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TECHNOLOGY FOCUS

Fixed Scanners Get Visionary

They are stationary, but fixed scanners and readers are a dynamic product category featuring better performance, lower prices, and new players.

LISA TERRY

Q: When is a fixed scanner not a fixed scanner?

A: When it's an imager.

Fixed (aka stationary) laser scanners have been a fixture of automatic identification technology for years, growing incrementally faster, more accurate, and easier to use. The category—which includes industrial and POS laser scanners as well as imagers—continues to plug along, accounting for about 14.5 percent of total global AIDC hardware sales, or about \$650 million in 2002, according to the Natick, MA-based research and analysis firm Venture Development Corp. That will grow to \$906 million by 2005, VDC predicts.

Fixed laser scanners remain a mainstay, particularly in industrial and retail applications. As a mature product type, new laser products offer smaller and more modular designs, increased communication options, and, for some applications, scanners that can be used in either handheld or stationary mode.

But sales of imagers are growing three times faster than lasers, says David Krebs, AIDC group manager at Venture Development. And imagers have become the focus of manufacturers' R&D efforts, in response to customers' demands for more data in less space, driving adoption of higher density symbologies that some insist are better read via imaging technologies. Imagers also offer diverse functionality. Increasingly, imagers from traditional scanner manufacturers are competing with those from machine vision manufacturers moving down market.

SIDEBAR:

Fixed
Scanner
Trends:
Key
Drivers for
2D and
Imaging

warehouse, asset, laboratory, records, library, and all Auto ID applications.

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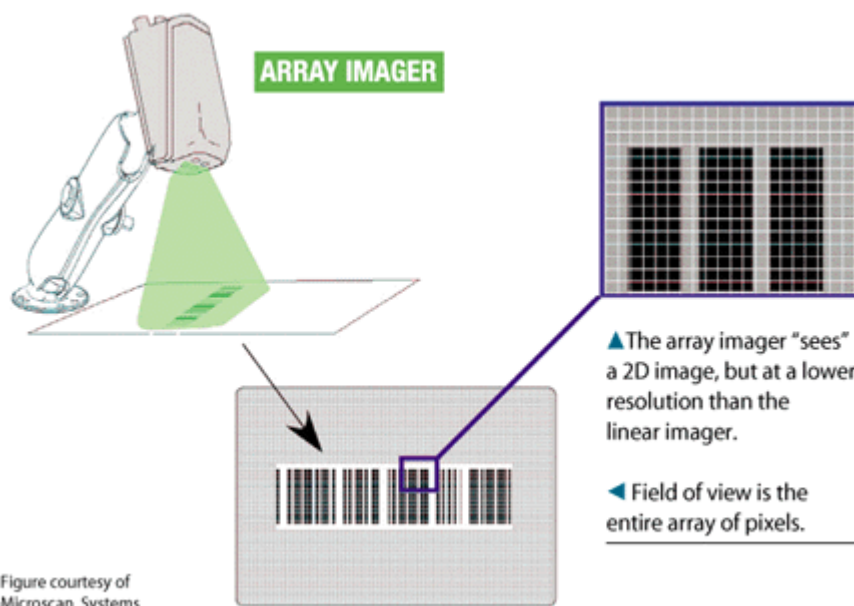
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The Move to Imaging and 2D

Today's acute focus on the supply chain is driving end users to require more visibility into the movement of goods and more information about those goods, even post-sale for recall and warranty uses. That often means marking individual items rather than just cases and pallets.

That's combined with shrinking real estate on which to place a bar code, such as on printed circuit boards or other electronic components. In addition, some products' printed labels cannot withstand the rigors of production or use, and symbols must be imprinted directly into parts via dot peen, etching, stamping, or other techniques.

These often require use of high density linear bar codes, 2D or even 3D symbologies—the net effect of imprinting 2D symbols into materials. While some of these more data-dense symbologies can be read by some lasers or linear CCDs, manufacturers of higher-end imagers insist they can often do a better job at reading and decoding these symbols.

