

Digital Cameras Or Film Cameras by Garry Edwards.

Introduction

There is, of course, no such thing as either an ideal or a standard camera type or format. Today, digital has virtually taken over from 35mm for amateur photographers and has also made very serious inroads into medium format photography, at least as far as the smaller sizes are concerned – take a look at the second hand values of 35mm and small medium format film cameras in the window of any camera shop or on Ebay, incredible bargains are available!

But although digital is now almost universal, a lot of people still use 35mm and there are two other camera types, rollfilm and sheetfilm, each available in a range of options and formats, and this article sets out to explain the main differences, advantages and disadvantages of each. It is intended for people who have limited knowledge of the different formats.

To keep this article as short and simple as possible I have assumed the use of reflex cameras throughout (except for large format cameras). Obviously not everyone uses reflex cameras but most people do and the article is generally relevant to non-reflex cameras too.

I hope you find this article helpful. You might like to look at my other articles too, or to view my full-length tutorials on www.photolearn.co.uk

Digital

Digital cameras have a kind of magic all of their own, and their great advantages are that the photographer can see his or her results almost immediately, which encourages greater creativity and experiment, images can be viewed and enhanced on computer without the need for scanning of prints or negatives, the images can be sent by email or uploaded on to photo sites easily and quickly, and of course there are no costs in terms of film or processing, although of course it still costs money to make prints, proper photographic prints are available from digital files at the same cost as prints from negatives. And the enormous depth of field that results from the very short lenses used by cheaper digital cameras can be a great help with macro or close-up photography, where DOF is always a problem, and can be an advantage with many other types of work too.

But of course there are disadvantages as well as advantages - For the price of a half-way decent digital camera you can buy a really good 35mm or even a reasonable medium format camera, and the cost doesn't stop with the initial purchase because digital is evolving very rapidly and the depreciation is horrendous!

But the main disadvantage is image quality, which often falls a long, long way short of even 35mm film. Now this is not a problem for internet use, where only small files are needed, and the quality is plenty good enough for small prints - the limitation only shows up when larger prints are needed.

Now, I know that this is an emotive subject and people will claim that their digital cameras can produce enormous, top-quality prints, but look at the maths....

A good quality 35mm camera with a good lens (say a Canon L series or a Nikon) using fine grained film can resolve at least 100 pairs of lines per millimetre, and this equates, in digital terms, to around 35 megapixels. Several of the more expensive amateur digital cameras available today capture an image of around 6 megapixels, which can produce a print at the standard resolution of 300 p.p.i., of just 10" x 6.67". You can of course get larger prints, but to do so you need to either 'spread' the pixels more thinly, which reduces quality, or increase the number of pixels by interpolation, which makes the file bigger but which doesn't (and can't) improve the quality.

This doesn't mean that large prints from digital cameras can't be sharp, because they can be sharpened very easily (and very effectively) on the computer - but quality doesn't begin and end with sharpness and large prints simply won't have the fine detail of prints made from film. Interpolating the pixels on computer simply makes the files bigger – it doesn't and can't add information that isn't there and is a bit like making a beefburger physically bigger by mixing cereal to the meat.

But what about the cameras with more than 6 megapixels? Well, more pixels means more resolution but you'd be hard pressed to tell the difference between prints from a camera with 6MP and one with 8, or between 8Mp and 10. The reason for this is that if you want to double the resolution you'll need to multiply the number of pixels by 4. In other words, if you want to produce a print of 18"x12" at 300 ppi then you'll need to start with a camera with 19.44 MP.

Not all of the quality problems are directly related to the resolution or to the size of the sensor. One serious shortcoming is caused by the limited dynamic range that digital cameras can record. Dynamic range is the range of contrast that can be recorded.

Digital cameras only take 1 type of 'film' and it's very similar in its characteristics to transparency, or slide film - it can only handle a very limited range of contrast, so although this isn't a problem in the studio, where contrast can be controlled, in bright sunlight or where there are other extremes of contrast it's easier to get better results by shooting on negative film, which has a much wider contrast range, and to scan the images into your computer. This is especially important in wedding photography, where typically the Bride wears a white dress and the Groom wears a black suit- this

stretches the capability of digital under any lighting conditions but creates an impossible situation in bright sunlight.

This shot shows adequate detail in the face but the detail in the white coat has 'blown out' or 'burnt out' (different ways of saying lost) and there is no discernable detail in the darkest areas either.



