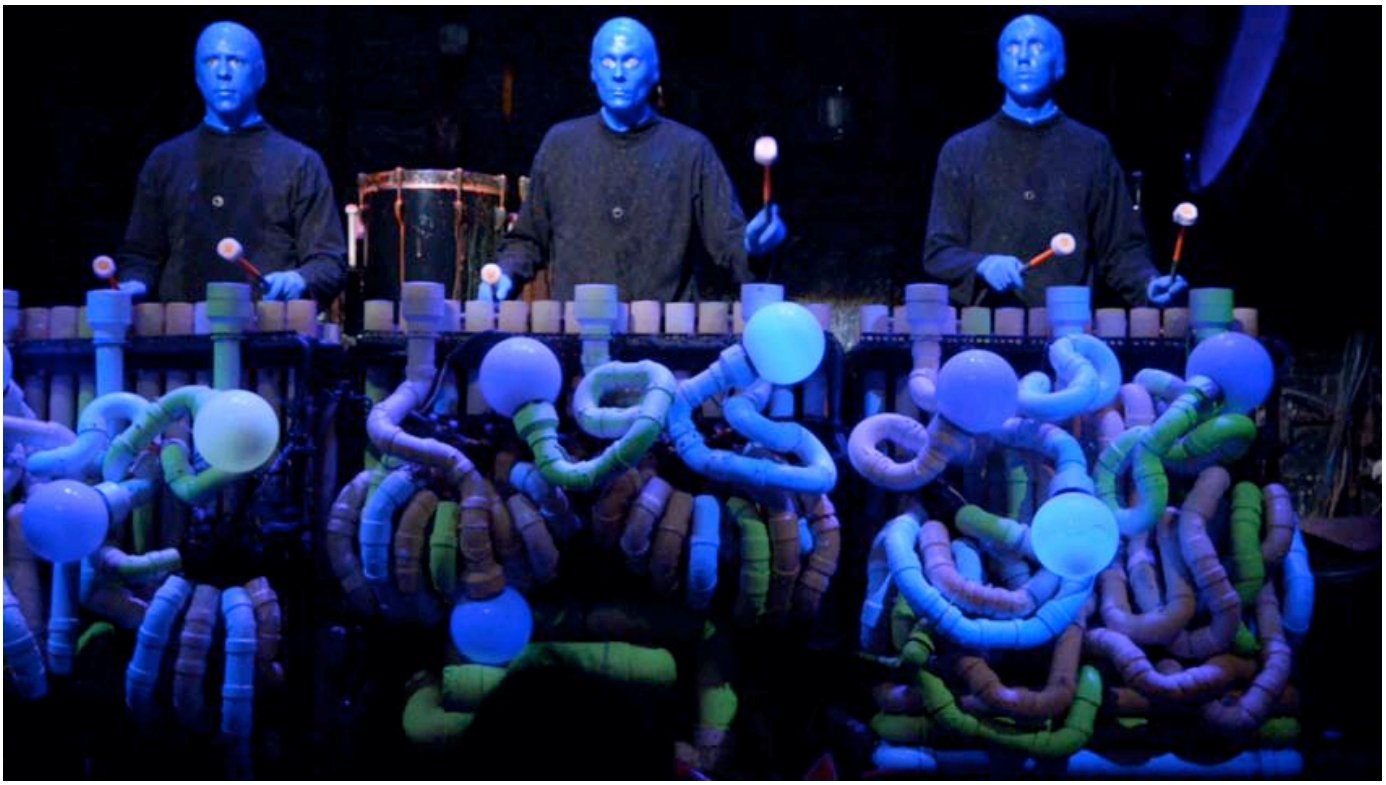
On the above image, there are a lot of luminance values that are at -4 and -5, for example, black trouser or lockers at back. If we observe independently the channels, we can see better the noise on each one. In addition, we can see less resolution on the blue and red channels than the green one; it is very characteristic of sensor with Bayer pattern.

