FLAAR Reports

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Medium Format Quality

Leaf, Imacon-Hasselblad, Jenoptik, Sinar and Phase One

Part II
What Camera to Use
to Photograph Paintings, Maps, Drawings, Posters
So you can print this art as Giclee

FLAAR Reports

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Caption for cover page: Imacon-Hasselblad medium format camera

Why medium format?

For years I used a Leica, because as a student I could not afford a medium format camera. Then, while a junior at Harvard I was able to use a Rolleiflex medium format camera while hired as a photographer on an archaeological dig in Tikal, Guatemala. When I returned to civilization I used my Grandmother's graduation present to buy a Hasselblad from E. Philip Levine. This was circa 1967. I soon found out that the results from medium format film were better in virtually every way than 35mm. The main advantage with 35mm cameras was being able to use long-lasting Kodachrome film: the 35mm version of that film was better in every respect than the medium format films, But otherwise, medium format beat 35mm.

Today the same is happening in digital photography. Kodak had two-page spreads claiming that its SLR/c and SLR/n are better than medium format. We have used both these Kodak cameras, and although in full sun the results are very pretty (prettier than shots from a Nikon D100), and although in some limited circumstances the Kodak camera is outstanding, overall a medium format digital camera beats 35mm in every way, shape, and form. There is no comparison (after having used them both).

Picture taken with Kodak SLR/c 35mm camera

It would be a challenge to find a person who has used a 22-megapixel medium format camera for a long time, and then dumped it to go back to 35mm (other than for the weight). I suspect it is the other way around: any 35mm photographer (me being one: I have a Nikon D100 and have used the Sigma (Foveon) SD9) who is accustomed to a 35mm, and then who is provided a medium format camera. I can't imagine them going back to 35mm (except if they are a sports or action photographer and need the speed and higher ISO of a Canon EOS 1D Mark II or Nikon D2x).

Canon EOS 1D Mark II 35 mm camera

But the advantages of medium format cameras have been overshadowed by their backwardness for three crucial years: 2000-2003. In those years medium format digital cameras were too expensive, too low in resolution, and too unwieldly to be used out on location. Only now have prices come down, resolution is up to 22-megapixels, and you have true portability[1] with the Leaf Valeo wireless. Nonetheless, the traditional manufacturers of medium format cameras are still coming to grips with the changes caused by photographers abandoning film and switching to digital.

After months of using both medium format digital and 35mm digital SLR cameras, I find the following advantages to the medium format:

- Viewer is clear: you see more, and more easily
- You can enlarge the resulting images to a larger size
- You have more clout walking into a shoot with a professional medium format camera than if you walk in with just a 35mm camera. If you have a serious camera, people take you seriously. If you also know how to use the medium format camera, your clients will really notice you.

[1] Since most paintings are photographed in a studio and not out on location, you do not need a wire-less cable-less medium format camera. You will get better results when you are tethered to your laptop because you can see the image more clearly (to know whether it needs improving). Usually you can access your camera's software more efficiently when you use a laptop computer than trying to work through menu layers on a camera's LCD monitor. But when you are deciding which medium format camera to buy, prior to 2004, only two medium format cameras were truly portable: the discontinued Kodak ProBack 645 and the Leaf Valeo 22 wireless. The Kodak ProBack Plus was almost untethered (it had only a bulky battery that required a cable). All other "portability packs" and portability solutions, especially by Phase One, Sinar, and others, were not acceptable if you needed serious portability in remote locations or were otherwise constantly moving while using your medium format camera. Today, in 2005, the other medium format camera companies are catching up with Leaf. In the meantime Leaf has updated their Valeo (which we have) to the Leaf Aptus. This is even more portable.

- 22-megapixel sensor is almost full-frame, so you can do architectural photography better than if you try to use a Nikon D100, Nikon D70, or Canon Digital Rebel. Olympus is the best example of why it is so much better to use a medium format: the Olympus sensor is so small that its lens reduction factor is the highest of any 35mm SLR camera (except perhaps the Sigma).

