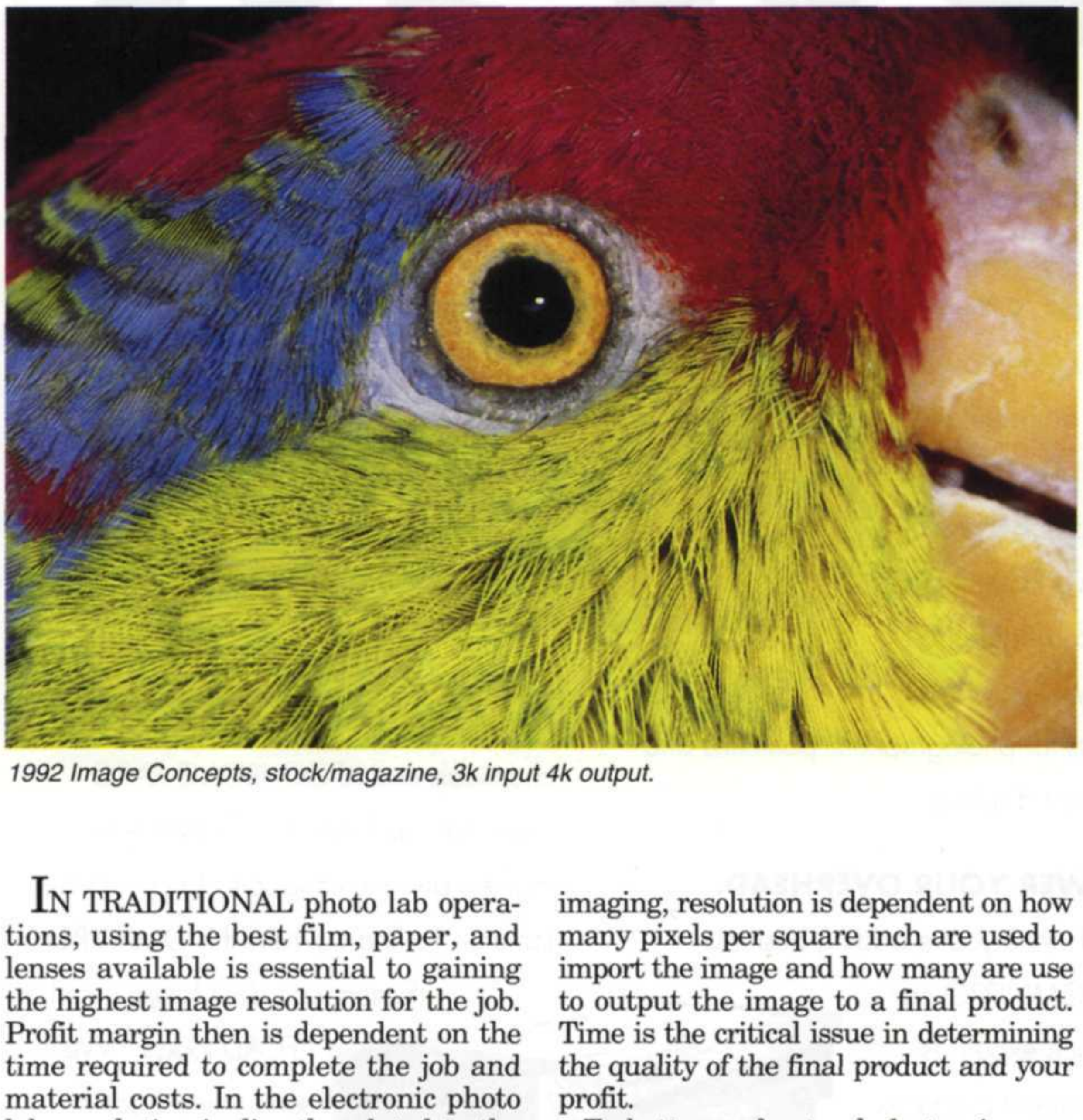
Understanding Electronic Image Resolution

Jack and Sue Drafahl



1992 Image Concepts, stock/magazine, 3k input 4k output.

IN TRADITIONAL photo lab operations, using the best film, paper, and lenses available is essential to gaining the highest image resolution for the job. Profit margin then is dependent on the time required to complete the job and material costs. In the electronic photo lab, resolution is directly related to the processing time, thus affecting your final quality and profit margin. In order to be competitive in the electronic imaging market, you must clearly understand electronic image resolution. We will try to simplify this so you can prosper yet achieve customer satisfaction.

