

MEDIUM FORMAT CAMERA ADVANTAGES



*HASSELBLAD*  
CREATE TO INSPIRE

## 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.

# 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 1941 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 H6D, the new generation of our integrated digital camera, secures that reputation for years to come.





# Bigger is better

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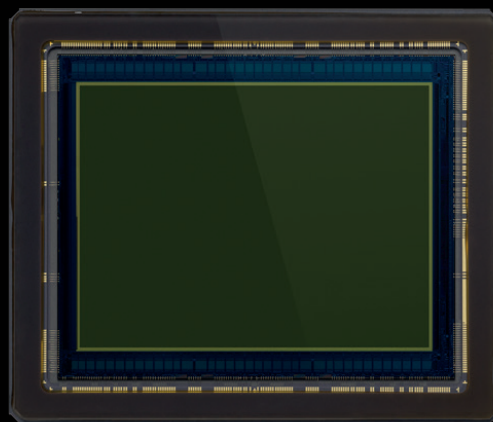
Medium format historically refers to the 120 size film format that was used in the Hasselblad V system cameras. It was much larger than the standard 35mm format and offered a superior image quality thanks to the high quality lenses and the larger image area of the film. In digital photography, medium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

## NOT JUST MEGAPIXELS

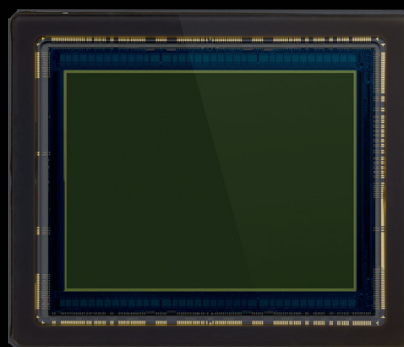
Even though our sensors offer some of the highest pixel count available today, it's not just the density of megapixels that sets a Hasselblad image apart from the crowd.

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 and the light gathering power determines the dynamic range of the sensor.

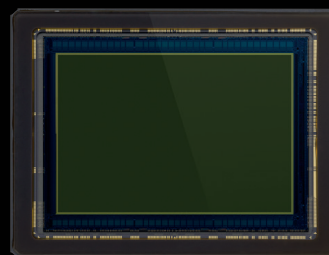
Pixel size and noise level drive the available dynamic range and very simple natural colour solution that delivers accurate colour recordings regardless of scene, and smooth tonal transitions without any need for multiple colour profiles.



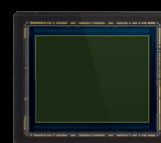
53 x 40mm  
H6D-100c



44 x 33mm  
H6D-50c



36 x 24mm  
'Full Frame' DSLR



17 x 13mm  
Micro Four-Thirds



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 64% increase in light gathering power.

### 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.

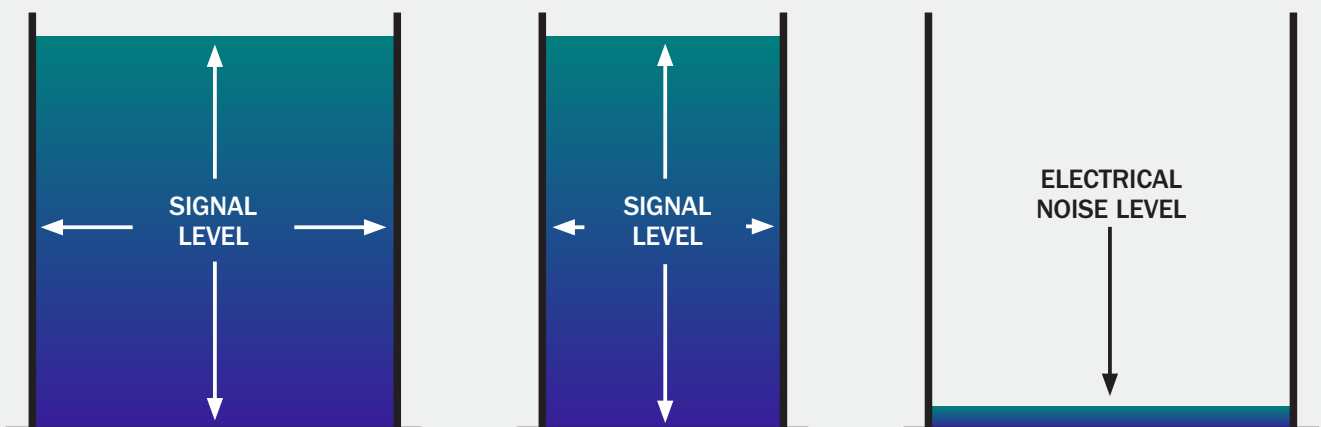
In the photographic world, this means starting from a black exposure - with no light hitting the sensor: how many stops you can increase the light level whilst still showing a signal level that is not pure white.



