

STEP INTO THE WORLD OF DIGITAL QUILT PHOTOGRAPHY

By Bob Dennis

You can stitch but you can't hide, digital quilt submission is coming. But what do you do? No digital camera? Not an issue. Can't tell a JPEG from a TIFF? What's a pixel? How can I make my quilts look their best? The following will answer the important questions and help you into this brave new world.

But why digital?

The world of photography has, for the most part, gone digital. Chances are you already own a compact digital camera or if you are lucky you have a digital single lens reflex (DSLR) camera. Why has this happened and why is Queensland Quilters Art Quilts (2QAQ) going into digital submission of quilts for selection?

The drivers for digital photography are immediacy, limited cost (after the initial outlay), ease of image manipulation and ease of sharing. One just has to watch families cluster around a camera, looking at the image on it's back, to appreciate immediacy. While the cost of the digital camera and computer are expensive, the ongoing cost equates to recharging the battery. Muffed the shot, just get them to smile again, click and delete the spoiled image. There is much cheap, easy to use software to crop the image and do other changes. Lastly sharing; what a fabulous world we live in when we can snap an image then download and email it to the other side of the world in minutes.

The advantages for 2QAQ are convenience, the ability to enlarge for inspection, the ability to send to involved people, wherever they might be, ease of sending for publicity and ease of storage. There is also no need to send back slides or photos, as all the quilter will send is a copy of the quilt image.

No digital camera, no worries

Film cameras take higher resolution images than all but the highest resolution (read very expensive) digital cameras. Until recently most of Sue Dennis' publicity and submission photographs were taken with a film camera as slides and the digital images were scanned to disk by the film processing laboratory. This was despite Bob having a very expensive DSLR capable of taking exhibition quality prints. Did Bob refuse to take them in vengeance for Sue's all consuming interest in quilts rather than him, you might think, but no there were other reasons.

Light is more important than whether the tool to make the image is film or digital and we didn't have the right setting and lighting to take the superb quality images that Sue demands for her quilts. This was recently corrected and now Sue is going completely digital for convenience.

So no digital camera - go the film route and have your slides/film scanned. Use a high quality processing laboratory as it's worth the extra money to avoid strange colours from use of old developing solutions, scratches, dust and fading slides or negatives, and have the slides scanned at the highest scanning resolution. You should aim at 300dpi (dots per inch across the image) on an image approximately A4 in size (21cm by 29.7cm). This would

produce a JPEG format image in the 4MB to 8MB size depending on JPEG compression. Good advice is to do a test run and assess the images for clipping at the light and dark ends for all three primary colours before committing to large runs with any particular processor. See the section below on manipulating the image for details on how and what to look for.

How the photograph was taken is very important

If you can find a professional or advanced amateur photographer to take the images for a reasonable cost get him/her to do it. Would you expect your partner to make a reasonable quilt? Hardly, so why do you think they would be able to take an excellent quality image? The advantages of using a professional or advanced amateur photographer are; they have spent a fortune on top quality gear (just like your sewing machine), they have a studio setup with light carefully controlled and applied and they know what they are doing and how to bring out the best of the quilt in the image.

OK, you can't find a professional photographer in your budget. With stash funding requirements and high thread costs this is entirely understandable. Besides, you have this great little \$200 digital compact that takes fantastic pictures of the dog/kids/grandkids and it takes 8/10MB images, the same size as those from a \$2,000 DSLR. Well you can use it but there are limitations, discussed below in the sections on image quality.

The first thing you need is a place to take the photograph. You need to be able to be able to control light, wind and background and doing it all is not always easy. My first attempt at home quilt photography was a disaster. I rigged up some old white sheets on a rod under the house eaves on the patio thinking 'good natural light'. In reality with the slightest breeze the sheets and quilt bent and swayed restricting photographing to still times. Our eyes and brain have beautifully transparent mechanisms to correct exposure problems, but when you take a photograph the whole image is frozen and differences in the amount of light become readily apparent. What a shock I got when on loading the images into the computer Sue's beautiful naturally lit quilts ranged from black in the shadows of the eaves to almost overexposed at the bottom. It was back to the professional photographer.

