MACHINE VISION

Looks Beyond Inspection

DEPTH AND DIVERSITY OF APPLICATIONS SHOW MACHINE VISION'S strength beyond its dominant use for inspection. Also, overall purchases are expanding.

About 35 percent of respondents expect machine vision purchases to increase over the next year, with about 54 percent expecting about the same amount spending, according to research by *Control Engineering*/Reed Research Group. Survey results are based on responses from 182 subscribers, all of whom buy, specify, or recommend machine vision products.

STORY_MARK HOSKE, CONTROL ENGINEERING

Machine vision use is in double digits for more than 15 applications.

Top applications are inspection, barcode reading, motion control, gauging, and robotics. Largest growth from 2004 to 2005 occurred in motion control; continuous processing; verification; diagnostics, testing, maintenance; SCADA; machine control; CNC equipment; as well as discrete product manufacturing.

TRENDS

- Vision systems easier to set up, use
- More speed, better algorithms
- Less capital impediment
- Increased use of system integrators

Among those using vision, 61 percent do so for in-plant requirements; 17 percent for OEM (original equipment manufacturer) resale requirements; and 22 percent for both OEM and in-plant requirements.

Application Intelligence

"Applications involving the pick and place of automobile door panels and hoods are becoming an increasing requirement for the automation solution suppliers to the automotive industry," according to William J. Amato, President, Phoenix Automation Group Inc. (www.phoenixautomationgroup.com).

"This would involve the application of sensing and guidance technologies for the true 3D guidance of industrial robotic systems," Amato says. "While previously this application has been accomplished with sophisticated 'high-end' vision and laser-based systems, we are discovering that the low cost and ease of installation of DVT SmartImage Sensors . . . have worked in many such applications." Applications include sorting of automotive body styles; measurement or gauging of precision machined components such as fasteners, transmissions, and other subassemblies; as well as error-proofing for manufacturing, Amato adds.

Robotics applications have special needs, says Mark Sippel, Cognex In-Sight vision sensors principal product marketing manager. "The increased use of vision for guidance of a motion control system requires a very fast vision system that can synchronize image capture, processing, and analysis with the motion controller. Accuracy is another key to success in these applications because they require some kind of scaling factor that relates pixels to distances, and the resolution of

the vision system correlates with the accuracy and repeatability of the motion system," Sippel says.

Via Ethernet

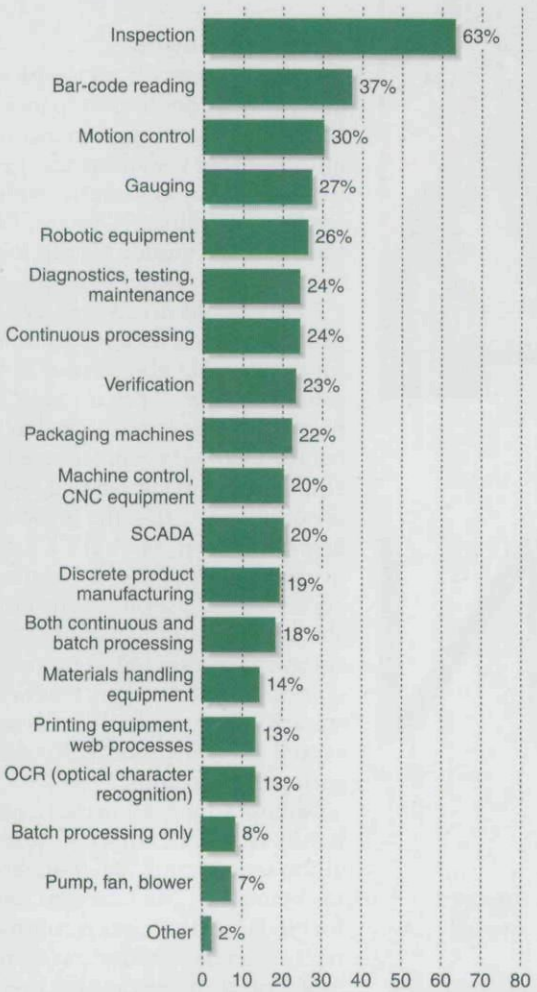
Regarding networks attached to machine vision, in 2004, survey respondents predicted that their use of Ethernet would soon overtake RS-232 as the dominant network. Ethernet did move from 65 percent in 2004 to 77 percent in 2005, and RS-232 moved from 73 percent down to 69 percent. Other notable increases in networking use with vision systems, 2004 to 2005, were DeviceNet from 36 percent to 40 percent, Modbus from 22 percent to 28 percent, and Profibus-DP from 20 percent to 25 percent.

Joshua Jelonek, machine vision application engineer, Keyence Corp. of America, concurs, "Ethernet is definitely the future of control communications. Its speed and flexibility offers many advantages to engineers looking to collect data for analysis or traceability purposes. It should be a priority for machine vision suppliers to provide their customers with powerful, easy-to-use data acquisition software to meet this increased demand." Other emerging network communication methods, Jelonek says, include Ethernet/IP, Modbus/IP, Profinet, and OPC.