### 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.

When you combine this high quality signal to noise ratio and the larger pixel sizes, Hasselblad sensors can deliver up to 15 stops of dynamic range compared to around 12 stops on a smaller sensor DSLR.



# Natural Colours

# HNCS in real terms

6

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

For serious users who demand the utmost colour accuracy the Hasselblad Natural Colour Solution (HNCS) was developed. The system delivers the best possible natural colours 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.

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.

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.



Generic profile?



Portrait profile?



Product profile?

Photo: Chris Cooze

We have also recalculated the algorithms and taken aspects of 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 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.

## Yesterday meets today

## Ready for tomorrow

10

We're always looking forward, always looking to improve our cameras and always striving to produce the highest image quality possible.

But that doesn't stop us taking the latest advances in sensor technology and image processing know-how and applying it to our cherished V System cameras.

The Hasselblad CFV-50c turns virtually all Hasselblad V System Cameras from the 500C onwards into high performance digital cameras in a very user friendly way. Only the 202, 203, and 205 need slight modification then they too are compatible. Attach the CFV-50c exactly as you would a film magazine, choose between a CF card and battery or FireWire and a computer and start shooting.



The CFV-50c is compatible with all Hasselblad prism viewfinders.

Our latest digital back - the CFV-50c shares much of the same technology as our H6D-50c and allows dedicated V System users – even those with cameras going back as far as 1957 – to have access to the very latest imaging technology, while still enjoying the classic V System design and feel.

