

The Advantages of
Hasselblad
Medium Format Cameras



H
HASSELBLAD

When a pixel paints a thousand words

When image is everything,
bigger is always better. The 21st
century imaging world is awash
with pixels on popular mass-
produced capture devices from
smartphones to DSLRs. And they
do a good job – within defined
boundaries of expectation.

If you want to upload a snapshot of your cat to Facebook, your cameraphone is an ideal tool. And of course popular DSLRs have their own marketplace.

But if you are a quality-fixated photographer working at the top of your game for perfection-driven clients, or on personal projects that serve to both underpin and promote your own unique craft and creativity, then there is never going to be room for equipment compromise.



Photo: Bryn Griffiths

In these circumstances there is a commercial imperative to see the bigger picture and embrace the bigger pixel solution.

A generation evolves

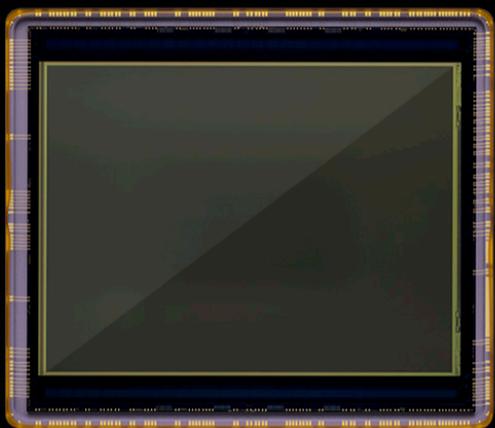
The basic idea behind our system for medium format photography – combining a love of photography with a mastery of technology – is as valid today as it was in 1948 when the first Hasselblad camera was introduced. Delivering superior craftsmanship and image quality is what has made Hasselblad cameras famous for over half a century.

Our latest H5D, the 6th generation of our integrated digital camera, secures that reputation for years to come.



Bigger is better

Medium format historically refers to the 120 size film format that was used in the Hasselblad V system cameras. It was much larger than the standard 35mm format and offered a superior image quality thanks to the high quality lenses and the larger image area of the film. In digital photography, medium format refers either to cameras adapted from medium format film models, or to cameras making use of sensors larger than that of a 35mm film frame.



53 x 40mm
H5D-60



49 x 37mm
H5D-50



44 x 33mm
H5D-50c & H5D-40



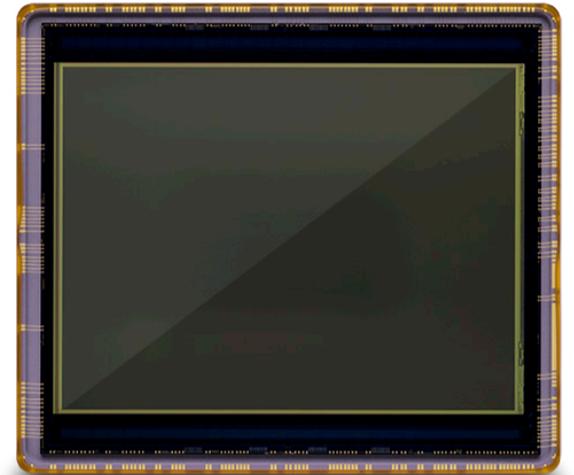
36 x 24mm
'Full Frame' DSLR

Pixel size and noise level drive the available dynamic range and very simple natural colour solution that delivers accurate colour recordings regardless of scene, and smooth tonal transitions without any need for multiple colour settings.

Not just megapixels

Even though our sensors offer some of the highest pixel count available today, it's not just the density of megapixels that sets a Hasselblad image apart from the crowd.

For any camera sensor, the physical size of its pixels governs the amount of light recorded for each one. Most sensor manufacturers are now using micro lenses on their pixels to maximise the light collected but a bigger pixel will still collect more light for a given exposure.



This increase in light gathering power determines the dynamic range of the sensor.