Fill flash can reduce the contrast in bright sunlight (if your subject is close enough) and shooting in raw format allows the contrast to be controlled without quality loss and for the dark parts and the light parts of an image to be combined if necessary, but this can only work satisfactorily if all of the data needed for the combined image was captured in the first place, and is a very time consuming process.

The greatest single cause of quality problems with digital cameras is probably directly related to their success - as digital photography continues to evolve, manufacturers have used their production technology to minaturise the light-sensitive chips on which the images are recorded. This reduces their costs dramatically and there can be advantages for the user in terms of camera weight and size - but at the cost of quality! The reasons for this are fairly complex, but it is all related to the actual (physical) size of the pixels - the smaller the chip, the smaller the pixels that fit on to it must be and the smaller the pixels, the less sensitive they are to light. In an attempt to make them more sensitive (higher ISO ratings) the manufacturers effectively turn up the voltage, which affects the signal to noise ratio and greatly reduces the quality. And to make matters even worse, the marketing hype persuades people that more pixels are better, so higher and higher numbers of pixels are being crammed on to smaller and smaller sensors....And this

in turn requires shorter and shorter focal length lenses, which creates its own quality problems because tiny lenses can only be used at wide apertures.

With the shortest lenses there is an enormous quality loss if the lens is stopped down to smaller than around f5.6 and with the better consumer digitals the effective limit is around f7.1 - even if the lens will stop down to a physically smaller size.

So how small **are** these sensors?

The smallest are only around 3x4mm - leaving aside the technical limitations mentioned above, that is an enlargement of over x50 to get a 10"x8" print...



Am I saying that digital is a waste of time and money then? No, definitely not. I have a Kodak 14N and Fuji S2Pro and Fuji S3Pro cameras and I'm very happy with them - the trick is to recognise the limitations!

I also have a professional digital back, that I use with my medium format and large format cameras and the results from this (expensive) piece of gear are every bit as good as the film they replace.

My advice to anyone thinking of buying a digital camera is:

1. Decide whether digital technology will produce the type of results you want

2. Choose a camera made by a camera manufacturer, e.g. Fuji, Nikon, Canon, Olympus, or Sony (Konica Minolta) who generally produce cameras with larger chips and decent lenses, and not by an electronics firm.
3. Make sure that it will record images in raw format as well as in JPEG - raw files are much bigger and slower than JPEGs but when quality is important you will need to record in raw. If you're into studio photography, make sure that the camera will synchronise with studio flash. Most cameras can be used with studio flash even if they don't have a PC socket, simply by plugging a radio trigger or an adapter into the hot shoe, but some, such as Minolta, use a non-standard connection.

35mm

For many years now, 35mm has been the camera of choice for news, sports and wildlife photographers as well as for family snapshots, and because most of the better cameras can now be used with a choice of auto and manual focus and a choice of auto or manual camera settings, they are ideal both for beginners and for people who want to have total control of the camera settings.

Quality has always been a limitation with 35mm - after all, the negative is only 36x24mm and the 3:2 ratio is less than ideal when making 'standard' shaped prints of 10"x8", so the usable negative can be said to be only 28x24mm - but tremendous improvements in film emulsions have improved quality enormously.

And even in the 'bad old days' of earlier films, good quality was still possible. As long ago as 1960 (and perhaps even earlier) Leica technical salesmen showed their customers beautiful 20"x16" prints produced from their 35mm cameras - and there was a famous cigarette advert from about the same time, shot on 35mm and enlarged to a 48-sheet poster!

The problem with quality then, as now, is that although the medium itself is capable of a great deal, everything about it must be perfect. Excellent lenses, perfect focussing, perfect exposure and perfect development. And perfect composition in camera too, because the negative just isn't big enough to allow for a lot of cropping.

Perhaps the greatest advantage of both 35mm and digital cameras is the now universal zoom lenses, which have improved a great deal in both range and quality. There are still some people who don't like zoom lenses because of their lower quality and relatively small maximum apertures, and perhaps because they tend to encourage people to be lazy and to take their pictures from wherever they happen to be standing instead of where they should be standing for the best viewpoint and perspective, but they certainly make life a lot easier!

Another disadvantage of zoom lenses is that their maximum focal length is getting longer and longer, which tends to encourage camera shake (as a group, 35mm

users have never been too keen on using sturdy tripods) and many people now use 400 ISO films or even faster to counteract this. In my own view, fast films should only be used only when poor light makes them essential, and the resulting loss of quality is justified. Unfortunately film manufacturers encourage people to use faster films by pricing them higher, with the result that some people, believing that the more expensive films are also better, buy films that are unsuitable!