35mm cameras are better for sports and action; but you don't need an action camera when you are photographing giclee.

35mm cameras have a better selection of lenses: but you only need one lens when you are photographing giclee.

I have yet to find any reason to interest me in using a 35mm camera when a medium format is better in most respects. Besides, the choice for photographing paintings for giclee is not between 35mm and medium format, but between medium format and large format.

Cameras to hold medium format backs

Bronica is a division of Tamron, whose lenses in past years have deeply impressed me by their notable lack of quality. The Bronica medium format camera was always the most clunky of the medium format species. It would be surprising if the Bronca camera company can survive because it has no digital partner and always had marginal market share compared with the vastly more popular Mamiya.

Pentax medium format cameras can't take a digital back.

Fuji GX680 medium format camera

Fuji's excellent GX680 medium format camera is too large and cumbersome for the 645-size of 22-megapixel sensors. Most medium format backs don't go directly onto a Fuji anyway. But since Fuji continues, somehow, to be surprisingly profitable, it seems to continue to subsidize the medium format camera, including their attempt at a medium format back. Both of these Fuji products must be loosing money every month, but the profits from when Fuji was beating Kodak in film sales in the 1990's are probably still producing interest that is subsidizing such money-loosing divisions.

Rollei is one of my favorite medium format cameras. But it is unsure how long it will be before they go the way of Bronica (gradually losing market share) or go the way of Ilford (bankrupt). The Rollei 6000-series bodies accept some medium format digital backs, but not all of them. Rollei never made a 645 format camera, so Contax, Mamiya, and then Hasselblad took over this market. 6x4.5 cm format is important since the 22-megapixel sensor is close to this size.

Rollei cameras

Contax / Kyocera booth at Photoplus trade show

Contax is kept alive by a camera company by Kyrocera, a huge and successful Japanese conglomerate. Kyrocera makes laser printers, multi-functional office printers, cell phones, and other IT products. But Contax has a limited and declining digital future on its own. With no sensor partner, Contax has a dim outlook for medium format nor in 35mm. Their attempt to create a full-frame 35mm SLR digital camera, the N-Digital, failed, because they did not realize that it was the software and processing which made a digital camera successful: Contax was used to building a mechanical body and using Zeiss lenses: and letting Fuji, Kodak, and Agfa worry about the film.

Mamiya is a popular camera, but you need the kind that has an inter-changeable viewer. A fixed viewer won't work at all on a reprographic stand. However if you are going to use your camera on a tripod (not recommended due problems with parallelism (alignment)), then the normal fixed-viewer for the Mamiya 645 AFD is okay.

Mamiya 645 AFD with a Leaf Valeo digital back."

Hasselblad escaped the fate of Bronica by cleverly merging (being bought out) by Imacon. Since the Hasselblad name was better known than Imacon, the combined company goes by the name Hasselblad.

Older V-series Hasselblad cameras (like the several I still have, unused in a closet), can take most medium format backs. The newer smaller 645 format Hasselblad H1 has the electronic features that make using your medium format back easier: the H1 seemingly also gives you a histogram in a dedicated monitor, so the histogram does not smoother the view of the image itself (on the regular monitor).


Hasselblad cameras

Medium Format Backs

It is best to buy a medium format back from a company that is likely to still be around to provide tech support in the future. Since several medium format companies have collapsed (Bronica) or are lingering (Contax), it is useful to have a frank appraisal. You won't find this kind of information easily elsewhere. We hope that all the companies survive, but when a giant such as Kodak dropped totally out of the medium format digital arena, that was a warning that lesser companies would also face difficulties.


Megavision digital camera back

At Photokina 2000, Heidelberg, ColorCrisp, Heidelberg and Jobo all offered medium format backs. Before that even Arca-Swiss and Rollei offered medium format backs. But at Photokina 2002, most of these had dropped out: ColorCrisp was gobbled up by Imacon (if I remember correctly). By Photokina 2004 Megavision and Fuji had pretty much dropped out of the race (for medium format). Both were still alive, but Fuji rarely even showed a medium format digital system.

