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# Dispelling the Myths of Color Scanning

Capturing High-Quality Images  
at an Affordable Price Without Compromising  
Speed or Efficiency



**By Eastman Kodak Company  
and Tower Technology, Inc.**



DOCUMENT IMAGING

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*“What we really need is a higher-end 20-to 30-ppm color duplex scanner priced at around \$25,000 to \$30,000, with on-board compression. It doesn’t have to be 300 dpi. Whoever comes up with this device will transform document imaging systems.”*

Harvey Spencer  
*Imaging & Document Solutions*  
 September 1998

## Production Color Scanning Myths

Myths about production color scanning have been perpetuated throughout the document management industry over the past several years. Fostered primarily by technological restrictions, these myths have played a role in making document imaging one of the few remaining applications forced to function in a black-and-white world. Here are some of the common myths:

- “Business documents are black and white.” A color scanner? Why would I need a color scanner? This business has always been black and white.
- “Color scanning is slow.” If I have serious scanning jobs to run, do I want a scanner with performance measured by minutes per page or pages per minute?
- “Color image file sizes are too big.” I’m already paying enough for storage. Do I want to add even more jukeboxes, optical drives or tape libraries?
- “Color scanning is expensive and represents ongoing costs.” Paying more for the scanner is just the beginning. What about storage, network bandwidth, operators playing with controls to make the images look pretty?

Until now, affordable production color scanners that performed as fast as black-and-white scanners did not exist, giving some credence to many of these beliefs.

But through continued research, investment and development in color imaging, specifically by Eastman Kodak Company and Tower Technology, Inc., organizations are discovering the affordability and benefits of color scanning in their document management processes.

## Why Color, Why Now?

Key findings from color scanner market research conducted by David Wood Associates Inc., an electronic document management (EDM), capture management and e-commerce consultant based in California, reveal that organizations are primed and willing to embrace color scanning technology, provided a product fits their scanning requirements. Participants in the firm’s research included end users, primarily department or Information Technology (IT) managers from large organizations, who currently use document management systems.

“We had three primary goals with our color scanning research,” said David Wood, president, David Wood Associates. “We wanted to find out what users consider the minimum acceptable resolution for color scans, how likely users are to switch from monochrome to color, and what users consider the best price/performance/resolution for a new production color scanner.”

Results of the research indicate that:

- Market forces are pushing widespread adoption of color documents;
- The display mechanism exists — users already have invested in a color monitor;
- Source documents are in color;
- Color simply looks better in document imaging applications;
- Thirty percent (30%) of the market would quickly shift to color if affordable products were made available;
- A pent-up demand for better quality images can be satisfied with 100-dpi production color scanners;
- Color scanned at 100 dpi is “more acceptable” than today’s 200-dpi and 300-dpi bi-tonal and grayscale images;
- Optical dropout filters can result in loss of detail (attempting to drop out color also can diminish light colors, such as pencil marks and annotations); and
- Color scanning is not well understood by the EDM market.

## Approaches to Dispelling Color Myths

The fact of the matter is that most business documents are in color — from the background color and shaded areas of the document to logos, official stamps, signatures, graphics, annotations and highlights. As an example, a customer who receives a black-and-white statement from a bank or insurance company most likely will assume it is a photocopy. The widespread use of yellow highlighters on black-and-white documents calls attention to specific information. When scanned and viewed in color, a document and its highlighting maintain full integrity. When scanned in black and white, the highlighting is blacked out or is invisible to the eye.

Organizations have been conditioned to think of documents as black and white because capture and retrieval software only displayed bi-tonal or grayscale images. This view has been widely adopted since the only color image capture options have been inexpensive, slow scanners or expensive production scanners.

Conventional production color scanners are designed to function as color scanners that also output black and white. This design approach requires the scanner to handle large amounts of internal data, involving expensive buffers, memory and other components. The result: high costs and/or lower production speeds. To output 300-dpi black-and-white images, conventional color scanners need to capture images in color at 300 dpi, resulting in file sizes of 24 megabytes on each side of the document. The scanner, therefore, is required to interpolate huge volumes of data internally.

An alternative approach would be to design an inexpensive, high-speed production color scanner. This could be achieved using an existing black-and-white scanner that also outputs color — an approach never before taken.