For example, some 3D marks, explains Carl Gerst, principal marketing manager for Cognex's In-Sight product line, undergo processes that change their appearance. "It's not a good mark to start with, then in some stages it looks white on dark, others dark on white." Marks can also lack good edge definition or be moving or poorly lit.

Many 2D symbologies include error correction, notes Matt Allen, industrial bar code manager for Microscan. "They can

TECHNOLOGY AT A GLANCE

FIXED SCANNER/IMAGER GUIDE

- **LASER SCANNER:** Uses a single-line laser diode to read bar code data. Common configurations include over-the-belt, in-counter, and presentation (side) scanning.
- **RASTERIZING LASER:** Sweeps a laser line through a zig-zag pattern to scan an area.
- **LINEAR IMAGER:** Uses a single line charge-coupled device (CCD) to read bar code using camera-based technology. (See the figure above.)
- **AREA (OR ARRAY) IMAGER:** Captures an image of a field of vision, then seeks out the symbol within for decoding. (See the figure

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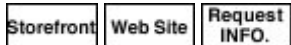
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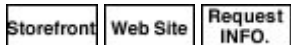
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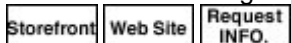
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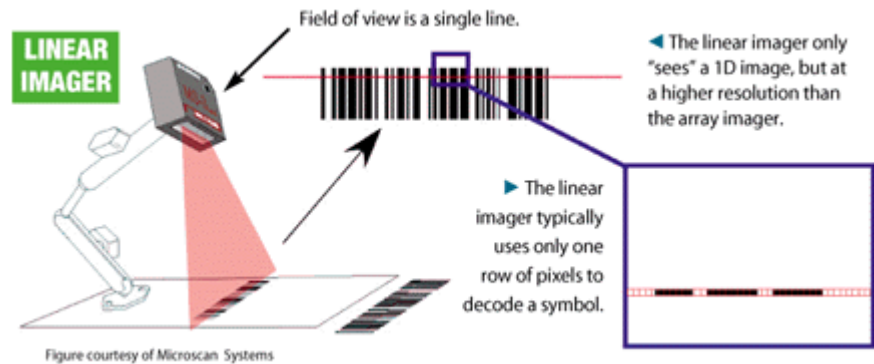


withstand damage and still ^{above.)} be read." For those that can't, imagers can record pictures of symbols with damaged or missing elements for later deciphering; for example, USPS workers decode unreadable labels remotely and transmit the results back to sortation equipment.

Imagers also offer additional functionality beyond bar code symbol decoding, such as receipt capture, signature capture, and label imaging, something that Supply Chain Systems Magazine readers said in a recent survey were important capabilities (for more information, see Figure 3, "Current and Future Use for Imagers," p. 22). Datalogic's decoding engine for its DV9100 Compact CCD Vision System, for example, handles package dimensioning as well as symbol decoding.

By upgrading to 2D direct part marking, "you get rid of the label in a dirty environment, you don't have to worry about having a person to put on the label, and you eliminate the cost of the label itself," says Greg Hilbert, sales engineer for Electronic Solutions. Electronic Solutions is a Microscan VAR based in Lafayette, Ind.

The result of the movement to higher-density symbols is a raft of new imaging products being added to manufacturers' fixed scanner line-ups. While some needs can still be met with laser products, other users are snapping up imagers for immediate application needs for investment protection, anticipating additional future uses of imaging.



Driving Forces of 2D and Imaging

"Most manufacturing, warehousing, and packaging is using 2D somewhere," says Microscan's Mr. Allen. Many applications of 2D are in direct part marking and over-the-belt high-speed scanning. Movement to 2D and imaging are particularly strong in automotive (including direct part marking for part tracking, production control, and more); aerospace (the SPEC2000 industry initiative calls for use of Data Matrix for permanent, "cradle-to-grave" identification of parts; electronics; lab automation; the military (including the ANSI MH10.8M shipping label); packaging (where imaging systems combine inspection with label decoding); parcel delivery; pharmaceuticals; retail distribution; and security. (For more information, see the sidebar, "Key Drivers for 2D and Imaging," on pg. 22). Despite all the initiatives, though, 1D bar codes persist, for good reason. They're cheaper to produce, cheaper to read, and linear (1D) bar code readers are simpler to set up and maintain.

