



The Case For And Against Medium Format

by

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Much has been written in the last 18 months stating that new high resolution cameras like the Nikon D800 and D800E equal medium format image quality. In September I had the opportunity to photograph with what is widely seen as the highest quality digital photography format available to photographers and test the validity of this statement. I joined Phase One for a shoot in the Dolomites in Northern Italy to fully evaluate the system including the 645 sized sensor digital backs, it's lenses and the Phase One 645DF+ digital camera. I thoroughly familiarized myself with the camera before arriving via online resources. I then spent about 6 hours hands on with the camera and back prior to taking the first photograph. By the time I took my first real photograph, I felt very comfortable with the camera, digital back and lenses. Since I have the opportunity to handle and test many camera systems from most manufacturers, I am able to learn a new system very quickly. I then shot with the Phase One system for 7 days for an average of 6 hours per day and spent another 2 hours per day talking with Phase One pros and others very experienced with the system. It was a full immersion into the Phase One Medium format system for about 18 hours a day. I also had a D800E with me and used it occasionally to take comparison shots for later evaluation.

The Phase One IQ digital backs are full frame 645 sensors available in 60 and 80 megapixel resolutions. The sensors are approximately three times the surface area of a full frame 35mm sensor. The lenses I used were mostly high quality Schneider - Kreuznach optics designed to cover the full image circle of the large 645 sized sensor. These lenses are leaf shutter lenses which have two advantages over regular lenses that use the camera's focal plane shutter. First, since the lenses use an internal leaf shutter, shutter vibration is significantly reduced. The 645 format focal plane shutter is large and can cause some vibration even when using mirror lock-up. By using the

much lower mass and smaller leaf shutter built into these lenses, focal plane shutter vibration is eliminated. Second, since flash does not need to synchronize with a moving focal plane shutter, any shutter speed can be used in flash photography.

Let's get one thing out of the way right up front! The D800E is no match for the 60 or 80 megapixel digital backs for recording fine detail. It really isn't even that close. The difference is plainly visible when cropping down to a small detail within the frame where the 36 megapixel 35mm frame might record a small blob as a small feature like a barn in the distance, the Phase One backs still records actual wood detail. Distant grasses that are muddled on the D800E still show individual blades of grass on the IQ sensors. Whether this matters or not largely depends on how big you print. If you generally don't print much larger than 11x15 (A3) or even 12x18 (Super A3) and your photographic technique is good, you will be hard pressed to see much of a difference between a 36 megapixel D800 and a 60 megapixel Phase One IQ back. Compared to something like a 22 megapixel Canon EOS 5D Mark III you will start to see some differences but this is mostly due to the much lower dynamic range of the Canon sensor. But if you print bigger than that you will definitely see a difference in fine detail.