Kodak has taken this approach in its *Kodak Digital Science™* Color Scanner 3590C. This scanner uses the same illumination source for both black-and-white and color imaging to defray manufacturing costs. And, unlike most color scanners, it uses two sensors for scanning the front of the document — one to capture black-and-white information when in bi-tonal capture mode and the other to capture color when operating in color mode.

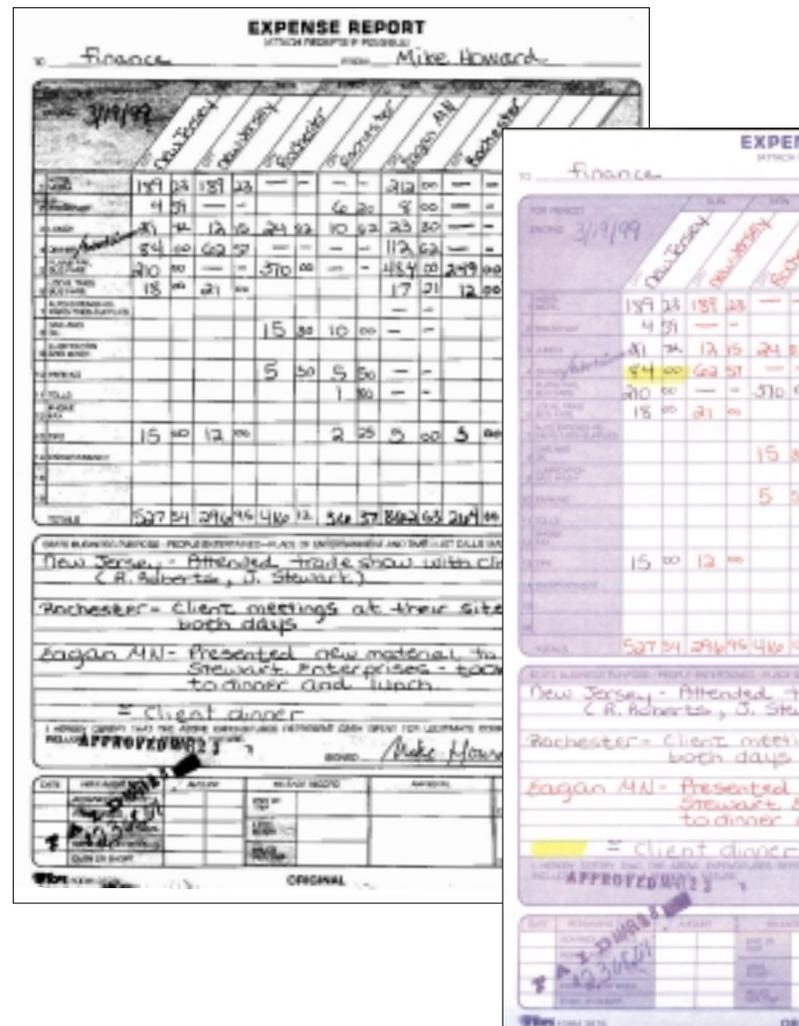
With this design philosophy, users have the option of scanning in color simplex, bi-tonal simplex or duplex,

or color on the front and bi-tonal on the back. In color scanning mode, the Color Scanner 3590C runs at the same speeds as in bi-tonal mode:

- 100-dpi color simplex – 85 ppm
- 150-dpi color simplex – 57 ppm
- 100-dpi color (front-side), 200-dpi bi-tonal (back-side) – 85 ppm
- 150-dpi color (front-side), 300-dpi bi-tonal (back-side) – 57 ppm
- 200-dpi bi-tonal duplex – 85 ppm
- 300-dpi bi-tonal duplex – 57 ppm

## Higher Quality Images at Lower dpi

Through various focus groups and customer surveys, Kodak determined that the most critical information of a business document or form usually appeared on the front side. By scanning in color on the front and

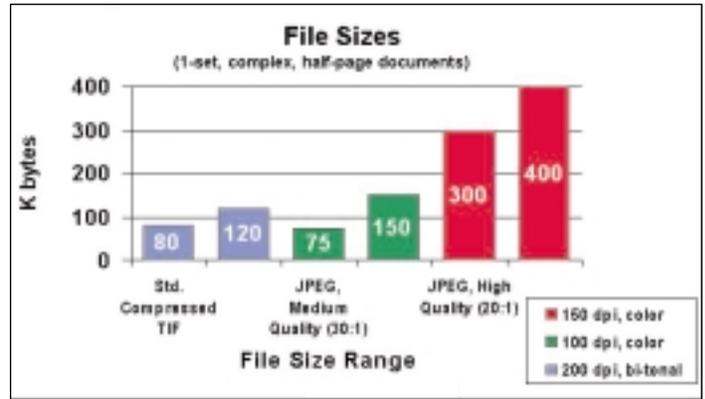


## DISPELLING THE MYTHS OF COLOR SCANNING

bi-tonal on the back, users can capture the most necessary and visually critical information.