The Stalwart: Fixed Lasers

Indeed, lasers continue to be the go-to reader for linear bar code applications, and some advantages over imagers



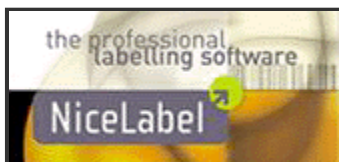
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remain, such as decode speed. "We're making them smaller and faster—2000 decodes per second buys you redundancy and reliability," says Microscan's Allen. Its imagers currently top out at 60 reads a second.

Users and integrators want fixed lasers to be as off-the-shelf as possible, and also seek the ideal combination of depth of field, processing power, software configurability, connectivity, and so on for the application, notes Mike Bosha, product manager for Accu-Sort. "They want software to be configurable to output to any type of process."

Current and Future Use for Imagers

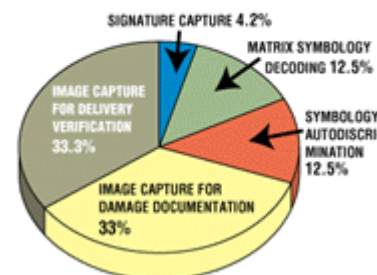


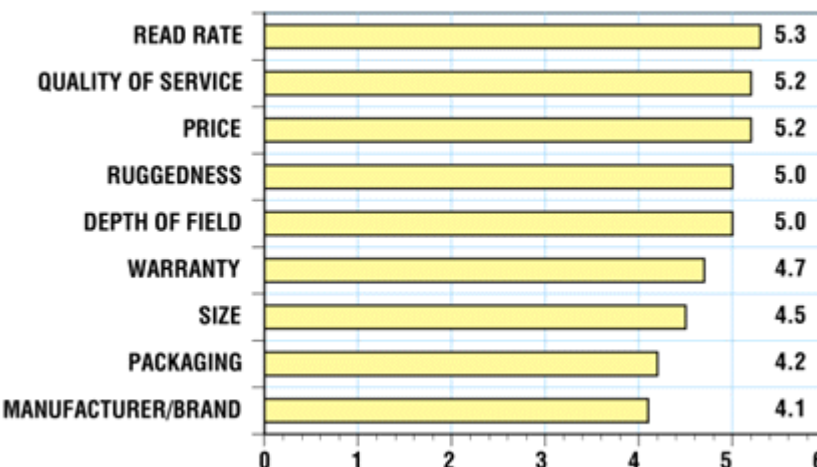
FIGURE 3: IN A SURVEY in the fall of 2002, 175 Supply Chain Systems Magazine readers indicated a high interest in imaging-related operations for CCD-based readers.

SICK, which acquired LazerData and RVSI's Computer Identities unit in 2001, has spread to its entire product line a feature called cloning that downloads reader parameters to an external device so the reader can be easily replaced should a problem occur, without costly downtime for set up. A display and additional communications options will be available with the next release this summer.

A trend that's impacting all auto ID equipment is demand for additional communication protocols. Manufacturers report many requests for Ethernet, DeviceNet, and Profibus, with some inquiries for PROFINet and Ethernet IP, to enable communication with computers and factory equipment.

While speed, uptime, and simplicity continue to rule in lasers, the maturity of the product has changed the competitive arena. "It's service and support that's pushing all of our product decisions," says Kris Zabel, marketing manager for SICK. These include "more efficient ways to decode, more efficient ways to do communication protocols, more flexibility with drivers." Indeed, a recent survey of Supply Chain Systems Magazine readers shows that quality of service was rated as in the top three of the most important criteria in evaluating stationary scanners or readers (for more information, see Figure 4, "Importance of Specific Criteria in Stationary Bar Code Scanners").