Wide dynamic range

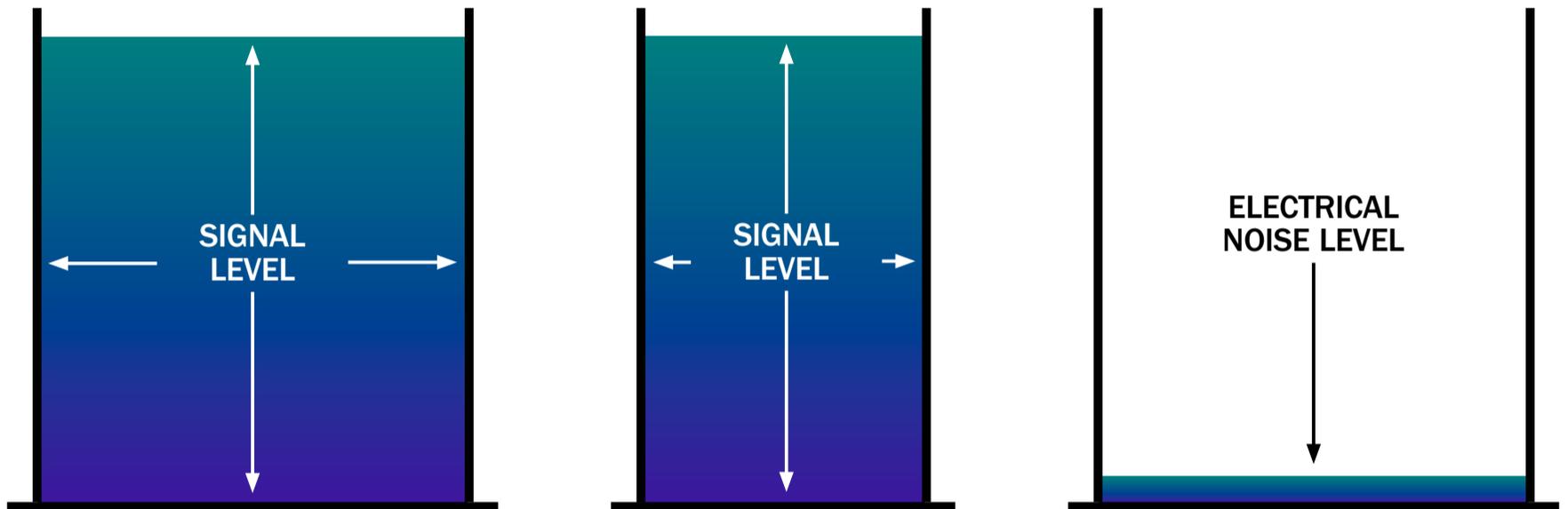
Dynamic range can be described as the tonal ratio difference between pure black and pure white. To put this into perspective, the human eye can perceive a dynamic range of around 22 stops; most digital cameras fall far short of this value.



In the photographic world, this means starting from a black exposure - with no light hitting the sensor: how many stops you can increase the light level whilst still showing a signal level that is not pure white.

The pixel analogy

Imagine each pixel as a container. The larger the container, the stronger the signal it can hold. In addition, all digital camera sensors have a minimum sensitivity level they can use, set by the electrical noise of the sensor itself. The difference between the two is known as the signal to noise ratio. Our medium format sensors have a very high signal to noise ratio.



Hasselblad's 50MP CMOS sensor delivers a pixel size of 5.3 microns; A similar resolution DSLR would have a pixel size of around 4.14 microns, giving the Hasselblad a 28% increase in light collecting ability.



When you combine this high quality signal to noise ratio and the larger pixel sizes, Hasselblad sensors can deliver up to 14 stops of dynamic range compared to around 12 stops on a smaller sensor DSLR.

Natural Colours

Whilst image colour and tonality is somewhat subjective, the tones displayed in an image are controlled by the following:

Pixel size and sensitivity (Dynamic range)

Number of bits per colour channel in the A/D conversion process

Colour profile applied to the resulting image data



Photo: Claudio Napolitano

For serious users who demand the utmost colour accuracy the Hasselblad Natural Colour Solution (HNCS) was developed. The system delivers the best possible natural colour's from the selected chip without having to select from multiple presets.