- Background must be neutral, preferably light grey, but soft whites are OK. Painted flat textured walls work but you may need to rig up a drape. The background needs to be large enough to accommodate your largest quilt, and some, with enough clear distance in front to be able to frame it with the lens of the camera set to a zoom length that has minimum distortion. Zoom lenses commonly distort the shape of the image with verticals bent to barrel shapes at wide angles and bent in to hour glass shapes at telephoto settings. There is a range in the middle where there is minimal distortion. Take a series of photos of vertical lines at various zoom distances to find the right setting then position the camera at various distances from the quilt to get it all in the frame. The distortion is typically worse for the small lenses used on cheap compact cameras than on SLR cameras.
- The best way to control wind is to be inside, however this can make lighting difficult.

- There are two choices in light, natural light or flash/studio light. You can use either or both but the trick is the direction the light is coming from. Look at figure 1, the photo on the left was taken with only the flash on the camera. The light was coming directly from the camera and back, evenly illuminating all the valleys in the quilt, making it look flat and dreary. The photo on the right used the flash off camera with light slanting across the quilt, adding depth because of the shadows. After spending a zillion hours carefully stitching in texture you certainly want the jury panel to see the results of the effort, not stare at a flat mosaic of colours.



On camera flash produces a flat image textured image



Side flash produces a

Figure 1 On camera flash lighting or side lighting?

Lighting

It is difficult to implement cross flash lighting with a compact camera because few, if any, have an external flash outlet allowing a second flash to be used for cross lighting. Good DSLR cameras have all these features built in, making this a relatively easy exercise.

Natural light can be used. We have a house with windows and glass doors either side of a long end wall. This is a natural cross light situation and good texture can be recorded without a flash. However, because of the environment the total amount of light is less and exposure times need to be long but by using a tripod for the camera very acceptable photographs can be made.



Beware of artificial room lighting. Figure 2 is horrible, right? It was taken to demonstrate colour temperature. OK, stop kidding around, you might think, colour isn't hot or cold. Well to a photographer it is and you have probably seen the effect in your family snaps. Photos of the kids late in the day on the beach are suffused with a lovely amber tint but the family in the middle of the day under the dense shade of that big tree look a bit cold and

blue. Photographers use the term colour temperature to describe these effects.

In Figure 2 very warm tungsten light is lighting the handsome model from the left while a horrible sickly yellow - green neon light was used on the right.

House lighting can have extreme colour temperatures. Non daylight fluorescent lighting is cold and has a nasty yellow - green tint while tungsten bulbs are warm giving an amber cast. Some types of lights only produce light over a very small range causing interesting and often ugly effects. *Turn off the house lights and rely on natural or flash/studio lights.*

The Home Photographic Studio



The setup for taking reasonable home quilt photographs does not have to be complicated as shown in Figure 3. This is what we use to photograph Sue's quilts. It consists of a couple of tripods, a neutral wall and a remote flash for side light.

Figure 3 A simple home photographic studio setup

Exposure and sharpness

OK, you're still sticking to that 12MP compact. Because you can't control an external flash you are taking the photos in natural side light on the back wall of the lounge, after moving the hubby and sofa to one side. You spent time setting up the shot, which turned out to be a one second exposure. However, on zooming in on the image in the computer you think, 'Why can't I see those stitches?' Unfortunately, the all automatic compact camera has probably done more than one thing, although you have probably only noticed the long expose. It has probably opened up the lens aperture to maximum, it has probably automatically wound up the ISO speed to maximum and in an attempt to drag in more photons it will have increased the exposure time.

To explain the jargon in the last paragraph these definitions may help.

- **Exposure** is the process of getting the correct amount of light on the film or digital camera sensor. It derives from the old process of taking the cover off, exposing the gelatine plate used to record the image on the earliest cameras. The amount of light can be controlled by lens aperture, time of exposure and the sensitivity of the film/sensor.