Importance of Specific Criteria in Stationary Bar Code Scanners

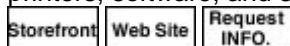




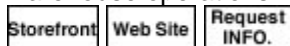
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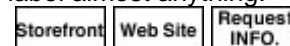
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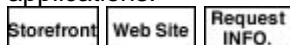
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FIGURE 4: SUPPLY CHAIN SYSTEMS MAGAZINE READERS put high priority on read rates, quality of service, and price when it comes to evaluating stationary, or fixed, scanners. In this chart, 1 = extremely unimportant, and 7 = extremely important. Number of survey responses = 175.

A New Area for Imagers

Linear imaging has already displaced some laser sales due to imagers' low cost and lack of moving parts. Now manufacturers hope area imagers will attain that level of success. A CCD area imager is made up of a dense matrix of CCD light sensitive elements that are electronically scanned in both the horizontal and vertical dimensions, forming a complete picture. This is similar to how a camcorder generates a video picture.

Area imaging technologies have a legacy of being complex, however, with separate cameras, lighting systems, and decoder processors that made set up an exacting and time-consuming process. Manufacturers are working to simplify that process with imagers that are more modular and easy to use. "Everyone wants to get the solution into one box, with the least amount of peripherals as possible," says Accu-Sort's Boshka. "Before, the cameras did the imaging, the illumination was separate, and the decoder was separate."

Newer imagers "are so much easier," says Electronic Solutions' Mr. Hilbert. "The field of view is much bigger, there are more software features, rapid capture, continuous capture, adjustable focus, and lighting and alignment improvements. It's fun to learn." The VAR has been able to deliver improved traceability, lower total cost of ownership, and more flexibility to customers via 2D symbology solutions and imagers, he says.

Microscan, for example, incorporates automatic calibration into its imager that takes care of setting the gain, threshold, and contrast, when the user trains the imager on a symbol and pushes a button. Streamlining of imager form factors also eases implementation by making imagers more compatible with conveyor systems.

"We're creating vision systems for people who are used to linear bar code scanners," says SICK's Ms. Zabel. SICK recently introduced a new linear CCD imager that reads Data Matrix.

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MORE FIXED SCANNER/READER INFO

CANPAR Demands Flexibility, Ease of Use

CANPAR Transport Ltd. of Ontario is under pressure to move packages as quickly and accurately as possible. The company turned to fixed scanners from Datalogic to boost read rates by 10 percent, increase throughput, reduce manpower, and provide better package security and more accurate package tracking.

Medical Instrument Maker Taps the Power of 2D and Imaging

A medical equipment manufacturer turned to fixed-mount imagers from Cognex to help speed and error proof its packaging process by removing manual verification of packing accuracy.

CMOS Compared to CCD

Today's imager vendors can use CMOS (Complementary Metal Oxide Semiconductor) or CCD (Charge Coupled Device) in their imagers. When is one better than the other? Microscan's Paul Thomas, senior technical communicator, describes the differences between the two technologies.

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"We've put in software tools to make it easier for users to validate the system," says Bob Settle, director of marketing for DVT Sensors. "You can detect when someone has made a change." Remote management is another priority, ensuring installed product can be supported for diagnostic and troubleshooting and remote update of parameters.

Work continues on improving imagers' decoding algorithms and adding symbologies, such as Vericode, Postnet, and Marconi's Snowflake code.

Incremental improvements in technology can make a huge impact. The difference between 99.7 percent and 99.9 percent read rate can be staggering on a line that's reading 600 parts per minute. "Our biggest challenge in R&D is to make a high-speed imager capable of reading 1D and 2D bar codes that is inexpensive," says Accu-Sort's Mr. Bosha. Reducing the cost will be a key factor in boosting imager adoption.