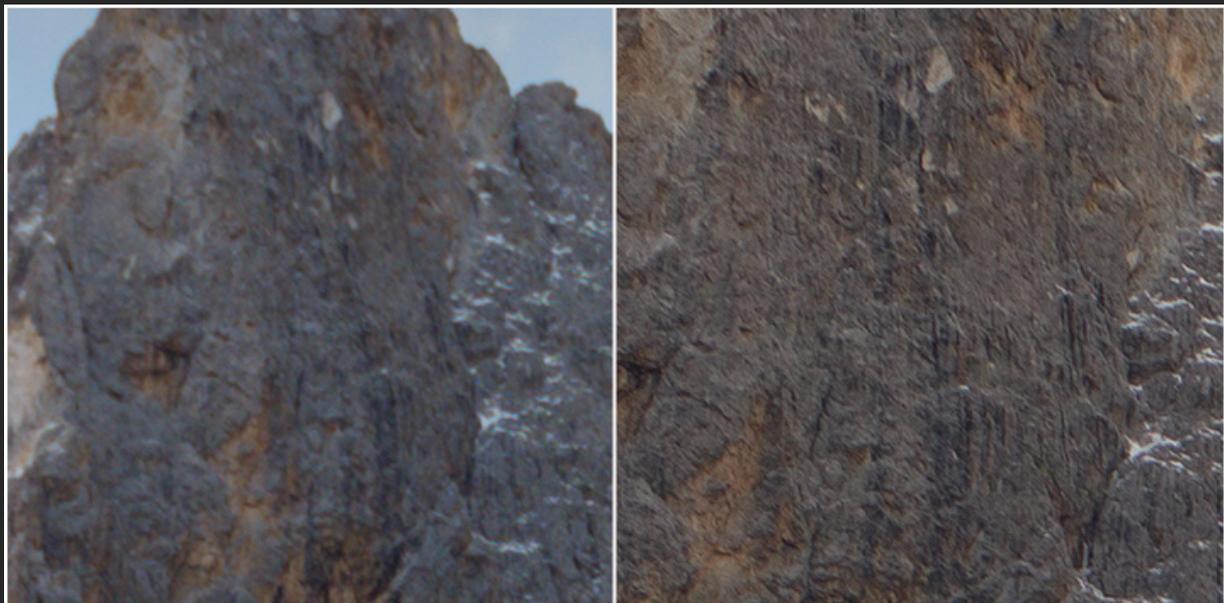


Figure 1- Nikon D800E with 24-70mm at 50mm and f/5.6 on left vs. Phase One IQ 160 with 75-150mm at 80mm and f/5.6 on right (same angle of view). This is just 16,000 pixels out of 36.5 million and 60.5 million respectively (0.04% and 0.025% of the frame respectively). While the crops represents a really tiny part of the frame, the additional acuity, not to mention many more pixels on the subject, is very evident.

Phase One claims that they have the best dynamic range available but field and lab tests show the D800E to have incredible dynamic range. In fact some tests show the D800 series to have about the same dynamic range as the Phase One IQ2xx series and better than the IQ1xx series. But there is a difference. The Phase One camera records 16 bits per color while the Nikon records 14 bits per color. So if we assume they have the same dynamic range, the Phase One camera should be able to record 4 times as

many colors in the darkest stop of the dynamic range window. The D800 is already legendary for how much detail you can pick out of shadows but in my testing, you can dig even a bit more detail out of the Phase One camera. The total dynamic range window of useable data is, therefore, a bit better on the Phase One camera but it isn't a huge difference. Again compared to any Canon camera, the difference in dynamic range is quite startling.

There is no contest when it comes to high ISO noise. The medium format digital backs are simply not designed for that. Native ISO is 50 or 35 depending on the back and they get very noisy at ISO as low as ISO 400. Even ISO 200 is much noisier than any current full frame Canon or Nikon camera but then again these sensors are not designed for high ISO

shooting. If you bin pixels to get down to similar resolution as the Nikon or Canon cameras the differences pretty much go away up to ISO 200 but beyond that, the 35mm cameras have a noise advantage. The digital backs do have what Phase One calls Sensor + mode which bins 4 pixels and allows much cleaner high ISO shooting at 15 or 20 megapixels for the 60 and 80 megapixel backs. The medium format backs and cameras are not designed for fast action like a high end DSLR is.

Besides resolution, acuity and overall image quality, there are other benefits of the Phase One systems. These include a very large and bright viewfinder in the 645DF+ camera body with excellent eye relief even for eyeglass wearers. There is a good selection of lenses available from 28mm to 250mm (17 to 150mm 35mm equivalent - the crop factor is approximately 0.6 compared to 35mm) including a selection of Schneider leaf shutter lenses which, as stated above, allow flash sync at any speed and do not use the focal plane shutter resulting in much less vibration. Additionally any of the Mamiya 645 lenses or lenses made for that mount can also be used which opens the focal length range up to 500mm and beyond with a teleconverter. Since one can easily swap the sensor back, there is much less built in obsolescence on the sensor front since you can, for a significant price, swap in a new sensor module including a



black and white achromatic back which does not need to be Bayer interpolated resulting in insane resolution. The camera body allows any amount of shutter delay from 0.5 second to a minute between mirror up and shutter actuation which is great for my style of shooting - I prefer to have the mirror come up and then the camera shoot the exposure after vibrations have settled down. I found a 5 second delay with mirror lockup and using the Scheider-Kreuznach leaf shutter lenses to be a very good set-up for stability. Tech and customer support for owners of Phase systems is beyond anything offered even through Professional Services with any of the DSLR companies. There is always somebody to talk to that can answer your questions. Your relationship with a company like Phase One is much more personal than it would be with Canon, Nikon, Sony, Ricoh (Pentax), etc.