- **Aperture** is the adjustable hole built into the camera lens, usually it is a ring of blades (diaphragm) that change in size letting in more or less light. Lens aperture affects both the depth of field and the sharpness of the image. The setting amount is called the f stop on cameras that allow you to control the adjustment. Whew, more jargon, I'll explain below.
- **Depth of field** is the distance in front of the camera that is in focus. Objects closer than the front plane of the depth of field are blurry as are those further away than the back plane of the depth of field.
- **Sharpness** is how clear the image is, whether you can see those wonderful stitches or they look hazy.
- **F stop** are numbers, typically seen on a ring on SLR lenses, that denote how much the aperture is open or closed. Small numbers mean the aperture is wider open and large numbers denote a smaller, more closed aperture.
- **ISO** is a numbering system that was devised to describe the sensitivity of film to light. High ISO means that little light is needed to get correct exposure, low ISO means more light is needed. The same system has been implemented in digital cameras but instead of changing the film to change ISO you can do it for each and every shot or just set it on automatic.
- **Photons** are particles of light. What, light is just there to see isn't it? Warming in the sunlight you don't feel like you are being sand blasted with little particles but the nerds are right and indeed the behaviour of light is both like waves and like very small particles. Digital photography buffs have adopted the term with gusto and use it to impress the uninitiated, so beware and be forearmed at the next dinner party.

Are you now ready to buy your husband/wife that DSLR that he/she has been lusting after these last two years and let them take the photos? It would be worth it after wading through the above list of jargon, wouldn't it? But you want to persevere so what do you do?

Well the first thing you do is buy a **tripod**. These are cheap and are undoubtedly the best aid to getting sharp photographs. Attach the camera to the tripod. Oh, no thread to attach it on the base of your compact digital camera? Blu-tack is a wonderful substance so use that. No shutter release? Read the manual and work out how to apply time release, that way you are not wobbling the camera all over the room during that two second exposure.

Many compact digital cameras have no way of controlling the aperture manually but it's probably worth a troll through the manual to see whether there is a way to do so or better still, if you are in the market for a camera make sure you buy one where you have control over aperture, shutter speed and ISO in addition to the usual automatic modes.

Assuming you have some control over aperture, lenses are usually sharpest at medium apertures. On the lenses I use, the sharpest images are obtained in the ranges of f5 to f11. This can vary between lenses and searching on the Internet is a good way of finding information on this for various lenses, or you can experiment by taking a series of

photographs with varying aperture. The middle apertures also have the advantage of giving a decent depth of field. If you use the very smallest f number (widest aperture) depth of field will be very narrow and it is easily possible, if the shot is not straight on, to end up with part of the quilt out of focus.

If it is controllable set ISO toward the lower(st) range available. At high ISO settings the image will become grainy (film) or noisy (digital). The explanation is technical and involves photons so I only ever espouse on this at dinner parties. The grain/noise will be most evident in darker parts of the image and can detract from its appearance.

Framing

After the last section this is easy going. Set the camera on the tripod in the middle of the quilt both in terms of height and laterally. This is to avoid keystone effects in the quilt image. Place the camera at a distance from the quilt and zoom range needed to frame the quilt with minimal barrel or hour glass distortion. Frame the quilt, allowing some but not too much margin around the outside of quilt. Beware that some automatic focus cameras change the zoom slightly when they focus so half press the shutter or look on the back after taking the shot to make sure this has not thrown part of the quilt out of the frame.

It is important that you have the quilt occupying as much of the frame as possible, leaving a small margin, because the amount of detail that can be seen is dependent on the DPI of the image. If the quilt is a small postage stamp in the middle of a blank white wall then there are few pixels on the quilt image to allow anyone to assess the quality of your work.

In the Computer

First thing - **NEVER EVER** adjust, change or resave your original out of camera file. Organise folders on the computer to keep the files and back them up, then back them up again. Make sure you have a back up out of your house, because if it burns down or a thief visits you can replace your stuff, but you can't always go back and re-take the images. Saving some image file types degrades the quality of the image through a process of compression, hence the warning not to do multiple re-saves of an image. Each one will be a degraded copy of the previous one.