The HNCS delivers smoother tonal transitions and a more analogue film like image quality straight out of the camera, thanks to its 16-bit colour depth, compared to the majority of smaller DSLR sensors.

HNCS in real terms

We spoke to many of our photographers and the feedback was unanimous:

- We find that solutions where you have to sacrifice some colours in order to get others right are unacceptable.
- We want correct colours in every shot, regardless of subject.
- We want a simplified colour temperature control, one that ensures the correct rendition of colours.
- We want a one-profile solution in order to keep colour management simple.



Generic profile?



Portrait profile?



Product profile?

To satisfy these requirements we produced a new colour look-up-table (LUT) so that, based on the adjusted colour balance input, we can render the image with this new LUT.

We have also recalculated the algorithms and taken aspects of CCD/CMOS sensitivity and filter characteristics into account to produce the most natural colours possible so that even skin tones show significant benefits from this approach. This process culminated in the creation of the Hasselblad RGB profile. For users with a wider gamut requirement, the Hasselblad L*RGB profile was also created, which incorporates LAB colour data for an extended colour space.

Piece by piece

The flexibility of our modular design enables owners to configure the camera to the requirements of the job, from choice of viewfinder to technical camera connectivity.



Waist-level and prism finders allow for different viewing options.



Unrivalled flexibility

The ability to remove the sensor unit and attach it with a battery unit to a technical camera (Alpa, Linhof, Cambo etc) gives access to the wide range of movements available from these large format devices.



Ultimate compatibility

For those users who still like to shoot film, our HM 16-32 filmback and HMi 100 Instant filmback are compatible with all current H system cameras.



Freedom to move

The ability to tilt or shift the lens in relation to the focal plane is a must have for architectural and product photographers.

Conventional DSLR users have to purchase expensive specialist lenses to have this flexibility, but with Hasselblad's innovative HTS 1.5x Tilt/Shift adapter, any H system lens from 24mm to 100mm can be used with a full range of movements.



The lens can be shifted 18 mm, either up or down and can be tilted 10 degrees up or down; both movements can also be combined. The HTS can also be rotated to offer corrections in any axis. Settings are shown on the camera's LCD and recorded in the file metadata.



The camera tilted up to include the top of the building results in converging vertical lines in the image.