Red channel

Green channel

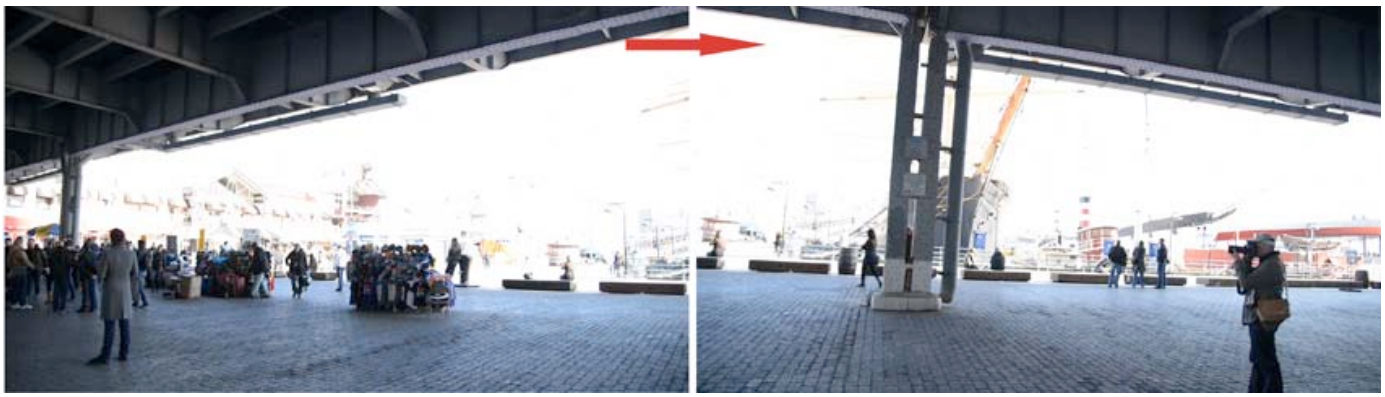
Blue channel

Although the noise reduces the DR and the resolution, as we see images on motion, general feeling of sharpness is good, and noise, even showing, is more than acceptable. Frames from the Blue Man's performance are an example.



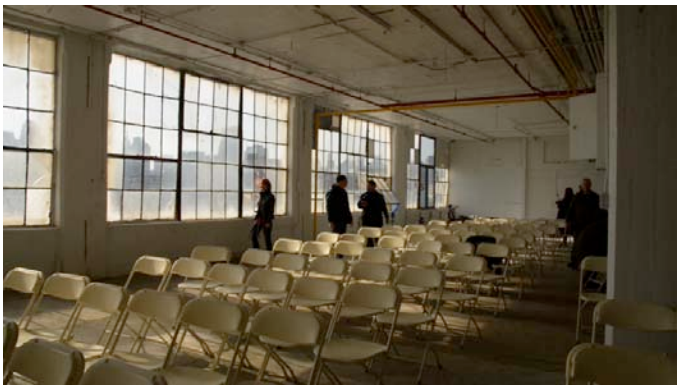
ISO value 3400 at T4

Let us see some examples about the DR limits of the camera.



As you can see on previous panoramics, the scene DR leaves behind the one that camera can provide; difference between clearest and darkest areas is above 12 stops.

Next, two exposures are coming: one for indoor and another for outdoor through the window glasses.



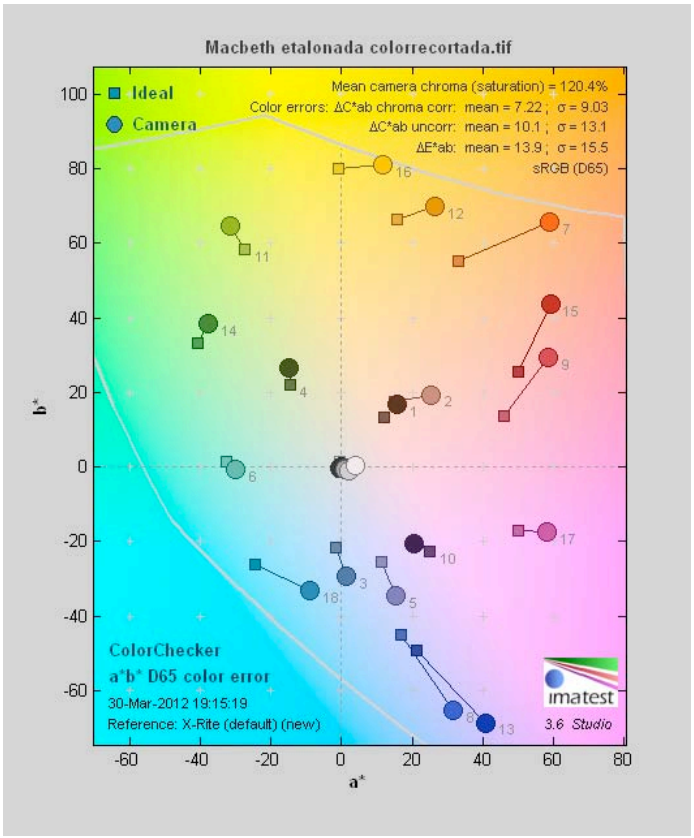
High light exposure (Outdoor)