In the traditional lab, resolution is dependent on the amount of silver halide crystals in the film and paper, and how well the lens can project the data from one medium to another. With electronic imaging, resolution is dependent on how many pixels per square inch are used to import the image and how many are use to output the image to a final product. Time is the critical issue in determining the quality of the final product and your profit.

To better understand electronic resolution, we will see how it relates to scanners, the most common input device used in an electronic photo lab. Scanners generally come in two variations, reflected and the transparency or film scanner. The flat bed reflected scanner is used to import color or black and white prints, artwork, and drawings. The transparency or film scanner is used to import color slides, negatives, and large transmitted artwork. The Nikon LS-3510 scanner is designed for 35mm films, while the Leafscan can handle both 35mm and 4x5 transparencies. Some of the flat bed scanners, such as the Agfa Arcus flat-bed scanner, can accommodate up to 6x 9" transparencies as well as reflected artwork. The higher end drum scanner can usually take both reflected and transparency photos and artwork.

All three types of scanners use two resolution ratings to indicate the quality and size of the image. The first resolution rating is called DPI (Dots Per Inch) and is similar to the DPI rating of the common laser printer. Approximate file size is determined by taking the DPI resolution and multiplying it by the dimensions of the original scanned artwork. For example, the resulting file from a 4x5 inch original scanned at 300 DPI would be 1200 (4 inch x 300 DPI) x 1500 (5 inch x 300 DPI) or approximately 1,800,000 bytes from a black and white scan. Color scans require three passes of red, green, and blue so they would equal 3 x 1,800,000 or 5,400,000 bytes of data.

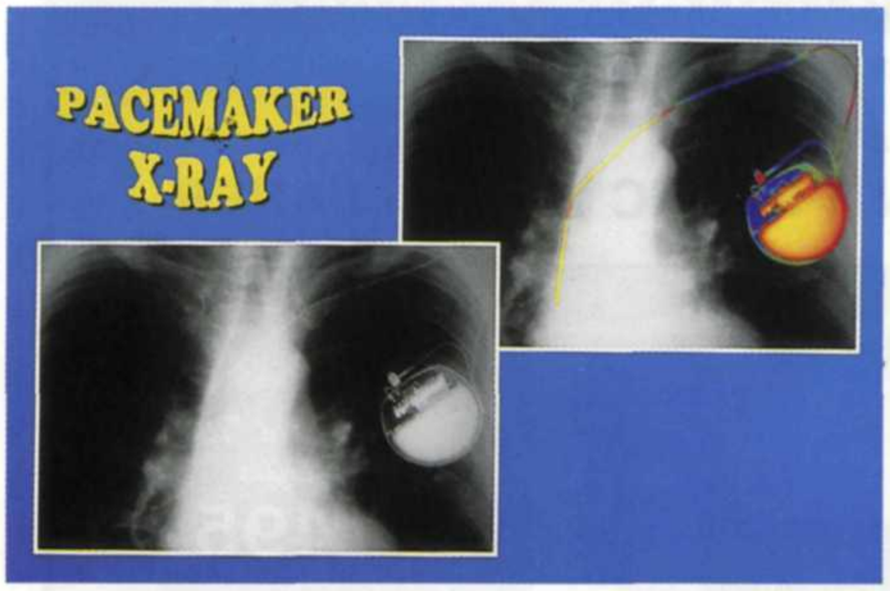
The second rating system determines the actual pixel dimension of the image. For example, a slide scanned in at 2048 pixels wide by 1366 pixels high is the dimension of a 2K 35mm slide. If you multiply these numbers together, you would get the total number of pixels for black and white 2,797,568 pixels). Full color image files would be three times that size or 8,392,704 pixels or bytes of data. That may seem like a large file, but remember that a full resolution 35mm image is usually at 4K or 4096 pixels x 2732 pixel x 3 colors or 33,570,816 bytes of data.