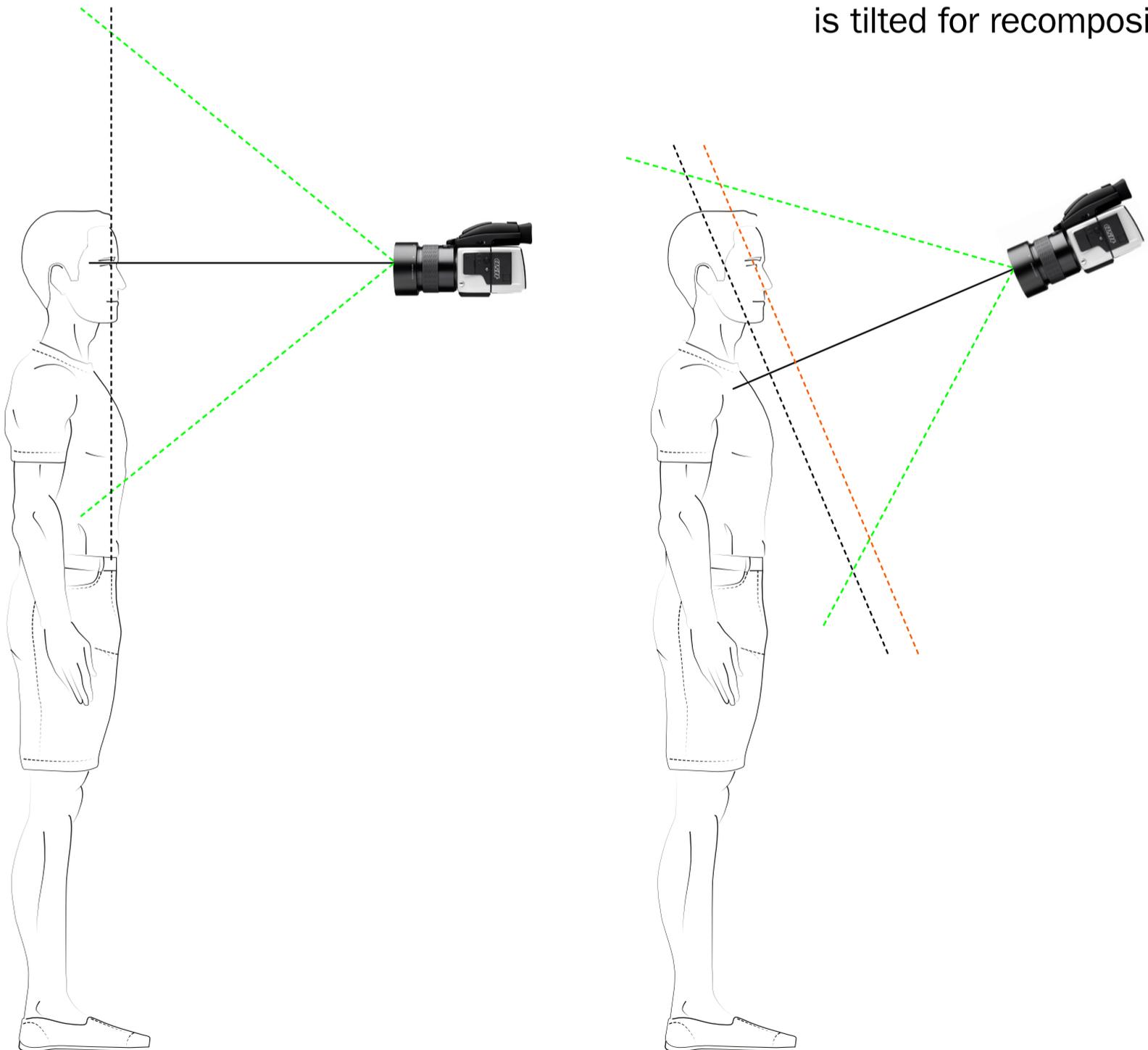


The camera positioned level with an upward lens shift of 9mm applied results in parallel verticals.

True Focus

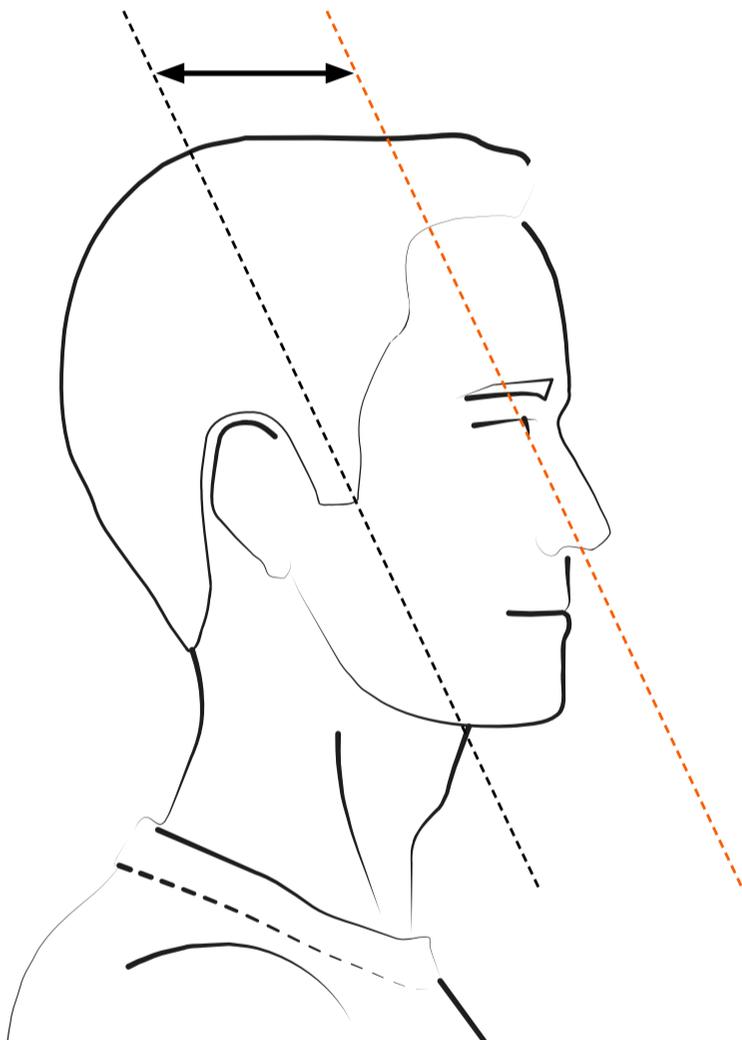
True Focus helps solve one of the most lingering challenges that faces serious photographers today: true, accurate focusing throughout the image field. Without multi-point auto-focus a typical autofocus camera can only correctly measure focus on a subject that is in the centre of the image. When a photographer wants to focus on a subject outside the centre area, they have to lock focus on the subject and then re-compose the image. In short distances especially, this re-composing causes focus error, as the plane of focus sharpness follows the camera's movement, perpendicular to the axis of the lens.