MegaVision is a small company, nice people, and a friendly and capable tech support person. Although they were early into the digital camera business, today they are at best a niche player, and do not have the operating capital to be a serious competitor in the future. However they are neither dead nor dormant; you can find MegaVision at PMA and sometimes PhotoPlus and PhotoKina, as a welcome guest in booths of larger companies. So in many ways MegaVision is more alive than Fuji, though I doubt either will have a medium format presence at Photokina 2006.


Fuji Luma II digital back

Fuji's much touted 20-megapixel sensor was vapor-ware. Fuji's hyped sensors for 35mm cameras get roasted in most independent reviews as being incapable of any better resolution than Nikon or Canon. Fuji does not even build their own medium format backs: the remnants of Dicomed built one of their early backs. I am not even sure Fuji has attempted to offer a 22-megapixel back. Their whole medium format program seems to be an orphan these days. For the last year not even the Luma II has been shown on the Fujifilm.com website.


Imacon camera at Atlanta Art Expo

Imacon engages in what we allege is potentially misleading advertising, touting their file size primarily at 16-bit depth. That is fine for capture, but all backs are the same in that respect. It is misleading to suggest that the Imacon achieves a larger file size in megabytes than a Jenoptik or Sinar, for example. You have to reduce the bit depth to 8-bits when you print anyway, so again, an image from an Imacon ends up the same file size as everyone else. Besides, Jim Rich, an independent color management and digital imaging consultant, author of technical books on Photoshop, has stated, clearly, that you can't tell the difference in the final print as to whether a file was worked in 16-bits or 8-bits. Obviously we take all our large format shots in 14-bit (their max) and we do all our medium format in 16-bit, simply because that is the expected quality (and the tradition). But we too have to downsize these to 8-bit when we print them.

Imacon is otherwise a good company with quality products, but it is not fair that they use hype that might tend to mislead people.

Jenoptik's EyeLike medium format back is heavily subsidized by their mother company (Jenoptik). The EyeLike back is as good as any other, has an active support group of photographers, a popular booth at PhotoPlus and Photokina trade shows, but is unlikely to survive competition with the combined Hasselblad-Imacon.


Jenoptik EyeLike medium format camera back

Leaf is a division of Creo (formerly CreoScitex, and before that, a division of Scitex). Leaf is made in Israel, the home of sophisticated high-tech digital equipment (Scitex Vision, Scitex scanners (now Creo), Indigo variable data printers (now part of HP), and so on. There is more innovation coming out of Israel than out of Germany.

Leaf America is imported by Mamiya America. Leaf backs also fit Hasselblad and other cameras. Their market has grown recently. FLAAR has a Leaf Valeo 22 wireless; it takes fabulous photos. But since we have a Cruse camera at one university and a BetterLight at the other university we don't use either 35mm or medium format to photograph paintings for giclee. But we do use the Leaf for almost everything else.

Mamiya announced at PhotoPlus that they would offer their own Mamiya ZD back (for their own "fronts" such as the Mamiya 645 AF). But even more innovative is that Mamiya is the first company to integrate a medium format sensor actually inside a 645-type of camera body. This will be the new Mamiya ZD. Only a prototype was available at PhotoPlus 2004, so there are no working models yet available in the US.

Mamiya ZD medium format camera from PhotoPlus 2004.

One immediate result is that Mamiya America will have their own back in addition to the Creo Leaf back.

This integrated medium format concept is the wave of the future. Surely Hasselblad will come out with a dedicated 22-megapixel camera too. This serves many purposes: first it makes it impossible to use any other back on such a model Hasselblad. Second, it makes any combo-system (one brand of camera combined with another brand of back) too expensive. Few people will want to buy a Hasselblad H1 and a Phase One back; they will prefer to buy a "Hasselblad H2-integrated" at 33% less price than the separate body and separate back.