About medium format

Medium format is the next step up (and a big one in terms of both quality and cost as well as weight) from 35mm but the term 'medium format' is only a general one, and includes a vast range of both film formats and types of camera. The only thing that all medium format cameras seem to have in common is that they all use 120-size film, but the many different cameras produce 4, 8, 9,10, 12, 15 or 16 from a roll. Many also take size 220 film, which is twice the length but thinner, and with backing paper only at the ends.

6cm x 4.5cm

The smallest medium format cameras produce 15 or 16 shots to a roll of film, with a nominal size of 6x4.5cm. This format almost perfectly matches the standard 10"x8" print ratio and with a negative 2.7 times the area of 35mm, gives a very worthwhile improvement to quality. Some of these cameras are very similar in design to 35mm, with (expensive) zoom lenses, auto focussing, auto metering and fixed film backs. Others have a choice of waist-level or pentaprism viewfinders and have interchangeable film backs, which allows the cameras to be used with both professional digital camera backs and Polaroid backs. Unfortunately the digital backs cost about 5 times as much as the camera and the Polaroid backs take the same size Polaroid film as their much larger brothers, which is a waste of expensive polaroids! They are however far more versatile than their '35mm type' brothers, and far more useful for serious amateurs and professionals in most types of work. The ability to change film backs makes it possible to shoot the same subject with different types of film, and the ability to change from pentaprism to waist-level viewfinders is a big help too - but as with any rectangular format, a pentaprism is all but essential when turning the camera on its side to change from portrait to landscape setting - when the camera is turned the image turns upside down too, and trying to compose a shot with the viewfinder image upside-down as well as back-to-front is, well, interesting!

These cameras produce much better quality than 35mm, but they are not ideal for

everything. They are a good deal larger and heavier than 35mm cameras, the range of available lenses is much smaller, the cameras and especially the lenses are much more expensive, film and processing is more expensive too and the cameras are far less suitable than 35mm for action shooting.

6 x 6cm

One of the most popular medium formats is the 6cm square image. This dates back to the Rolleicord twin-lens reflex of around 1919 and was no doubt chosen because of the practical impossibility of turning these cameras on their sides - much easier to make the negative square, so that the final shape of the image could be determined later, in the darkroom, especially as most people at that time did their own darkroom work. And when Hasselblad brought out their first model in 1948 the pentaprism still hadn't been invented and the problem of turning the camera on its side was still there, and so they used the same square image shape.

But the shape which evolved out of practical necessity soon became a virtue, and although very few images from these square negatives end up being printed square, there are a large number of photographers who like shooting square and deciding on the crop afterwards. Because of this a lot of people regard 6 x 6cm as the ideal format, and the only real problem is the waste caused by cropping most of the negatives to the standard rectangular shape - when cropped to 10"x8" proportions the effective size of the negative is only 6 x 4.5cm, even though the camera has produced only 12 negatives from a roll of 120 film.

Some of these cameras, especially the Hasselblads and Bronicas, are very versatile and have an enormous range of lenses and other accessories including, of course, Polaroid backs, interchangeable film backs and interchangeable viewfinders, but others are far simpler. Twin lens reflexes have gone out of fashion now, but there are still a lot of people using old Rolleiflexes and Rolleicords, Yashicas and Autocords and even the Lubetel, none of which have interchangeable film backs or interchangeable lenses. As far as I know, only Mamiya produced a TLR with interchangeable lenses, and I used their C330S model myself until a few years ago.

The main disadvantages compared to 35mm or digital, as well as the cost of the equipment, include weight and bulk and the fairly long time lag between pressing the shutter button and actually taking the picture on single lens reflexes, which makes them unsuitable for fast action shots.

There is virtually no delay however with twin lens reflexes, which are just as quick as rangefinder cameras - but they are also less than ideal for fast action shots because the viewfinder image is laterally reversed, which means that the action is going in the wrong direction!

6 x 7cm

The next step up from 6x6cm is 6x7cm, but the difference between them is much more than the obvious 1cm, because these cameras produce a rectangular negative that matches the popular 10"x8" print ratio, and so all of the negative is used. This means that the negatives have an area 5.75 times larger than the usable 35mm negative (24x28mm when cropped to the same proportions) and the difference in image quality is Well, there's just no comparison!