The plane of focus changes when the camera is tilted for recomposition.



The traditional solution for most DSLR cameras has been to equip the camera with a multi-point AF sensor. These sensors allow the photographer to fix an off-center focus point on an off-center subject, which is then focused correctly. Such multi-point AF solutions are often tedious and inflexible to work with. Due to the physics of an SLR camera, the off-centre focus points that are offered are all clustered relatively close to the centre of the image. To set focus outside of this centre area, the photographer is still forced to focus first, and then shift the camera to reframe, with the resulting loss of focus as a result.

Camera corrects for shift in focus position.



With True Focus



Without True Focus

DSLR cameras tend to use their multiple focusing points to try and compensate for the shift in focus when recomposing, although because they tend to be concentrated towards the centre of the frame, they are not as accurate as the True Focus system.

Hasselblad's unique True Focus ensures that the focus is accurately adjusted to give razor sharp images

Optical excellence

Hasselblad's extensive HC & HCD lens range offers focal lengths from 24mm to 300mm - including 2 zoom lenses - all with superb quality optics and leaf shutters as standard.



Every image starts in front of the camera

However good the camera, whatever detail the sensor can capture, a system not only deserves but even demands the very best from its lenses to be able to deliver the finest images possible.



Photo: Dmitry Ageev

Medium format systems can deliver a shallower depth of field compared to smaller DSLRs, thanks to the larger sensor size.

This can be a huge advantage, especially for portraiture where a large aperture is used to isolate the subject from the background.

Flash sync without limits

Hasselblad HC & HCD lenses have leaf shutters as standard, allowing flash synchronisation at all shutter speeds up to 1/800th second. This is available without having to resort to specialist triggers or hypersync technology. DSLR cameras are limited to 1/200 or 1/250th second without specialist flash modes or triggers.



Photo: Claudio Napolitano

Having the ability to shoot outdoor flash with faster shutter speeds gives much more control over the ambient exposure and allows for greater flexibility with choice of aperture.



Daylight fill-flash at 1/200th second sync
The relatively slow shutter speed has overexposed the sky.