Keep in mind that these large files represent a single image. The larger the file, the longer it takes to process it through the computer system. It becomes vitally important that you closely

(Continued on page 25)

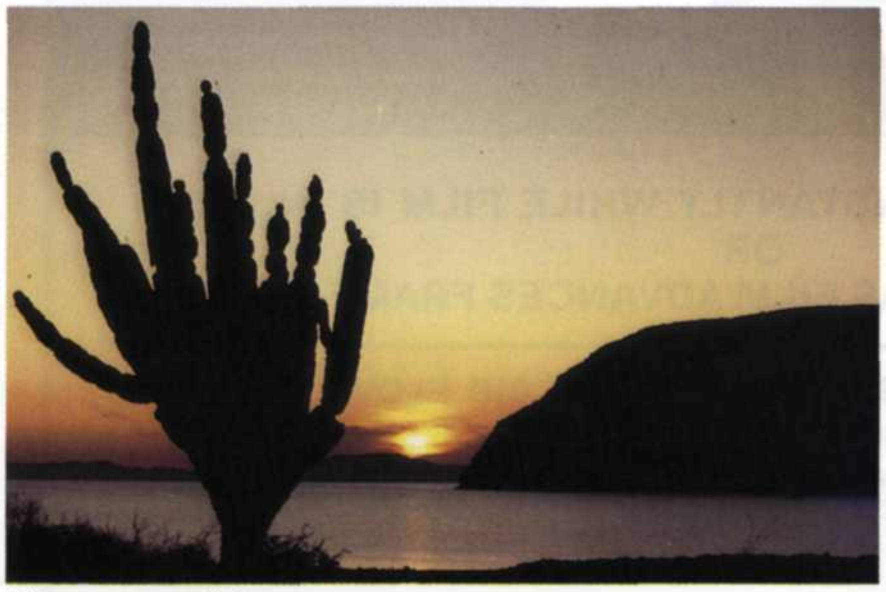
Understanding Electronic Image Resolution

(Continued from page 20)



1992 Image Concepts, multi-media use, 2k input 2k output.

Ektapress color neg converted to slide: Nikon film scanner.



Nikon scanner 2k image.

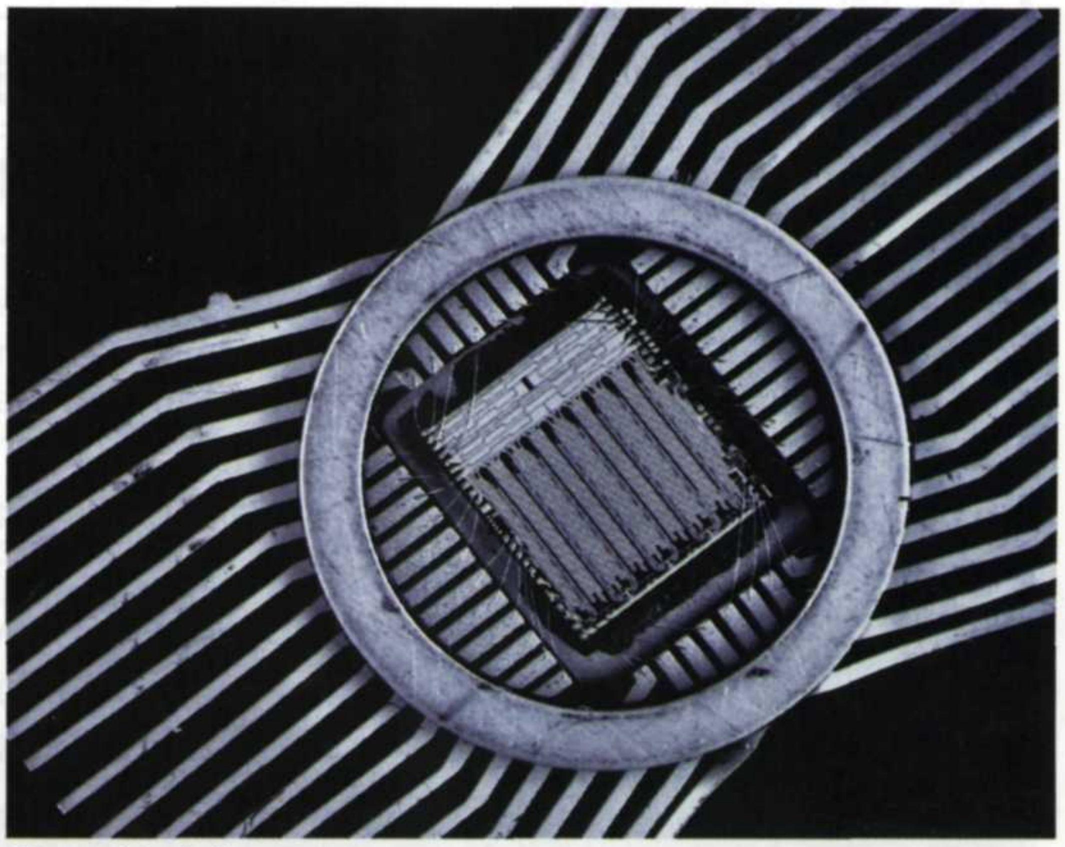
2k scanned image, b/w conversion.