Color creates 24 times more visual information than bi-tonal scanning. Such elements as graphics, stamps, logos, signatures, highlights and annotations are more readable in color than in black and white even at a lower dpi — producing near-equivalent file sizes with lower resolution and higher-quality images. High-volume, production-quality scanning diminishes massive storage requirements. For example, the following images were scanned in both color and bi-tonal. The color images were scanned at a lower dpi than their bi-tonal counterparts; however, a greater amount of visual data and more critical information is clearly displayed.

With regard to infrastructure issues, today's networked office environment already depends on color — PC monitors, color copiers, color printers and color PDF documents communicated over e-mail, intranets and the Internet.

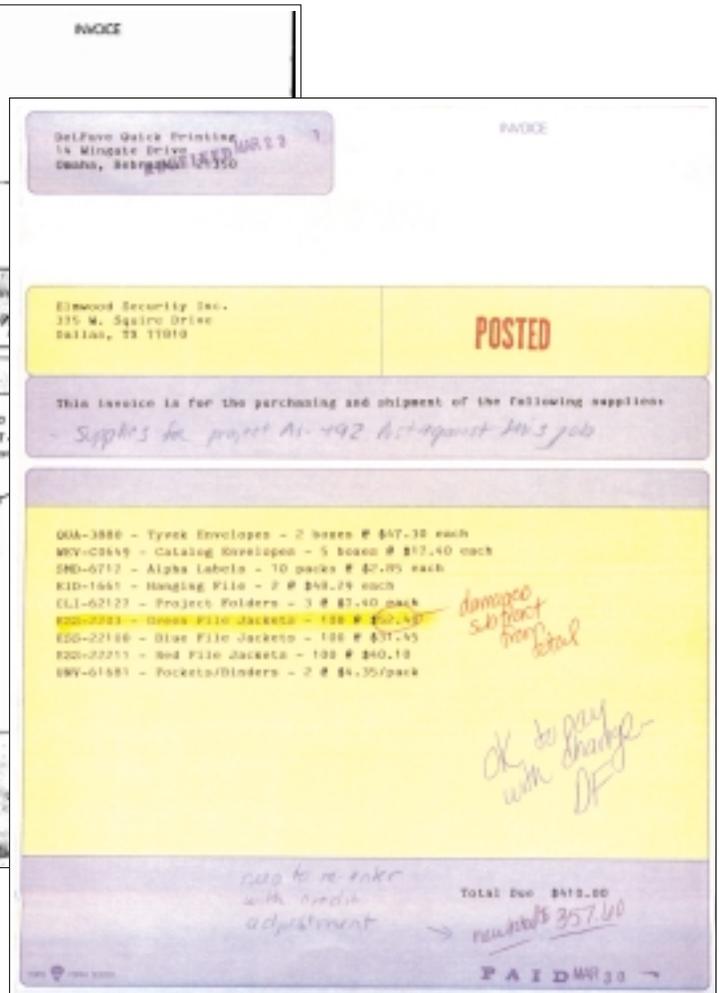
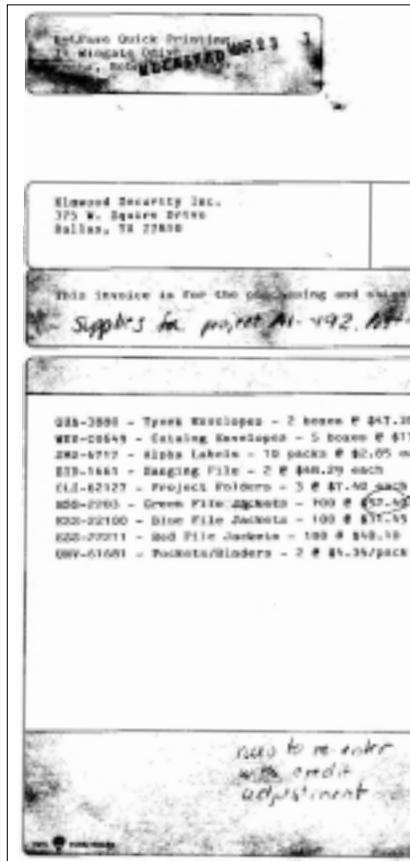