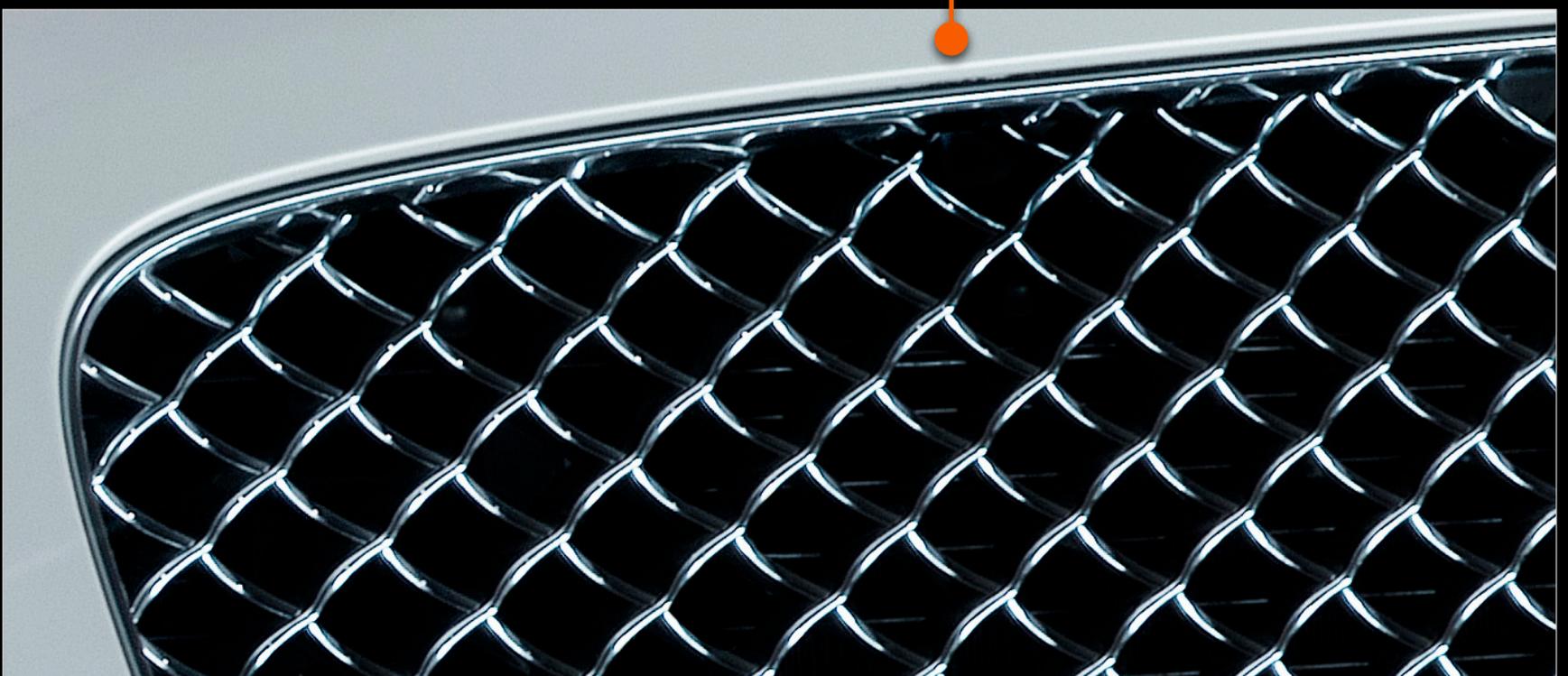
Daylight fill-flash at 1/800th second sync
The faster shutter speed has allowed the ambient exposure
to expose the sky correctly.

Multi-Shot

Hasselblad's unique Multi-Shot technology, available in 50 and 200 megapixel resolutions, provides the ultimate in still subject capture. Whether for the extremely high demands of archiving and art reproduction or for obtaining the absolutely highest resolution in highend product, architectural, still-life shooting, or for any other kind of shooting where detail or resolution are important, Hasselblad Multi-Shot cameras bring mind blowing detail and open new creative and commercial doors.