Digital images are large files and getting larger with each new camera generation. You need to consider this in your back up strategy. I am now using dual half terabyte (TB) that is 500megabyte (MB) portable hard drives with the same data on each drive. You probably won't want to go to that extreme, but I take a lot of photographs. The reason for two is the risk that one might fail or get lost with a total loss of data. If you use CD or DVD back up also do duplicate back up as they too have been known to fail.

Don't panic about this, people worry about digital data security because the technology is new and the dining room experts are out to scare. I have been through five home computers and numerous work machines over the last twenty years and still can access data from the earliest time (if I could just remember what it meant or why I did it). This is far better than I have managed with paper files and many of my early photograph negatives have degenerated with age. Digital images will never degenerate.

The Un-manipulated Photograph Fallacy

So many times I've seen requests for or arguments supporting "un-manipulated" digital photographs. These requests spring from ignorance or misunderstanding on the part of person making the request or argument.

All images film or digital are a manipulated representation of reality. The only difference is that the manipulators have changed from Kodak chemists to you on your computer. Power to the people I say and you can only output what is in the quilt image originally, you can't artificially make it better than it is in reality.

What do you do if you are confronted by one of these bizarre requests? Two choices really, either don't submit or bring out the best with your computer rather than darkroom post processing and just submit the image. In the typical file formats requested there is no way for the righteous to know what you have done to the image.

File types

There are many different image file types but there are only four that you need to know about as follows.

- **JPEG** is the most common file type and just about every digital camera can export this type. The cheaper compact cameras can only export this type of file. The file sizes are small but the compression mathematics will degenerate the image detail to some extent. This is acceptable in most cases but for your quilt photographs make sure you always set the camera and any other software used to save the highest quality and largest file size setting. This is particularly important in the camera where many people just accept the default settings that typically aren't the highest resolution available on the camera. Read the manual and change the camera set up for highest quality or you will never get the best quality quilt images. Because of the advantages of file size most people accept JPEG files despite the compromise of slightly reduced image quality involved.
- **TIFF** is a no loss (no image quality is lost in saves) image file format and some people will ask for images in this format. It encodes additional information such as the colour space of the image. However, the files are huge to the point where an A4 300dpi image is way too large to email. If you are asked to use this format you will need to post a CD.
- **Bitmap** images (BMP) are also no loss and files are also huge. It is a simple format, which doesn't encode any data but the image itself. This has gone out of fashion and it is unlikely you will be asked to provide images in this format.
- **RAW** image files are camera specific files, which encode all the information from the sensor with minimal in camera processing. These are proprietary file formats and you need camera specific software to manipulate them. You will never be asked to supply a file in one of these formats. I explain so that when your advanced amateur friend starts talking about them you won't have such a blank look. It's

good trivia for dinner parties as well. RAW files preserve all of the information from the camera, which can be very useful if you know how to process them.

Colour Space and Clipping

Colour spaces are the range of colour in a red, green, blue (RGB) world that can be represented by a device, say a camera, computer screen or paper print. All these devices have limitations on the amount of RGB colour they can represent. Often the colours represented by the device are less than what our human eyes can see. Digital imaging systems represent each of the three colours RGB by three numbers each from 0 to 255. The numbers specify the amount of red, green or blue light for each pixel in the image. Blending the three colours at the intensity defined by the numbers produce any colour that can be seen. Fine, but what happens if the object has more of the colours than the camera, computer screen or print can represent? What happens is called **CLIPPING** and it is a major problem for digital cameras and processing. Figure 4 below shows parts of two images and a graph of the colour intensities in RGB for each image. The one on the left has no clipping and the one on the right has the more intense red spectra clipped. Loss of image detail can be seen on the right because the fine detail, which was formerly represented in the red colour channel, is now clipped. This effect can occur with film but it is not as extreme, with a shoulder of decreasing response, rather than a sharp cut as occurs in the digital world.