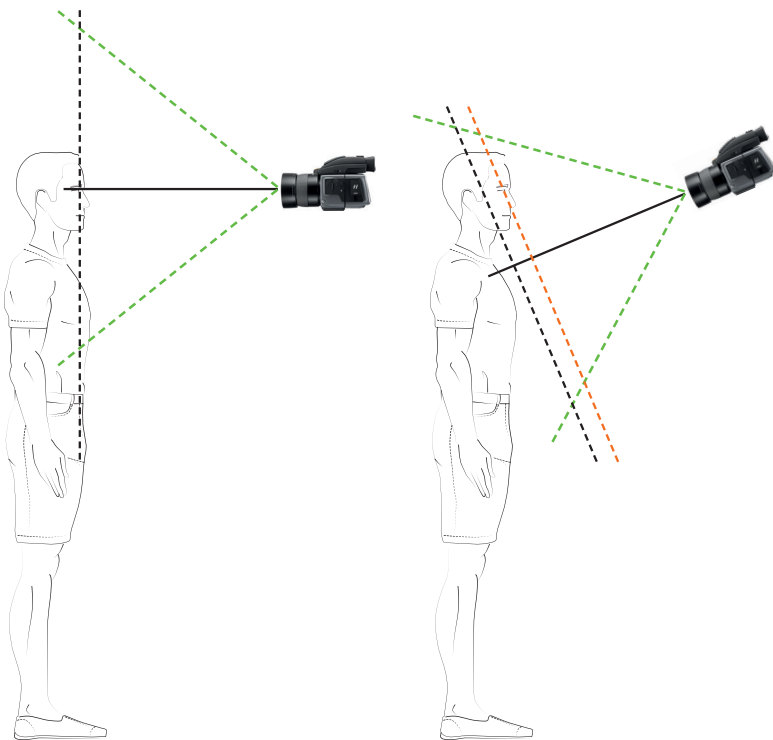


# True Focus

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

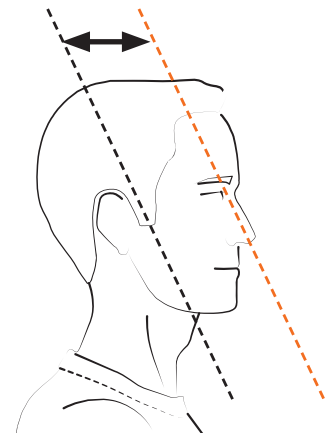
True Focus helps solve one of the most lingering challenges that faces serious photographers today: true, accurate focusing throughout the image field. Without multi-point auto-focus a typical autofocus camera can only correctly measure focus on a subject that is in the centre of the image. When a photographer 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 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.



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

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.



Camera corrects for shift in focus position.



With True Focus



Without True Focus

# Optical excellence

12 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.

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 1/2000th 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.

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.

13



The relatively slow shutter speed has overexposed the sky.



The faster shutter speed has allowed the ambient exposure to expose the sky correctly.



# Multi-Shot

14 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.