The negatives of the medium format system, above and beyond anything else, is the price. Basic cost of entry for the current 60megapixel back, the 645DF+ body and a Schneider 80mm f/2.8 lens (50mm equivalent) is nearly \$44,000. The best image quality does not come cheap! The Phase One 645DF+ camera body that one attaches the digital back to the back of and the lens to the front of is archaic by today's DSLR standards. The AF performance is equivalent to 35mm before the dawn of ultrasonic motors (Nikon AF-S and Canon USM) and the lenses are all screw and gear driven. Similarly, even though the camera has matrix metering, it is rarely correct in the type of

shooting I do and has a tendency to overexpose bright areas. I felt like I was back in 2002 where every correct exposure is about 2/3 or 1 stop lower than the meter suggests. The Automatic White Balance is also not up to current DSLR levels and, inexplicably at times in a sequence of shots of the same thing, chooses a white balance that is either ridiculously low or high. Similarly, exposure bracketing of shots causes the AWB system to select totally different white balance levels of the same scene just shot at different exposures - the light hasn't changed nor has the camera position and neither should the white balance. This results in more work in the post production flow than with more modern DSLRs. Some of the button and wheel placement ergonomics are also not as well conceived as most modern DSLRs. The camera is basically an evolution of the Mamiya 645 camera that has been around for a very long time and dates back to the film era. A sensor this good and lenses as capable as the Schneider-Kreuznach lenses really deserve a modern, well designed high end modern camera body. Speaking of Schneider-Kreuznach lenses, there is a large gap in the leaf shutter lens line-up between 28mm (17mm equivalent) and 55mm (35mm equivalent). This gap is filled by Mamiya derived Phase One 35mm (24mm equivalent) and 45mm (28mm equivalent) lenses but since these lenses use the focal plane shutter, they are more prone to camera induced vibration. There is also no wide to medium zoom.



I experienced numerous lock-ups of the camera when using Leaf Shutter lenses where the body seems to get confused between the focal plane shutter and the leaf shutter. Similarly, the body occasionally would just forget that it is in self timer with mirror lock-up mode and not take the shot even though it was set up to do just that. I had to remove the camera's battery many times to clear little nuisances like this. Overall these



angle of view making the system a lot heavier and requiring a larger packing footprint for travel.

There are other medium format choices with more modern bodies. The Leica and especially the Pentax medium format systems offer bodies that are much more up-to-date but the sensors are significantly smaller and much lower in resolution than the Phase One sensors. The image quality difference to a D800E of those systems is less. The camera backs of the Pentax and Leica are not removable so there is no upgrade path without getting a whole new camera that costs in the five figure regime. The Hasselblad H5D has a removable larger sensor that is still a bit smaller than the Phase One IQ sensors but it is a more modern, almost video game like, camera body. The resolution is also significantly lower.

If you are looking for unequalled image quality and the ability to print really large prints from a digital camera and you do not need high ISO capability, you would be hard pressed to beat the Phase One IQ system but it comes at a very high cost and you need to be prepared to go backward in time on the camera feature and performance side of the equation. But if you can afford it, can handle some glitches now and then,

are annoyances although not show stoppers. The medium format style of photography is a slower more deliberate type of photography. Other little annoyances include the inability to turn off dark frame subtraction for multi-second exposures, very cheap plastic lens hoods (except on the 75-150mm and 250mm lenses), and a view finder that appears to only be about 97% in coverage. The 35mm format has gone through many more cycles of evolution and the camera bodies are therefore more tuned to all types of photography with better autofocus, higher frame rates, video recording and just a huge number of features for every style of photography. One final disadvantage is the size and weight of the system. The larger sensor requires longer focal lengths with much larger exit pupils for an equivalent

and demand the best image quality, medium format and the Phase One system is the way to go.

For me and my photography, the Phase One system makes sense for my landscape photography as I am seeing detail, depth and a three dimensionality I have not ever experienced before in photography. The digital back that makes most sense for my type of photography is the IQ260. This is a 60.5 megapixel full 645 frame sensor that provides an additional stop of dynamic range to the IQ160 and allows for very long exposures which none of the other backs allow. However I have not yet made the investment. I will re-evaluate the system once Phase One comes out with a new, more modern camera body and may finance it with selling some (but not all) of my 35mm equipment. They tell me "it is coming..."