The question is whether Contax or Rollei will wake up and form an alliance with Phase One, Leaf, or Jenoptik to build a competing dedicated medium format digital camera. Leaf, Phase One, and Jenoptik are, at the moment, out on a limb because they don't have a camera partner, especially now that Hasselblad is tied to Imacon, Mamiya is tied to itself. This leaves camera manufacturers Contax and Rollei potentially heading the way of Bronica (going out of business).

Phase One makes good products but an occasional advertising claim is misleading. They claim "full frame CCD." That is not true because this CCD is only 36.9 x 36.9 mm, which is not full anything. It is a highly reduced CCD compared with true medium format. Shame. Otherwise Phase One is more honest than Imacon; Phase One clearly gives the RGB output at 8 bits (24 bit is three channels, R, G, and B, each at 8 bit). This is the only acceptable international figure which is valid for comparison. All other numbers, at 16 bit and at CMYK, are not the numbers you should feature, because none of them mean a whit when your digital image hits the inkjet printer. Inkjet printers accept files ONLY in 8 bit and only in RGB (it is the RIP or printer driver that turns the file into CMYK).

Sinar is a Swiss manufacturer of traditional 4x5, 5x7, and 8x10 inch cameras. Four years ago Sinar was allied with Leaf in the sense that Sinar sold Leaf digital backs. Then Sinar learned enough so that Sinar could commission their own backs. Indeed Sinar came out with the first 22-megapixel back at Photokina 2002, a year ahead of everyone else.

Sinar uses the 22-megapixel chip from Kodak. Several of the other companies prefer the 22-megapixel chip from Dalsa. I am not aware of any independent test comparing the two (few people have both cameras available).

Sinar also makes 4-shot and 16-shot backs.

Sinar digital camera back

True Frame Size

Most digital camera manufacturers, in the early years, did not wish photographers to understand how small the surface of the sensor was. So digital camera manufacturers concentrated on the megapixel count, and not the physical width and height of the sensor. Only after the first year did photographers find out that early sensors, especially in medium format backs, were substantially less in size than the film types we were all used to.

Only today, with the 22-megapixel chips, is the physical dimension of the chip anywhere near the size of medium format film, and then only sideways (but this is a huge advance over the chips of three years ago). Today a 22-megapixel chip is about 36.7 x 48.9 mm; a full medium format is 60 x 60 mm; the popular smaller format cameras are 45 x 60 mm. So you still have a lens reduction factor, but not as bad as inside a Nikon D70, Nikon D100, Canon Digital Rebel, and no where near as bad as the lens reduction factor of a Sigma or Olympus 35mm SLR.

All this is academic today because the results from the 22-megapixel medium format chips are spectacular.

1-shot vs Multi-Shot

Today all medium format cameras have a CCD arranged in a Bayer Pattern. There are no CMOS sensors for mainstream medium format cameras.[2] I doubt if any more tri-linear scanning backs, such as an old model from Phase One (now discontinued) are made in medium format size (we do not recommend the Kaiser Scando or any other atypical formats or atypical technologies: the tri-linear scan backs we recommend are those at large format size, by BetterLight).

There are two 22-megapixel CCD sensor manufacturers: Kodak and Dalsa. Dalsa, a Canadian company, took over CCD business from Philips in Europe. They may have various models with technical differences among them. We are neutral, but have to admit that we are quite pleased with whatever chip is in the Leaf Valeo 22 wireless back. Dalsa made the CCD sensor used in the Mars Rovers; this chip is 1 megapixel, so don't worry about having just a few megapixels in your camera here on Earth.

Software and hardware enables some medium format backs to take 3-shots (one Red, one Blue, one Green). Most are arranged to take a second Green shot since our human eyes are sensitive to green. The result is a 4-shot camera.

The Imacon, Jenoptik EyeLike, and also the Sinar can accomplish 16-shot movements as well. This requires that the object be absolutely still; otherwise the pixels of each of the 16 shots won't line up properly.

