

STEVE CAPLIN'S **A** TO **Z** OF DESIGN

J: Jpeg

Steve Caplin walks us alphabetically through the concepts essential to success for any jobbing or aspiring designer.



ABOUT THE AUTHOR

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Jpeg (pronounced jay-peg) stands for

Joint Photographic Experts Group, the name of the committee that originally devised the standard. Even the abbreviation is questionable: Jpeg is one character too long to be a PC file extension, so it's frequently shortened to JPG.

The Jpeg format has the distinct advantage of being able to reduce the size of image files by a significant amount. This makes it ideal for preparing images to be viewed on websites, as they can be delivered in a fraction of the time. It's also common practice to save files as Jpegs for archiving; most image libraries, both online and on CD, deliver their files in Jpeg format.

Jpeg compression is a 'lossy' format, which means that the more an image is compressed, the more degraded it becomes. At high-quality settings, this degradation is imperceptible to the eye, but the resulting file sizes are larger. Achieving smaller sizes involves a trade-off between speed of delivery (smaller file size) and image quality.

Digital cameras routinely save files as Jpegs to memory cards, which increases the number of images that can be stored. Most cameras offer a choice of compression ratios. Again, the larger the file size, the better the image quality. At first glance, you would be hard pressed to notice the difference between different compression standards on a digital camera. However, when the image is adjusted in Photoshop, the compression will become more evident. Operations such as brightening shadows will tend to reveal ugly blocking in the image. For this reason, many professional photographers choose to save their images in either Tiff or Raw format, both of which use lossless compression when saving. The downside, of course, is that far fewer images can fit on a memory card this way.

HOW JPEG COMPRESSION WORKS

The human eye is good at seeing differences in brightness over a large area and at recognising transitions between areas of different contrast. However, it's not so good at spotting minor variations in colour or high-frequency brightness. It's this limitation that Jpeg files exploit by separating the brightness and colour components of the image. It then examines images for areas of fine and coarse detail: fine detail, too small to be seen easily with the naked eye, is discarded. At high-quality settings, we don't notice the difference, but since it's fine detail that increases file sizes more than anything else, losing just a small amount of this detail greatly reduces the size.

When a file is saved in Jpeg format, several processes ensue. The file is divided into blocks of 8 x 8 pixels, and a series of algorithms is used to reduce the fine detail to a degree determined by the amount of compression specified in the Jpeg quality value. An RGB file is interpreted in the YCC colour space, separating the luminosity from the colour component so that the colour can be compressed more than the brightness. Further processes involve quantizing the spatial frequency matrix and other complex mathematical procedures. It's all far too complex to go into here, but, rest assured, you really don't need to know about this side of things.

JPEG COMPRESSION IN PRACTICE

The standard way of saving a Jpeg file from Photoshop is to choose Jpeg from the pop-up menu in the Save As dialog. Choosing an image quality of 10 or higher (the maximum is 12) will produce files that are small in size, but that show no apparent damage. Files saved at this quality will be good enough for high end print purposes. When saving for web delivery, file size is of paramount

importance. So rather than choosing Save As, instead use the Save for Web dialog. This opens a new window that shows the result of saving the image with the quality setting you choose, together with an indication of the resulting file size. In this way, it's possible to see the trade-off between file size and image quality clearly – you can even choose to view multiple versions of your image with different Jpeg quality settings so you can visually compare the results.

While saving an image as a Jpeg file will produce imperceptible loss of quality at high settings, repeated saving of the same file will build up the degradation over time. As such, if you have an image you're working on repeatedly, it's best practice to save it as a lossless native Photoshop file until you're sure you've finished editing it, and only then save it as a Jpeg.

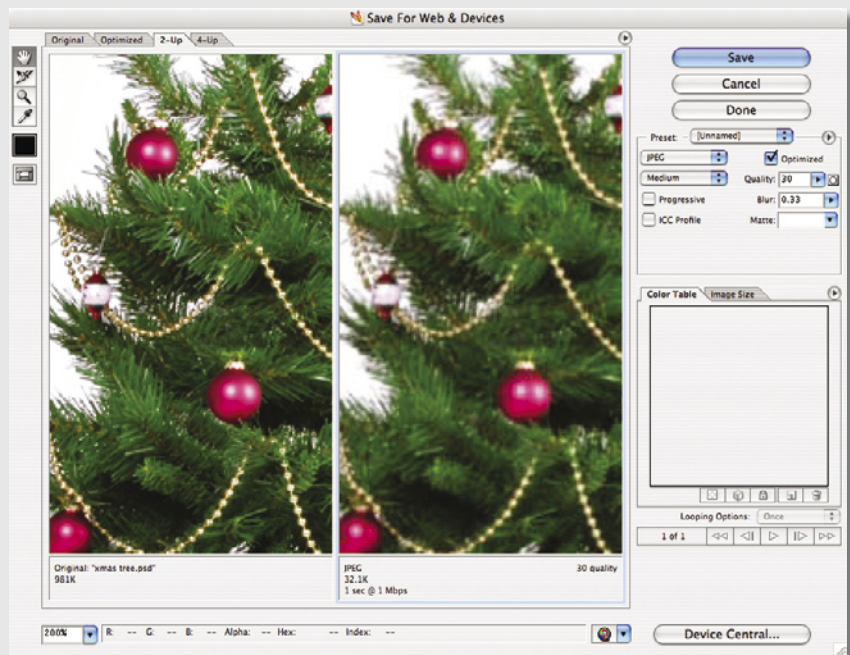
TAKING JPEGS FURTHER

Saved at maximum quality, Jpeg files are an economical way of storing images. The standard Jpeg file format can include clipping paths, so cutout data can be stored within the file for later retrieval. A bonus for Photoshop users is that 3D grids set up in the Vanishing Point filter are also stored within the file when it's saved.

Jpegs can't hold multiple layers or additional channels the way that Tiff images can. However, there's a second Jpeg format, called Jpeg 2000, which uses wavelet compression for less lossy results. It's also capable of containing alpha channels for storing soft-edged and semi-transparent selections. This format must be loaded and saved using a separate plug-in in Photoshop; as of Photoshop CS3, it's built into the Save As dialog. The only problem here is that, at present, Jpeg 2000 isn't supported by web browsers,



▲ Our original image (top left), greatly magnified, shows a lot of detail on this Christmas tree. Even at a high-quality Jpeg setting (top right), some fine detail is clearly lost in the leaves and ornaments. At a low setting (bottom left), we can start to see the 8 x 8 pixel blocks the Jpeg algorithm uses for compressing the image. At the lowest quality (bottom right) these blocks overpower the image.



▲ Photoshop's Save for Web dialog enables you to compare different Jpeg quality settings: it also shows you the resulting file size for the settings you choose.

so it's a format that can be used for archive only, rather than Internet delivery.

In rare circumstances, you might want a Jpeg file that's more compressed in some areas than others. For example, if you're preparing an image that you're going to zoom into using, say, After Effects, then loss of detail around the edge is unimportant, while high detail in the centre is vital. This is

achieved by creating a new channel in the original document and painting on it in white where the image is required at high quality, leaving it black elsewhere. Then, choosing Save for Web in Photoshop, click the Channel Mask icon next to the Quality setting to load that channel. In the resulting dialog, you can set the maximum and minimum quality settings for the image.