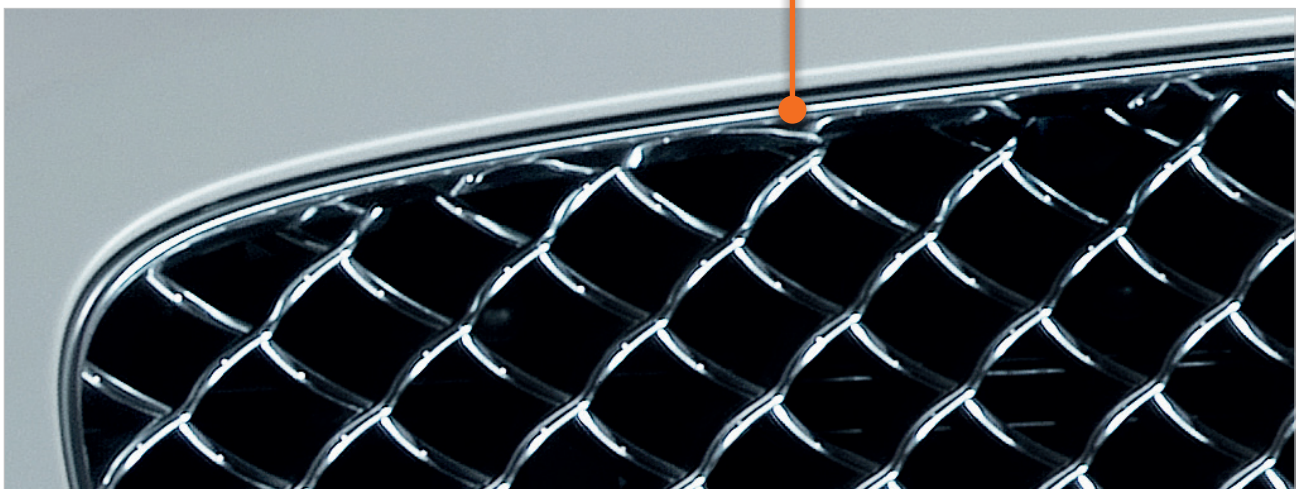


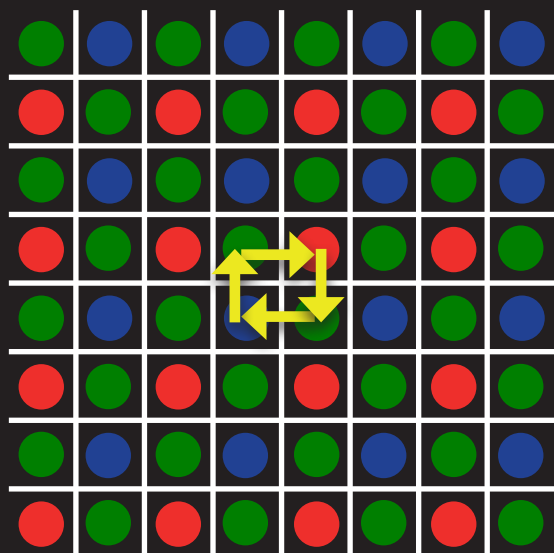
Photo: Ripley & Ripley

## 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.

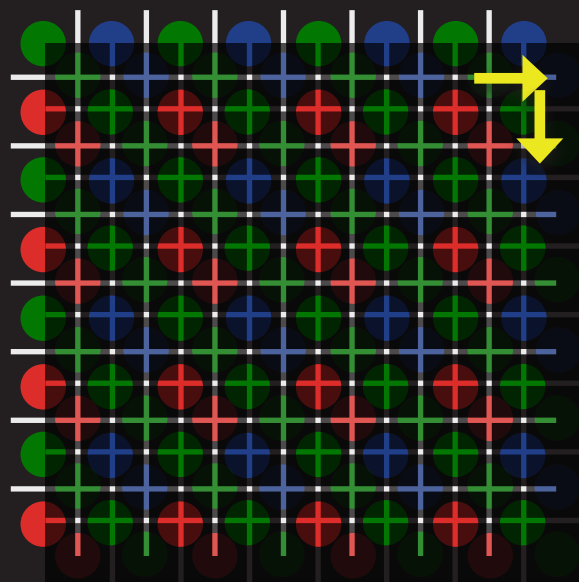
The advanced Hasselblad Multi-shot (4-shot and 6-shot) technology eliminates the issues that the single-shot interpolation routine can sometimes introduce, such as moiré and colour rendering issues, by physically moving the sensor 1 pixel at a time, thereby capturing the red, green and blue

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.



### 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.

# Image advancement

16 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](http://www.hasselblad.com). On the Mac platform, Phocus offers support for RAW files from around 200 other digital camera RAW formats.



Photo: Claudio Napolitano

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





Photo: Karl Taylor



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.

### 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.

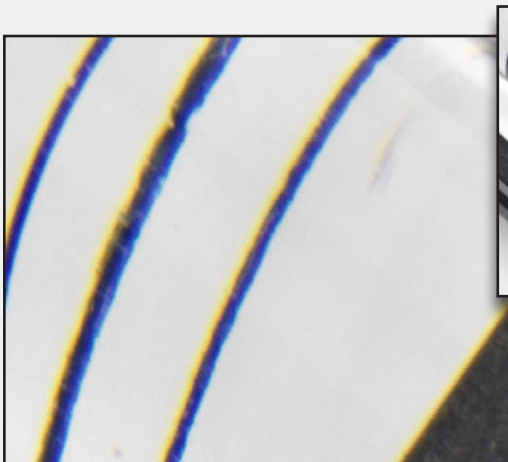
The below image was shot on using a V System CF30mm fisheye lens. Phocus is able to correct the fisheye distortion to give a rectilinear effect.



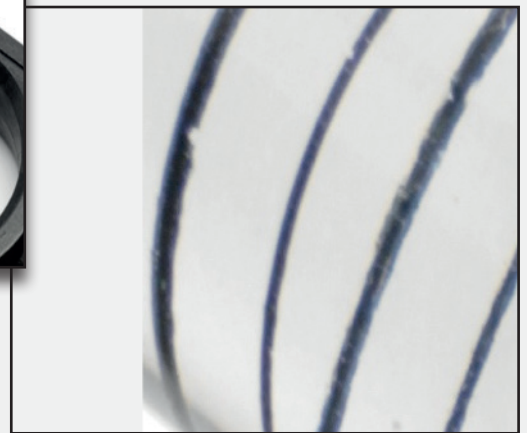
without correction



with distortion and vignette correction



Chromatic aberration example



Corrected image







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