match your customers' needs with the resolution necessary to achieve customer satisfaction. It doesn't make business sense to scan in a slide at 4K (33 megabyte) if the output is only going to be a 3.5x5 color print. You are essentially throwing away resolution, your time and profit.

Output devices are restricted to preset sizes. For example, some of the high end film recorders, will only output at 2K, 4K, 8K, and 16K resolution. Paper output devices have even fewer size options. This means that no matter what resolution the image came into the system, it would be stretched up to the nearest output size. As these file sizes get larger, the quality improves but the time necessary to import and output them increases and so does the price tag.

One solution is to create some sample jobs with varying resolutions and time them from start to finish. Document the

(Continued on page 27)



35mm original. 4k output.

Understanding Electronic Image Resolution

(Continued from page 25)

materials used, equipment wear and tear, human computer time, and unattended computer time in order to determine the price for that service. Show the finished work to your clients to determine which resolution is acceptable for their needs.

Many labs starting out in electronic imaging use their accounting computer to perform the work. These computers are usually too slow and hardly ever have enough computer memory (RAM) to process the information. Since speed is the key to making money, you need the fastest computer you can afford, with at least 40 megs of RAM. You can work with less, but only if you want to lose money.

When we first started electronic imaging, we used a medium speed 386 with 16 megabytes of RAM and thought that was adequate to take care of any job. Wrong!! We moved up to a 486-66 with 50 megs of RAM and jobs that took 30 minutes to accomplish took less than three! We ran a cost analysis of both computers with a special software program and found that each full-time 386 converted to a 486-66 would save or earn more than $20,000 per year.