Uncompressed color images are quite large compared to bi-tonal images; however, standard JPEG compression optimizes image quality and file size to a point where incremental storage costs and other infrastructure issues are not significant. See chart above.

**EXPENSE REPORT**  
 (ACCOUNTS PAYABLE REPORT)  
 FROM: Mike Howard

DATE	DESCRIPTION	AMOUNT	TOTAL
6/20	...	212.00	590.36
6/20	...	9.00	18.36
10/20	...	23.50	93.11
...	...	112.00	308.19
...	...	454.00	1363.00
...	...	17.21	68.21
...	...	...	25.50
...	...	...	11.00
...	...	...	1.50
...	...	2.25	37.25
...	...	...	236.61

Handwritten notes: "trade show with clients - part.", "lunch at their site", "new material to enterprises - took them and lunch.", "Mike Howard 3/22/99"



The bottom line: Customers have accepted black-and-white imaging technology because of the perceived high costs and technological restrictions associated with color imaging. Regardless of the medium used — optical, magnetic, CD-recordable — storage costs are plummeting and should no longer be the driving force behind a decision that makes the most sense for an organization. “Last year’s cost to store a black-and-white image is today’s cost for storing a color image,” said William Zastrow, vice president of marketing, Tower Technology, Inc.

By capturing full 24-bit color, the need for traditional image quality settings on black-and-white scanners (contrast and threshold) across a wide range of mixed documents can be eliminated. The Color Scanner 3590C’s “one-size-fits-all” scanner setting enables operators to accurately scan a document right, the first time.

In addition, operators working with key-from-image applications can identify lead or index documents in a folder or batch with color scanning, saving productivity costs associated with time spent locating images. Thumbnails are now more useful in color, enabling users to distinguish lead documents in a customer folder by color, logo, graphic, etc., instead of wasting valuable time trying to find the black-and-white equivalent.

Finally, and most importantly, customer service is improved. With color scanning, end users are more likely to find and retrieve color-identified documents — “It’s line 23, on the pink form.”

### **Future of Color Scanning**

Based on research, Kodak believes within two to three years, the number of color scanners shipped will likely reach 50 percent of the entire mid-volume segment.

With the Kodak implementation of color, moving to this technology poses no risk to the end user. A scanner that is designed to output either bi-tonal or color images allows end users to make a wise capital investment in hardware that is essentially future proof. The color capability is built in, for when you need it.

Tower Technology has been developing and integrating color solutions, based on customer requirements, for several years. Its unique approach to high-volume, production-quality color imaging and its integrated

document management solutions software make use of both color and bi-tonal images at customer sites around the world.

“Our experience with color imaging proves time and again that once users see the obvious utility of color, they never go back,” Zastrow said.

### **Conclusion: Price/Performance Is Driving Force for Color Adoption**

As other industries are proving, color in document imaging makes sense. Desktop color inkjet printers, color monitors, etc., have been adopted by the market once their price/performance approached that of black-and-white devices. For example, when desktop color inkjet printers carried a price premium of 30 to 50 percent higher than black-and-white printers, there was a major shift to color. Today, there is no premium for color in this market, and end users typically would not even consider purchasing a black-and-white inkjet printer. Commercial laser printers, however, are still struggling. With a price that is three to four times higher than black and white, the laser printer market has not yet accepted color. The trend is clear — as the price of a color device approaches that of a black-and-white, color is adopted.

Within the document management industry, the scanner captures an original document and outputs a digital image. A color image inherently has more value.

“Image archives have a long life — typically seven years — so, users should build their archives in color now,” Zastrow said.

An affordable production color scanner that creates high-quality images and operates at the same speeds as today’s black-and-white scanners most likely will make color scanning attractive for most mainstream applications.

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*Kodak, through its Document Imaging division, offers components and media for a variety of imaging and document management applications that require micrographics, digital or hybrid solutions.*