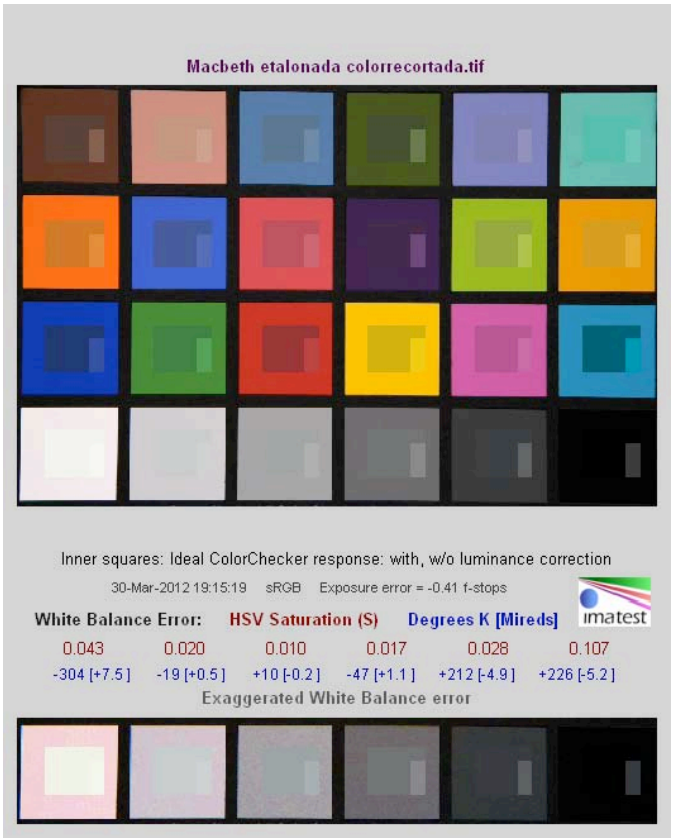
Indoor exposure

Finally, in this example we have exposed to the high lights which are on the top parts of the buildings. As we finished the panoramic, the lowest part of the street keeps underexposed.

Color

We have not been surprised by color results. As we already know, these kind of cameras handle a limited space of color; therefore, they make generally a limited tone scale and a high saturation. We have been able to check it as we have photographed the Macbeth chart, and then evaluated through Imatest. Chart is photographed to match with a neutral middle gray.



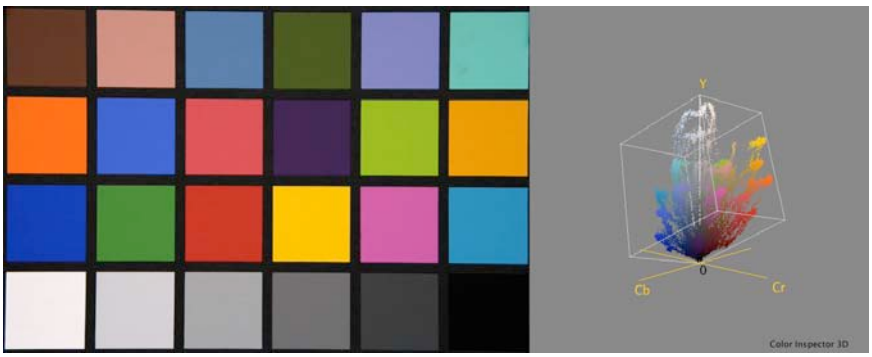


Through Imatest analysis, we have seen how the sigma value (RMS) is around 13.1 without chroma correction and 9.03 whit it (sigma value evaluates the deviation of colors photographed by the camera regarding the "ideal ones"). As we can see, chart shows a 120.4% of saturation. As an example, if we compare with the results of the F35 camera (7.09 without correction), we can say that the Nikon camera is far from a natural reproduction of colors, above all from yellow to red, going through orange.