Part of the reason imagers must be made easier, notes SICK's Ms. Zabel, is that imaging manufacturers and integrators can no longer afford to spend margin on complex, lengthy installations that require expensive manpower.

Digital imaging continues to advance, and "the ADC industry is going to be a beneficiary," says Dan Bodnar, director of product marketing for Intermecc's Data Capture Systems Group.

Converging on Imaging

The spike in interest in imaging has attracted two camps: traditional auto ID manufacturers and those grounded in the machine vision world.

Automatic identification companies began adding area imagers to their product line-ups over the past few years as interest arose in high-density symbols and the image capture capabilities of imagers.

Meanwhile, machine vision companies, who were already in manufacturing operations for functions such as parts inspection and OCR reading, began to see opportunity in reading the symbols that were increasingly affixed to materials. They began producing smart cameras that use pattern recognition and algorithms to locate and decode 1D and 2D symbols and text within the camera's field of view. Advances in efficiency and lower cost over traditional machine vision made these suitable for materials handling. With a vision system, you can not only decode bar codes, but execute additional functions such as assessing label orientation, grading, and performing other inspections, says DVT's Mr. Settle.

"Vision added bar code algorithms to their products, and we added vision technology to decode bar codes," says Microscan's Mr. Allen.

"The Cognexes and DVTs of the world are definitely making inroads into the space and taking some marketshare," says VDC's Mr. Krebs. He notes the vision vendors are moving from mostly custom applications to more packaged bar code reading solutions.

"Two years ago they were completely different genres," adds SICK's Ms. Zabel. Coming up against one another benefits the end user by combining the strengths of both industries, she suggests. Some have struck alliances, such as the co-development agreement between Accu-Sort and Cognex.

Other Trends

Those aren't the only changes afoot in the fixed scanner/imager camp. Other

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trends:

• **Product divisions are blurring.** In non-industrial applications such as retail, the line between fixed and handheld scanning is blurring, notes Intermec's Mr. Bodnar. A handheld can often be placed in a holder and its trigger disabled to serve as a presentation scanner.

• **RFID is coming.** Observers see rising interest in RFID as the beginning of the end for bar codes, but others expect the two to peacefully coexist. The middle-grounders say RFID will first overtake bar code for pallets and cases, while item-level marking will still be made with bar codes for some time to come. VDC's Mr. Krebs anticipates strategic alliances between scanner and RFID companies.

• **Kiosks dominate retail sales.** Retailers are examining their fixed scanners to be sure they are capable of handling EAN 13 and 8 in order to meet the UCC GTIN Sunrise Date in 2005; some will need to upgrade firmware or replace their units if they are very old. While fixed scanners have long incorporated EAS technology, newer models are offering Electronic Product Code disarming (that is, the turning off of the RF anti-theft sensor).

• **Kiosks are where things are really happening.** Customer applications are demanding more complex scanning, for kiosks and on-cart terminal applications such as price look-up, lottery, and photo processing terminals. "Higher-end omnidirectional scanning capability does not require the user to orient the bar code," explains Intermec's Mr. Bodnar. "There are classes of these devices that need an area imager." Liability concerns are also sending retailers to imagers for customer applications.

Moving the Goods

No matter what the technology of choice may be, manufacturers agree that users are taking their time with purchases. While sales are roughly equally divided between upgrades and new applications, according to these manufacturers, users are making vendors work for those sales.

"In the last year and half, budgets have dried up for large projects," observes SICK's Ms. Zabel. "There are always three or four of us [manufacturers] chasing leads."

With the rapid improvements underway in imaging technology, end users now

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have a wider array of choices in addressing automatic identification challenges. From lasers to imagers to vision systems, from linear to stacked to two-dimensional symbologies, end users can now more precisely align the challenges of their unique applications with the correct marking and reading technologies to fit the bill.

*[Eds. note: Check out the "**New Products**" section for information on a couple of imagers just out.]*

LISA TERRY is a professional journalist specializing in retail, AIDC, supply chain, and channel issues.



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