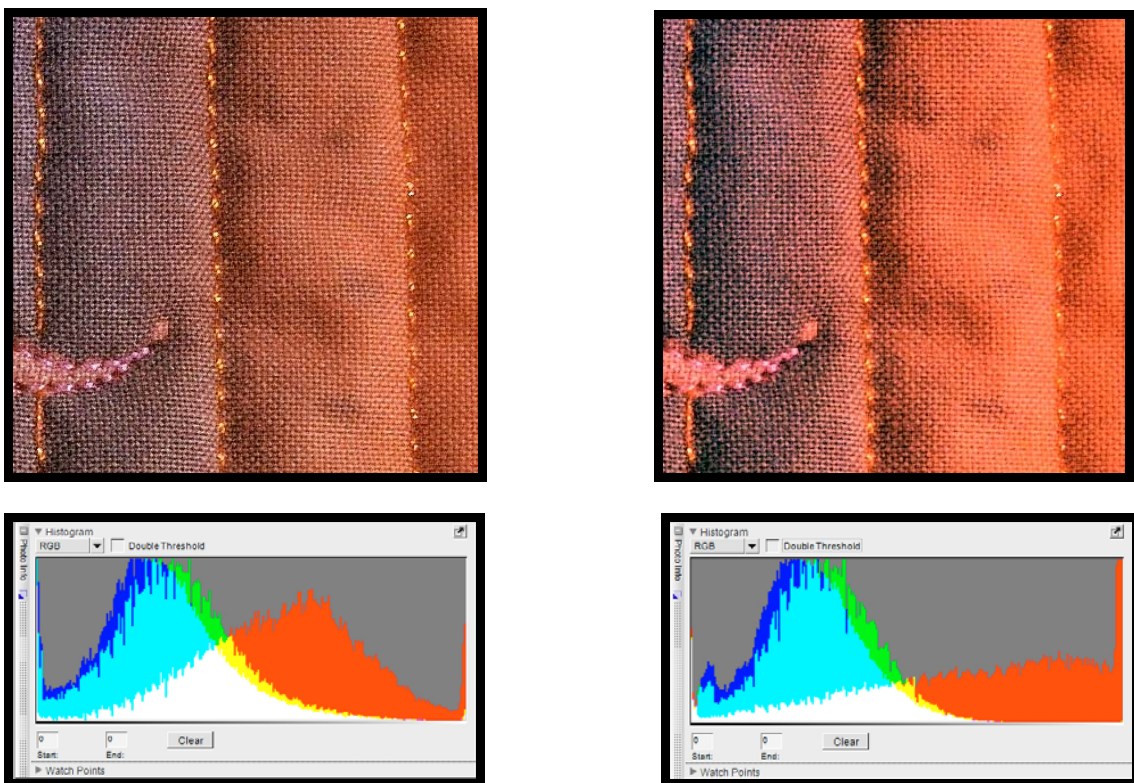


Fig 4 The section of the quilt on left has minimal clipping of the red part of the spectra while on the right this part is strongly clipped with loss of detail in the red part of the image.

The above is very geeky but has huge implications for digital quilt images. You all love detail and why spend hundreds of hours stitching in fine detail that the camera just clips away like a discarded toenail? If you love bright colours they are the ones that are right out there at the 255 end of the 0 to 255 numeric representation, the ones that will be clipped, losing detail in the bright areas of the quilt. On typical digital camera systems it is the red channel of the sensor that is less sensitive, so this channel is typically the one where problems will show. Guess what, Sue just LOVES red and bright orange. I quake with each finished quilt when she stresses my sensors!

Back to that \$200 compact digital camera, it's manufacturers have studied people and know they are immediately attracted to bright colourful objects. The cunning blighters install in camera processing that adjusts the information coming from the camera sensor so that the image fills the whole 0 to 255 space, problem is they go too far, and when you point the device at that tropical fantastic quilt sometimes those bright areas with intricate stitching are clipped to a blur. The manufacturers automate the whole process and once the JPEG file is written the information is lost forever.

You can use a compact digital camera but understand there will be compromises. If you are purchasing a camera, one with RAW file output is optimum. If you don't want to go to this expense and trouble, check whether the camera has exposure compensation. Use this to move highlights away from the dreaded 255 number. Deliberately underexpose the image a small amount. The images will appear dark but judicious work on the computer can fix that without the loss of detail. I'll explain how to do that below. With a camera outputting RAW files you can in all but extremely over exposed images use the camera manufacturer's software to make these adjustments.