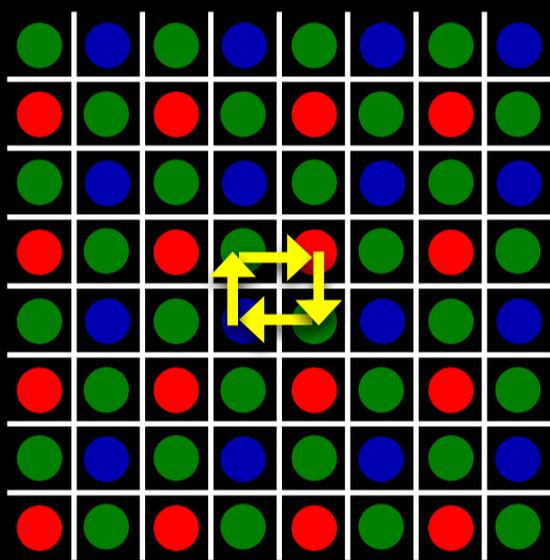


Photo: Ripley & Ripley



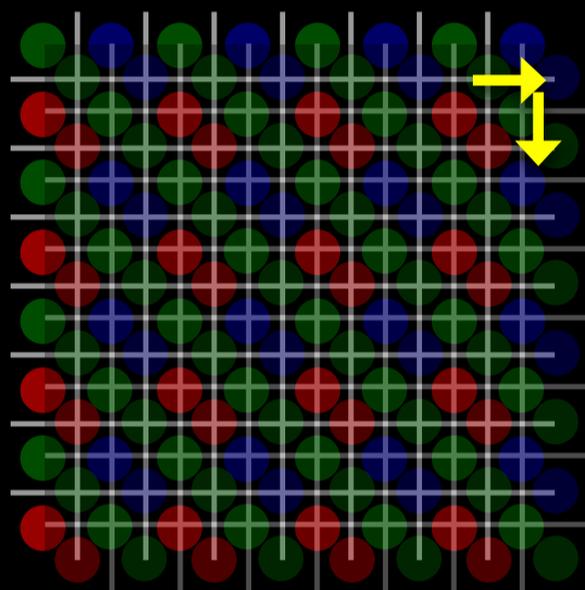
How it works

The key to the single-shot quality from a CMOS sensor is the use of a Bayer Mosaic filter. This is a specific filter layout that is used in conjunction with software to interpret the colour data from the sensor. A single-shot system delivers one colour per pixel, and the remaining two channels must be estimated and calculated using a best guess strategy known as interpolation. This is done in Hasselblad cameras by using algorithms that optimise colour rendition and sharpness without disturbing the perception of the human eye by the artefacts always present in raw single shot captures.



4-Shot

The red, green and blue information is captured individually by moving the sensor exactly 1 pixel at a time.



6-Shot

The same process as with the 4-shot is applied, with the sensor moving an extra $\frac{1}{2}$ pixel in both directions.

The advanced Hasselblad Multi-shot (4-shot and 6-shot) technology eliminates the issues that the single-shot interpolation routine can sometimes introduce, such as moiré and colour rendering issues, by physically moving the sensor 1 pixel at a time, thereby capturing the red, green and blue information in each individual pixel point and then combining these captures into one. This results in a true colour and moiré free capture with increased level of detail as there is no need for interpolation at all. High precision piezo-electrical actuators control movements of the sensor in $\frac{1}{2}$ and in one pixel increments. By combining six shots, offset by a combination of both $\frac{1}{2}$ pixel increments and one pixel increments, the colours, Red, Green and Blue of each point are obtained with a double resolution in both the X and Y directions. The result is an astonishing 200 megapixel full colour image with no artefacts, such as moiré.

Image advancement

Phocus, Hasselblad's powerful imaging software has both brains and brawn. Brains in its attractive working environment and in the advanced tools that form the core of this amazing program, and brawn in its sheer power and performance.



In addition to its powerful RAW processing engine, Phocus provides you with comprehensive tethered camera controls as well as unique mobile solutions for more flexible studio work, client review, and so on. Phocus for Mac and Windows users is available for free download, with unlimited installations and distribution from www.hasselblad.com. On the Mac platform, Phocus offers support for RAW files from around 200 other digital camera RAW formats.



Phocus Mobile for iOS offers extended flexibility with remote shooting and browsing.

Digital lens correction

Hasselblad's modern lens design has been optimised for digital perfection, including full automatic correction for chromatic aberration, distortion and vignetting. Phocus calculates the optical corrections for every shot at the given distance and aperture setting, providing perfect images, and an ideal basis for optimal image rendering and further processing. Hasselblad digital lens correction technology works automatically with all Hasselblad H System lenses, even with tilt/shift movements and it works manually with all the classic V System lenses.



Taken with an HCD28mm $f/4$
without correction



Taken with an HCD28mm $f/4$
with distortion and vignette correction



Chromatic aberration example

Corrected image