The 6x7 market has been dominated by Mamiya, who have their wonderful revolving backs, fitted to their RB67 and RZ67 cameras, which allows photographers to change from portrait to landscape without turning the camera on its side. These cameras have quite a wide range of lenses, including tilt/shift lenses and even a zoom, and have become the industry standard for professional studio work. Why studio work? Well, working in a studio it doesn't really matter how large the cameras are, how heavy the tripod needs to be and how much the lenses weigh!

And of course, it's all getting a bit expensive now, there are no third-party lenses and just 10 shots from a roll of film...Don't even think about using these cameras for fast action shots, they use between-the-lens shutters, which means that they synchronise at all shutter speeds, but the downside is that there is a long, long lag between pressing the button and taking the picture.

Here, to illustrate the point better, is the sequence:

1. Press the button
2. A large flap comes down at the back of the camera and covers the film
3. The mirror (a large one) goes up out of the way
4. The shutter closes
5. The rear flap goes up
6. The shutter opens and closes, finally taking your picture!

6x8cm

This format was developed because its proportions match the standard print sizes, so will print on A4, A3 etc with no negative wastage, but it has never really caught on. 9 shots to a roll of film.

6 x 9cm

There are still a few cameras taking this size, producing 8 shots from a roll of film, but it has the disadvantage of 3:2 image shape, the same as 35mm. Interestingly, there are a couple of cameras which are similar to oversized 35mm's, used at eye level.

6x17cm

These are specialised cameras for panoramic shots, producing just 4 shots from a roll of film. I'd like to tell you all about them but I've never actually used one!

Other panoramic formats also exist, there is at least one 35mm, and some medium format cameras also produce panoramic images. There is also a panoramic 6 x 12cm rollfilm format.

Large format

Large format photography is very different from 35mm and medium format, and although it is outside the experience of most amateur photographers there are quite a lot of keen amateurs who use them for landscape, architectural and portrait photography.

Large format cameras take film sizes from 5"x4" (the most popular size) upwards. They are also known as plate cameras because the film used to be in the form of glass plates. Now it comes as thick (for flatness) sheets, which are loaded into darkslides in the darkroom or, more conveniently, as Readyload (Kodak) or Quickload (Fuji) sheets contained in their own paper darkslide, which fit into a Polaroid holder or into their own special holder.

The cameras themselves come in 3 types, Field cameras are the simplest, they are folding cameras which have limited front movements only. Monorail (or view) cameras have a wide range of movements both front and back. The fronts can shift up or down, go side to side, tilt upwards or downwards and swing from side to side. Technical cameras are similar to field cameras but have a wider range of movements.

The movements are used to control the picture in many different ways. For example, if you point an 'ordinary' camera at a tall building you will normally need to tilt it upwards to get all of the building in. But because the back of the camera is then not straight in relation to the building, the building ends up looking as if it's falling over backwards. And if you point an 'ordinary' camera at something, say a product, that needs to show its top as well as its front, you get the same thing in reverse - it looks top heavy and seems to be falling forwards. With a large format camera you would simply point the camera straight at the subject, keeping the back straight, and would then raise the front of the camera to include the top of the building and cut out unwanted foreground, or lower raise the camera up and lower the front of the camera in the case of your product. The result is the same in each case, perfect image geometry!

You can of course get similar results in photoshop (select, then edit/transform/perspective (or distort) - but the results are nowhere near as good.

The lens (front standard) and the film back (rear standard) can also be tilted or swung to change the plane of sharp focus to match the shape of the subject, in effect getting everything on your chosen plane in sharp focus. The physics for this was worked out by an Austrian army officer, Otto Scheimflug, in 1904 (very clever lad) and is known as the Scheimflug rule.

The lenses for large format cameras are remarkable, because they need to cover a much larger area than normal to allow them to be shifted up, down or sideways and swung and tilted. The maximum aperture is often f5.6 or f8, but this is used for viewing and focussing only, and shooting is normally carried out at between f22 and f45. Smaller than f45 and diffraction can set in, although this is much less of a problem with large format than with small cameras because, typically, the negatives aren't enlarged very much. Most of my work is done on a 5"x4" but I also use 10"x8" for some food shots, and have sometimes shut the lens down to f90 at this size.

Except for one or 2 of the old press cameras, large format cameras have no viewfinder. The shutter is normally contained in or just behind the lens and the camera is focussed using a ground glass screen, which is spring-loaded and positioned at the film plane. When the film holder is inserted it simply takes the place of the ground glass screen. The image is, of course, upside down and is focussed and viewed under a black cloth. Great fun and not easy - but the quality is out of this world!