Computer Image Software

There is abundant choice of image processing software. Photoshop is king but you would need to put off your next sewing machine purchase to pay its exorbitant cost. There are many cheaper packages even some that are free, eg GIMP. (I've played with GIMP and it has many of the capabilities of Photoshop, but the interface is not as polished, and their implementation of 'unsharpen mask', in my opinion an essential tool, is very slow and almost unusable.) As I process most images from RAW I find myself using Nikon's Capture NX for most image adjustments. It is not as good as Photoshop but suffices for most things. I won't recommend any particular software but will just highlight what features to look for in software. Do some research about what you need or go the freeware route. You may even find the software provided with the camera does the job. The choices are myriad.

Computer Image Software Essential Features

This is a list of the things I find myself using frequently and I regard as essential features for quilt image processing. You will probably find your software has numerous additional features. Don't worry about these, most will probably just destroy your image (remember NEVER save back over the original camera file, if you haven't you can always retrieve it and start again).

Essential features

- **The ability to input and output a variety of file types.** Make sure the options cover your camera file types and output at least JPEG and TIFF files. Most times you will be asked to submit JPEG files but some exhibitions, particularly in the USA, ask for TIFF files.
- **Rotation of the image** or a selection of the image, not only by 90 degree amounts but by very small amounts, at least down to a degree at a time, but preferable a user entered amount. This is to allow you to align the image with the edges of the photograph if you don't quite get it right in the studio.
- The software must be able to easily and rapidly **zoom in and out** so you can inspect fine detail or view the complete image.
- **Transformation of the image** is necessary because despite your best efforts taking the picture you will probably find keystone effects or barrel/pincushion distortion in some images. These can be rectified at the image processing stage.
- **Cropping function** to trim away and leave regular backgrounds around the quilt.
- The ability to **control and output image size and dots per inch (DPI)**. You will find that exhibition organisers often ask for a particular DPI (normally 300dpi) but don't specify the image size. You should be able to set the DPI in two ways, the first is to downsize or upsize the image to get to the wanted DPI without creating or blending pixels and the second is to have the software create or blend the pixels. The first situation is the far better but sometimes if both DPI and image size is requested you may have to resort to the latter mode.
- The software must be able to display a **graph of the amount of pixels across the 255 values** as in figure 4. Some software combines the RGB into one graph while others represent them independently, which is preferable but not essential.
- You must be able to **adjust and rescale the output levels of the image from the input to the output file** by adjustment of the cut points at the dark and light end and the midpoint. You are normally able to grab and drag the end and center markers to control how the light in the image is represented in the 0 to 255 number system. This is often called the **curves function**. Typically you would be able to drag the cut points at both ends as well as the midpoint. This is essential to get bright images containing all the detail you need.
- **Saturation and contrast adjusters** are useful.
- The ability to **clone small parts of the image and merge/replace small areas**, which have defects such as dust spots, is a handy tool.
- A **sharpening filter** is needed on many images and the best adjusting tool is unsharpen mask. Live view is a great help in getting it right but the very minimum

is the ability to step back and rapidly remove or re-instate the changes while zooming and scrolling around the image.

The above functionality is the minimum needed but how do you actually make the changes to the image? This is explained in the section below.

Typical Image Processing Workflow

This is what you would typically do to an image to prepare it for submission or publicity.