It deserves to study the image on the right; the largest squares are the color as we have photographed, and they are related to the circles on the left graph. The smallest squares, in the center of the largest ones, are ideal values of chart color corrected with luminance of the photographed. Finally, the small rectangles are ideal values of color without luminance correction.

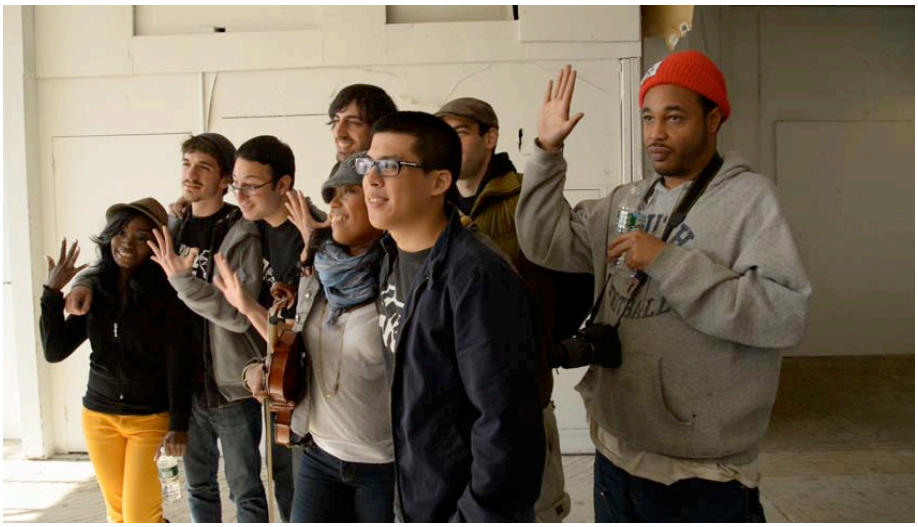
We can see that orange (sample 7), red (9 and 15) and the deepest blue (13) give high saturation, in addition high lights are toned toward red. Color tones are right, although red and yellow have a tendency toward orange-like. Cyan (18) shows more deviation, it goes to blue. We have also seen that neutral gray turns aside cyan with underexposures.

We can control the undue saturation with the camera itself just adjusting the profile.



Macbeth chart and its color representation on Y Cb Cr color space. We can see how red and orange tones are very saturated and are close to the limit of such space

Due to this saturation as well as the small dynamic range, Caucasic skin has certain artificial tone; it is characteristic of these cameras. Tones of darker skin are much better showed. In order to get skin tones more natural, we have to desaturate slightly, as well as being careful with the exposure, as we can see on 5 Pointz's image bellow.



Nevertheless, on next examples, camera reproduces very well the intense and high colors of graffiti. Every tone is showed very well, although from my view, we have to go on moderating colors saturation, above all reds, oranges and yellows.

Regarding camera handling, we have found problems related to HDSLR at video recording mode; however, we have also found nice surprises, for example, we could see the histogram live, in other words, during recording; thus we can adjust directly the exposure. Nevertheless, focus and viewing go on being complex if you do not have accessories especially designed for them, such as focus control, viewfinder or additional screens. Throughout the *Tour*, we could appreciate the different accessories designed by Redrock, they were really very useful.

Conclusions

If we take into account all of the above observations already pointed out, the Nikon D800 generally shows an attractive image, with good sharpness and typical resolution of the usual HD broadcast cameras. Thus we can get clear images, with quite a lot detail and texture. However, we can see certain level of Moire and some artifacts due to the compression. Dynamic range is clearly insufficient, although as well as with other HDSLR cameras, through Picture Profile, we can prepare some profile "Log"-er in order to improve the latitude. Color is within typical of the Y Cb Cr color space, with tones of Caucasic skin a bit artificial, although they can be improved quite well if we work with the saturation of reds and oranges. Visual appearance of noise is really good; although you can clearly see it, it is not really unpleasant until reaching very high ISO values. Finally, it should be pointed out that we can only handle little depth of field, it may be either an advantage or a disadvantage; either there is an exceptional focus puller or we are not worried about any taking out of focus.

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