

DATA COLLECTION & ACQUISITION

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Greater information density provides solutions for applications requiring "portable databases."

2-D CODES BRING BAR CODING TO A HIGHER PLANE

BY MARTY WEIL

For many years, linear bar codes have played a vital role in manufacturing's data-management strategy, but the new two-dimensional bar code symbologies promise to elevate the significance of bar coding. And, with manufacturers of scanning and printing equipment rushing to support these sophisticated new symbologies, they are now attainable for a broad range of industries.

"The sky is the limit with two-dimensional bar coding for applications requiring a large amount of information, and the emerging leader in this area has to be Symbol Technologies with its PDF417," says Bonnie Stamper, president of AIM USA Inc. (Pittsburgh, PA). This trade association covers automatic data collection and keyless data entry technologies.

Symbol Technologies Inc.'s (Bohemia, NY) PDF417 is a powerful, paper-based communications protocol for transferring a file's worth of data between computer systems, without rekeying or reentering the data. It can also be used as a high-density, high-capacity (over 1,850 ASCII characters per symbol) "portable database," so-called because information can be accessed without having to reference an external database.

Marty Weil is the editor of the Data Collection and Acquisition section. He can be reached at (708) 292-2032 or fax (708) 292-2042, 104 Main St., Suite 3D, Park Ridge, IL 60068.

"PDF417 is the newest innovation in bar code structure, and with Symbol's introduction of a scanner specifically for 2-D bar codes, the PDF 1000 [*Managing Automation*, September 1992, page 39], it has become more practical for a wide range of applications," says David C. Allais, president of the consulting firm Applied Tactical Systems of Washington (Seattle, WA). Former chief executive officer of Intermecc Corp. (Everett, WA), Allais has created five bar code symbologies during his career, including Code 49, one of the first widely used 2-D codes.

Most 2-D bar codes, such as Code 49 and Code 16K, "stack" a large number of one-dimensional bar codes on top of each other. A high-speed laser scanner must weave through the stack until it has covered all the rows—a maneuver that can be tedious and time-consuming for the operator.

According to Ted Williams, the developer of Code 16K and president

of Laserlight Systems (Dedham, MA), there is still an important role for "stacked" bar codes to play in today's manufacturing environment. For six-digit item identification or other applications where a short, two-row configuration is required, PDF417 would not be the best solution, he explains. It has considerable fixed overhead for start/stop characteristics, row characters, and quiet zones. Also, it was designed to encode hundreds of characters of data efficiently. A six-digit symbol, however, would be comprised of less than 4% actual data and more than 96% overhead.

Allais agrees with that assessment. "PDF417 is very promising for large amounts of data, but it is not as efficient for applications with as few as 25 or 30 characters."

Bar code printer manufacturers such as Zebra Technologies Corp. (Vernon Hills, IL) and scanner equipment makers like Accu-Sort Systems

Scanning a PDF417 tag gives this warehouse worker access to large amounts of information without referencing an external database.



Photo courtesy: Symbol Technologies Inc.

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Small Camera Offers High Resolution

A new model has been added to the CCTV lineup. The TSE270 series incorporates 1/3-in. chip technology in a monochrome video camera, including electronic iris control for indoor application and provision for conventional auto iris lenses for outdoor applications. Horizontal resolution is nearly 400TV (h) with a low-light sensitivity of only 0.15 lux at f/1.4. It is available in 24VAC, 12VOC, and 120VAC formats; it also accepts CS lenses (C-mount with adapter). S/N ratio is 50 dB.

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Inc. (Telford, PA) are banking on the growth of applications requiring the information capacity and high survivability characteristics found in Symbol's PDF417. This is evidenced by the recent incorporation of software support for PDF417 in their products.

"We believe PDF417 will be the bar code standard of the future," says Clive Hohberger, vice president of market development for Zebra and a member of AIM USA's technical symbology committee. "The biggest thing that has held back two-dimensional symbology has been the lack of supporting hardware. But with the introduction of Symbol's PDF 1000 scanner, this barrier has been broken."