1. **Download** the images from the camera to the original file folder.
2. **Inspect** the images to decide which ones are worthy of processing time.
3. **Open** a selected image and **save** it with an appropriate and different file name into a different processed images folder in a no loss format (not JPEG, perhaps TIFF or PSD if you use Photoshop) format.
4. **Rotate** and **correct** any keystone or lens distortion defects by selecting and transforming the whole image so sides are straight and right angles are right angles.
5. **Select** and **crop** the image so you have a nice but not too large border around the quilt.
6. **Check** the **light display** (curves) graph and **move the end points**, so that available spectrum is spread over most of the 0 to 255 range you have available. Zoom into the bright areas and make sure your setting point has not removed detail from the bright parts of the image. Sometimes it is necessary to back off a bit from the 255 end to preserve detail.
7. **Move the middle point** on the graph to get a nice contrast but not a too dark image. Moving the middle set point right towards 255 increases contrast but can result in very dark shadow areas dominating while moving it left to the 0 end will make a lighter image but it will look washed out.
8. Depending on the image **you may need to boost the saturation slightly** but if you do re-check for clipping on the graph and by inspecting bright areas of the quilt.
9. **Check the image for defects** such as dust spots, scanned negative scratches or unsightly rod support strings and clone them out of the image.
10. Use a judicious amount of **unsharpen mask** to bring out the detail in the image. Don't go too far or the image will look ghastly but some images are soft, particularly the ones I get out of camera from my D300, and improve markedly with this tool.
11. **Re-save the processed image** in the no loss format you have chosen to use.

For sending for jurying you will probably need to output a copy of your image at a specified size, resolution (DPI) and in JPEG format.

12. **Open the image** from the processed no loss file format.
13. Use the **image re-size tools** to adjust the image size to what has been specified, only if it has been specified. Be VERY afraid, what this tool can do to pixels can't be mentioned in polite company. If only a size is specified uncheck the re-sampling box so that new pixels are not created or old pixels blended together to give fewer and just make the size change. The resolution of the modified image will be changed. If just the resolution is specified adjust that and let the image size change. If both are specified, chances are your image won't conform so you have no option but to modify both size and resolution and you will have to resample the image.
14. After the image has been re-sized and if you had to resample **typically a small amount of unsharpen mask** will be needed to re-sharpen the image.
15. **Save the image to a JPEG file** at the maximum detail preserved setting. Do not re-save it over your original processed file but to a different file name. I usually specify the resolution in the file name so I know it's a processed daughter image.
16. Some organisations specify a particular file naming format and you may need to **rename the file** to that name. Do that in Windows Explorer (if you use a PC) rather than in the image processing software, which would require another save. Remember, every save to a JPEG format will further degrade the JPEG file.
17. **Burn to a CD or email.**

When sending the Image

Image files are big. Send the file as a JPEG, unless otherwise specified, to keep file size down.

Be wary of the little window that pops up in Windows asking what size of image you want the image sent. This window, set at anything other than original size, compresses the image to a smaller file size by throwing away pixels you have carefully nurtured. This is a Machiavellian plot by Microsoft to prey on people who are a bit daunted by the new technology and it is really annoying for those who know and have to forever scroll through to check the correct box! On day I'll figure if I can and how to change this default.

Make sure whoever you are sending the file to and through have the necessary bandwidth on their email to accept the large files you will be sending. In Australia BigPond won't relay an email greater than 10MB in size and because a high resolution JPEG file can easily be around 8MB you may need to split up what you are sending into a number of emails.

If the person you are sending to has a slow connection, particularly a dial up, then your large email will clutter up their system and they are likely to get very upset with you. Also typical ISP email letter boxes are in the order of 20MB. There is every chance you will overflow the receiving persons box if you send more than that and they are not clearing their box at frequent intervals.

Send a preliminary email letting the person know what you intend doing so they can set up their system to handle the large files. Send the images one at a time with a delay between images so their system has time to download and delete the file from the ISP mail box before the next one arrives from you. This way you may avoid some of the drama.

Bob Dennis © 2008

Good luck with your steps into the digital world.

Recommended Web Sites

<http://www.hollyknott.com/stq/index.htm>

<http://www.shortcourses.com/workflow/>

<http://www.hollyknott.com/stq/cameras.htm>

<http://www.dpreview.com/reviews/>

<http://www.luminous-landscape.com/reviews/cameras/ricoh-gx100.shtml>

<http://www.consumersearch.com/www/software/photo-editing-software/review.html>

<http://www.bryerpatch.com/faq/photo.htm>

http://www.factsfacts.com/quilts/Photographing_Quilts/Photographing_Quilts.htm

<http://www.rickleephoto.com/rlartcopying.htm>