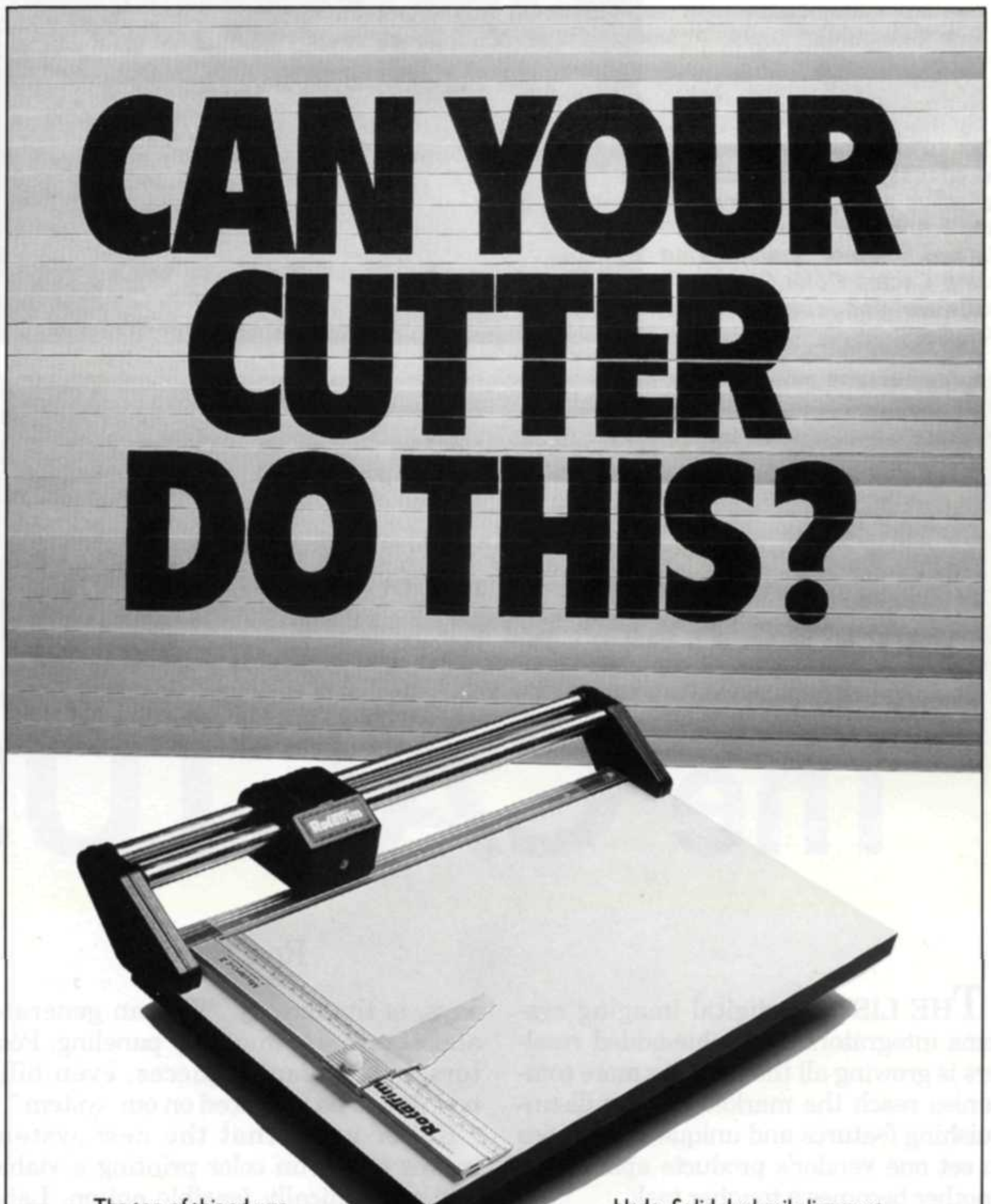
The best way to determine the necessary RAM is to take the size of your largest working files and double that in RAM. For example, if your lab is doing a lot of slide manipulation, you may find that 18 megabyte files give you the resolution you need to do the job. You would need a minimum of 40 megs of RAM—18 to hold the file in memory, 18 for editing the file, and four for your computer operating system. If you are blending more than one image, each will require at least 18 megabytes plus some additional for editing. As soon as the computer runs out of RAM, it will use the hard disk for temporary storage, slowing down the system as much as 90 percent

We scan in images used for Multimedia shows at 2048x1366 pixels (8 megabytes). If we need to use an image as a stock photo or for publication, we scan in 35mm images at 3072x2048 (18 megabytes). All the images are output at the next highest film recorder resolution. The images scanned onto Kodak CD's are at 18 megabyte. The only time we bring in 35mm images at the full 4096x2736 resolution (33 megabytes), is when the image is to be output to 4x5 or larger film sizes. These images are normally used in large photo displays and require the highest resolution possible.

To simplify this data for our lab customers, we list resolutions at low (2k), medium (3k), high resolution (4k) and extra high at (8 or 16k). As the resolution goes up, so does the price. When a customer calls, we discuss the final use of the photo and then recommend a specific resolution for each job.

As you have seen, image resolution determines quality, but resolution requires added time. The old adage of "Time is Money" is the key to understanding electronic imaging resolution.

Jack and Sue Drafahl own and operate a "transitioning" photo lab in Portland, OR.



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