The advent of sophisticated error-correction capabilities are as much a reason for PDF417's dominance as are its storage capabilities, according

to Jo Martell, senior manager for PDF417 North American market development at Symbol. "We can correct for lost or missing data because the code is not the actual data; it is a mathematical value that represents the data. As such, we can do higher-level mathematics—simultaneous polynomial equations—to compute any missing values, in the event that any part of the physical code is missing or damaged," she explains.

PDF417 also allows for the embedding of graphics and digital images. For example, fingerprints, photos, and other images can be embedded in a code, creating "a self-authenticating ID card," says Martell.

However, most current applications for 2-D bar codes are far more mundane. "We are only seeing the tip of the iceberg on the infinite applica-

tions that are evolving for PDF417," Martell notes. "Right now, the most common applications are in shipping and receiving."

Warehouse and shipping personnel use PDF417 to enter and verify entire shipping manifests throughout the shipping and receiving process. In some cases, PDF417 serves as a paper supplement to EDI transactions by providing a faxable data record, or a record affixed to the actual shipping carton. The paper record can be scanned into the recipient's system at a fraction of the cost of traditional EDI methods. Manufactured parts that carry PDF417 labels are tracked via serial and lot number throughout the production and assembly process. Finished goods carry their serial number and production history in a PDF417 label, and entire maintenance histories are accessed by PDF 1000-equipped service personnel.

Portable data files are extending bar coding technology to open important new applications requiring low-cost access to large amounts of data, without having to reference an external database. It does this by providing a tool to mark an item with a full database, without database conductivity. Meanwhile, stacked symbologies enable the labeling of small objects that have been beyond the reach of traditional linear bar codes.

For the first time since its introduction, the complete 2-D bar code package is within industry's reach, in all of its manifestations. MA

DATA COLLECTION AND ACQUISITION HIGHLIGHTS

ACCUSORT UPGRADES MATRIX SCANNING SYSTEM TO TAKE ADVANTAGE OF PDF417

—Accu-Sort Systems Inc. (Telford, PA) has incorporated PDF417 into its new Matrix Scanning System. The Accu-Sort automatic matrix scanning system reads entire master pack cartons or full pallet loads. Bar-code data is sent from the automatic scanner to a sophisticated processor that uses Accu-Sort's Data Reconstruction Decoding Technology. The Accu-Sort system determines the exact position of the codes on the pallet or within a carton. "For Accu-Sort customers, one of the major benefits of incorporating PDF417 into a matrix scanning system is to receive pallet loads of product with the manifest already encoded on the pallet label," says David Cohen, director of marketing for Accu-Sort Systems. "Scanning one PDF417 label speeds order reconciliation and allows the system user to implement advanced shipping notices and bills of lading directly from the pallet's label."

ZEBRA TECHNOLOGIES ANNOUNCES SUPPORT FOR PDF417—Zebra Technologies' (Vernon Hills, IL) Z-140 series thermal transfer printers now incorporate the capability to print PDF417. Zebra also plans to incorporate support for the two-dimensional symbology in the Zebra Z-90A, Z-91, and Z-221.

The Z-140 family produces labels, tickets, and tags using 14 bar-code symbologies, typographic fonts, and intricate graphics at 6 ft./sec. To maximize throughput, an advanced 32-bit microprocessor increases productivity by reducing format time. The units print on paper and synthetic facestocks with manual tear-off, automatic peel-off, cutter, and rewind media delivery options. An RS-232 port is incorporated in the standard Z-140 for operation with PC, minicomputer, and mainframe host computing systems. "PDF417 offers exciting new opportunities to put a machine-readable data file right where it is needed—on the product," said Clive Hohberger, vice president of market development for Zebra. "Now Zebra customers have access to PDF417 through our printers."

Accu-Sort Systems Inc.	
Matrix Scanning System.....	RC# 67
Symbol Technologies Inc.	
PDF 1000 scanner	RC# 68
Zebra Technologies Corp.	
Z-90A, Z-91, Z-221, Z-140	
series printers.....	RC# 69

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