[2] Leaf offered a "C-MOS back, 6 megapixels, but this is no longer a current back that I am aware of.

Alignment

Most medium format cameras have the lens aligned with the film plane (now the CCD sensor plane). It is primarily view cameras, which have an independent, moveable front plane and also a separate independent moveable back plane, where you have to align the camera parts first. With a medium format camera you just have to align the camera to be parallel with the item you are photographing. Usually this is done by eyeball, but that invites error. Although I have not seen any users of medium format cameras employing a Zig-align system, this is what I would recommend. We have to use a Zig-align system for large format cameras (such as the BetterLight). Yet at all trade shows where vendors of medium format cameras are trying to sell their solution for giclee production, I do not see any attention to the issue of alignment.

Of course the depth of field increases as the resolution decreases, so a medium format camera may tend to have more depth of field than a large format camera. Where you see the results of mis-alignment is when you enlarge all four corners of the painting. If the painting is not flawlessly parallel to the camera, then one or more of the corners will be out of focus.

At the Art Expo and Décor Expo trade shows, more than half the giclee prints in the exhibits have been printed from inadequate photographs, usually because professional photographers (who mainly do portraits, commercial product photography, architectural photography or landscapes) have never previously had to face the issues of alignment. The photographers don't see the printed giclee results either: all they do is take the photos and charge a large fee.

Cruse camera-scanner

This is one reason BGSU+FLAAR is receiving paintings from artists across the USA and throughout Ohio. We know the complete workflow of giclee: the photography, the color management, the RIPing, and the printing. The Cruse camera-scanner is fully aligned because it is a turnkey system. Besides, the Cruse photographs each pixel column independently; the lens does not have to look out to the corners because our model of Cruse camera has the patented Synchron table. So the corners of the lens are not used; only the center of the lens, the sweet spot so to speak.

Conclusion:
What Camera(s) Are Recommended for Photographing Paintings for Giclee?

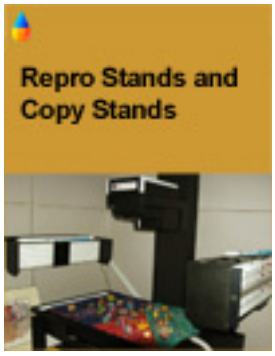
If your giclees are fine art photos (meaning you are printing photos, not paintings), then a medium format is one of the best selections for a camera. Your images will tend to be better than from any 35mm.

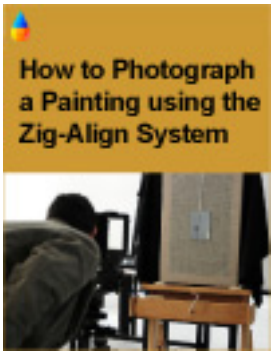
Medium format is easier to carry around and use out on location and gives better depth of field than a large format camera.

But for photographing historical maps, posters, drawings and paintings, to reproduce as giclee, a large format digital back, such as BetterLight, is a good choice.

Other reports in this Theme

Part I covers basic entry level cameras to record paintings for subsequent giclee printing.
The present Part II covers medium format cameras.
Part III covers large format cameras.
Part IV covers copy stands (for all sizes of camera)
Part V covers large format cameras specifically with the Zig-Align system.
Part VI covers the dedicated (turnkey) Cruse reprographic system, the professional system for a giclee atelier.





It was possible to briefly compare the results from a 48-megapixel BetterLight, an 11-megapixel Canon EOS 1Ds, and a 22-megapixel Leaf Valeo wireless on a Mamiya 645 AFD. All three cameras produce professional results. Each has pros and cons. No one camera is perfect; and one is not better than the other: they are different. Chosing one of the three depends on what you, and your client, need to see in the final print. Another consideration is efficiency while doing the photography and ease of alignment. We prefer the BetterLight and the Leaf; we would not use a 35mm, but primarily because we don't have to: we already have two cameras that are demonstrably better