



## Current Issues

### May 2001

#### The Compression Wars by Jack and Sue Drafa

*We recently requested product images from a company to accompany our article on digital imaging. We specified the page size and dpi we preferred, and waited for the image to be shipped back via e-mail. A few minutes later the download started, but it quickly became apparent that the files were being sent in an uncompressed mode. At this rate it would take hours to download. We aborted the transmission, deleted the large e-mail and immediately contacted the company and asked that they send a compressed JPEG file. Their answer took us by surprise. "We can't send the image in compressed mode, because the quality will be unacceptable when printed in your magazine."*



Original test file created in Adobe Photoshop 6.0. Text was converted to bitmap and saved as an uncompressed tiff file.

Once again we had to educate a compression unbeliever. We instructed them to save each 9 megabyte uncompressed file as a JPEG format level 10 in Photoshop 6 and re-send the files. Each file was less than 1 megabyte and produced excellent quality in the magazine.

You would think that with all the available technology information, more people would have a better understanding of image compression. It seems that no matter how much we write, instruct, and preach the benefits of image compression, our message is still lost.

There are several sources of the problem. First there are the traditional photographers who have worked with film for years, and are reluctant to make the transition to digital. When told they will give up image quality to compress a file, they have visions of their image being degraded. They don't understand compression but surely don't want to take any chances, so they save and transmit images in uncompressed modes.

The second source of the problem is the Internet itself. Most people today have surfed the Net, downloaded sample images, and zoomed in to look at the detail. Since most of these images are optimized for quick transmission over the Net, any image magnification and the quality deteriorates. Immediately the blame falls on image compression. The truth is that most Net images are only designed to be viewed on the computer screen and nothing else. If you need an image for purposes other than the Web, then a higher scan is necessary.

The third source of the problem is a total misunderstanding and misuse of image compression. Most people have never run comparisons of different levels of compression, and are only guessing which setting to use when compressing files. The solution here is compression education. We find that in our fast paced world often overnight express is not even quick enough, so you need to rely on electronic mail. Since time is money, file compression is a necessary tool if you want to send critical images in a hurry.

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Comparison image showing that jpeg compression at the higher levels does not affect image quality. Far left is a zoom in of the no-compression image, and continues to the right with jpeg compression starting at level 12, and ending with level 09.



Comparison image showing no compression on left, and increasing levels of jpeg compression from level 12 to level 00.

Before we look at the some of the methods and compression formats you can use in your business, we should discuss two basic types of compression—lossless and lossy. Lossless file compression reduces the file without removing any image detail. This data is usually found at the Dmax level of the image or areas where there are no tonal value changes. This barely compresses the file, and generally only reduces the file by half or one-third at most. The amount of compression depends on how much tonal value is in the image. If you only have a small product on a pure white background, the file will compress well. If the product fills the frame and has several shades of color, little compression will result.

Lossy file compression removes more of the image detail in order to further compress the file. As the compression increases, the file becomes smaller, but more detail is removed from the image. This is where the traditional photographers' nightmare begins as they envision massive amounts of detail being removed from their images. In truth, most image compression schemes can reduce a file to one tenth the original size and show no apparent changes in image quality. This is where compression education and testing comes into play.

We can't tell you which format to use as there are dozens of compression formats, and most work very well. The most universal today is the JPEG format, Joint Photographic Experts Group. You can find it included with most every editing program, scanner, and image viewer. It has evolved over the years, and is one of the most successful compression formats to date. A new JPEG 2000 format will be available soon that will bring compression options to an even greater level.

The best method for understanding image compression is to run comparison tests yourself. Scan a photographic image in at 8-18 megabytes in an uncompressed format such as TIFF and save the file as the master. Next, save the image out again at the highest quality JPEG resolution. Continue stepping down a couple of compression levels each time you save, until you have saved out a file at the highest compression level possible.

Reload in the master uncompressed file and zoom in on a section that has fine detail. Load in each JPEG level image and compare them to the master. We think that you will be surprised at how well compression works. The next step is to print your results at the maximum magnification you would print the uncompressed file. By comparing the results, you should be able to select a compression level that provides the quality you require while still maximizing file size.



Comparison of original uncompressed image of #3 on left. Fractal compression of same file is on right. Image is small portion of original file. Fractal compression of same file is on right.



Comparison of original uncompressed image of #3 on left. (extreme enlargement)

If you are transmitting images for use on the Web, Adobe Photoshop 6.0 makes life even easier. You can select the "Save for Web" feature and a menu will show the original file and three compression versions. Each image will indicate compression ratio, transmission time at a specific Internet speed, and the new file size if you select that specific compression ratio. If you zoom in on the original, magically all the comparisons will zoom to the same ratio. One of the most exciting compression formats in use today is the Genuine Fractals format from the Altamira Group.

This state of the art compression technology uses both fractal mathematics and wavelet image compression to compress files and then expand them beyond their original file size. The software does a great job with image compression, but that is just the beginning. When you save an image in this format, the first question it will ask is lossless or visually lossless. If you are paranoid about image quality, select the lossless and your 8 megabyte file will reduce to about 3 megabytes. If you desire more compression, the visually lossless selection will reduce the 8 megabyte file to about 500K in size.

Now here comes the best part. When you open the file, you will be asked how big you want this new file. You can increase the size of an 8 megabyte file to as much as 2 gigabytes in size or an increase of 1600%. With this program, as you increase file size, the pixelation decreases proportionally creating the illusion of more detail than was in the original image. This format is especially useful when you have an image with a specific dpi and page size that is smaller than what is needed for the final output. If you save the image out in this format and then reopen it at your desired image size, you will have an image with the quality necessary for your final print size.

We know it sounds a little impossible, but it really does work. In the last few months, we have seen this software bundled with many of the new digital cameras and scanners. It serves as a resolution extension. For example, we took a Nikon 990 image, compressed it with this format and then printed it on a 16 x 20 output device. No pixelation was visible, and the image quality was that of a 6 megapixel digital camera.

Most digital cameras and scanners are preset to scan images in a horizontal format. There is concern that rotating vertical images and re-compressing them will reduce quality even more. If you do very little editing or cropping to a vertical JPEG image, you can rotate them with little change in compression. ACD Systems has a program that will let you rotate JPEG files with no change to the compression. Just select the specific images, right click on them, and follow the instructions for proper rotation.

Image compression is a necessary task if you are going to be sending images over email. Image compress works without sacrificing image quality, but seeing is believing. Take the time and run some compression tests so you can see the results first hand.

***The Drafhls are involved in digital imaging in the Portland, Ore., area, and are also professional photographers.***

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