About 52 percent of those responding used smart vision sensors in 2005, compared to 46 percent in 2004. About 83 percent said those smart visions sensors met requirements, compared to 90 percent in 2004. Write-in comments on satisfaction mentioned superiority of smart sensors compared to human inspection, ease of programming, and high success rates. Write-in reasons for dissatisfaction mentioned concerns about accuracy.

Kyle Voosen, machine vision product manager, National Instruments, says, "It seems to me that the big statistic here is that smart cameras' meeting customer requirements is down from 90 percent to 83 percent. This probably has a lot to do with customer expectations on what smart cameras are capable of doing. It may also be a symptom of low cost. With smart cameras selling for such low prices, one can afford to risk a few thousand dollars just to see if a smart camera will work. Any concern about accuracy is a software issue. For all this talk about rugged, small vision systems, perhaps customers are more frustrated by the simple configuration software that comes with smart cameras."

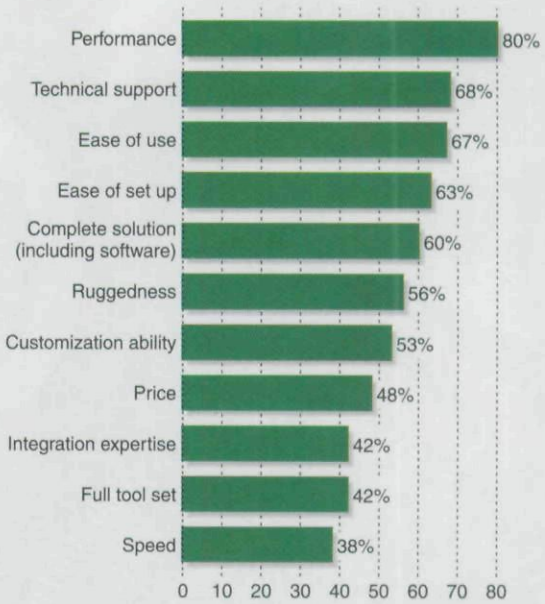
What are your primary applications for machine vision?



Source: Control Engineering/Reed Research Machine Vision, Product Research Studies, May 2005 and June 2004

Seven application areas of largest growth from 2004's survey to 2005 are: motion control; continuous processing; verification; diagnostics, testing, maintenance; SCADA; machine control; CNC equipment; and discrete product manufacturing.

Product selection criteria for buying a machine vision product



Source: Control Engineering/Reed Research Machine Vision, Product Research Studies, May 2005

Respondents to the 2005 survey listed their top five as performance, technical support, ease of use, ease of setup, and complete solution.

Performance, Support, Ease

In the survey results, the leading three product selection criteria when choosing machine vision are performance, technical support, and ease of use. Seven requirements ranked higher than price in importance.

Dan Holste, director of vision products for Banner Engineering, observes, "Many of the product-selection criteria cited in the survey are about ease of use, critical when operators with multiple duties support highly sophisticated vision products on the factory floor. Performance is number one on the list of product selection criteria, and it should be. The sensor has to be able to do the job or it's a no show, despite low cost and ease of use.

Continues Sippel from Cognex, "This year's significant decrease in vision systems meeting user requirements may result from engineers specifying lower cost vision platform implemen-

Machine Vision Products

For more manufacturers, visit www.controleng.com/buyersguide. For integrators with vision expertise, go to www.controleng.com/integrators. For more on products, visit the websites listed below.

Vision Sensor Has 1.3 Megapixels <$2k
Banner Engineering
www.bannerengineering.com

2-megapixel Vision Sensor
Cognex
www.cognex.com

2-megapixel CCD Vision System
Keyence
www.keyence.com

Advanced Algorithms Speed Machine Vision
National Instruments
www.ni.com/vision

Smart Vision Sensors Lower Cost, Increase Speed
Omron Electronics
www.omron.com/oei

Flexible, Easy Vision System Follows Standard
IDP, a div. of Coreco Imaging
www.goidp.com

Intelligent Cameras Make a System; Free Tutoria
PPT Vision
www.pptvision.com

For more detailed product write-ups, go to http://rbi.ims.ca/4393-556.

tations that lack the hardware and software performance to adequately solve user applications. Perhaps this is one reason why demand for technical support, full product tool sets and more integrator expertise has increased, while the importance of product price has decreased."

Perceptions of cost didn't change much: 57 percent of respondents say machine vision isn't too complex or costly to implement; 43 percent say it is—about the same as last year. Not surprisingly, in 2005, capital budgets are less of an impediment to increasing machine vision investments. In 2004, capital was the key obstacle to investing in machine vision for 46 percent. Just 39 percent saw that as the key problem in 2005. Priority compared to other automation was an impediment for 14 percent in 2004 and for 19 percent in 2005.

Adaptation Continues

System integrators are getting more machine vision business, perhaps to help those with lack of in-house resources. Integrators used for vision system projects jumped from 19 percent in 2004 to 25 percent in 2005; those planning to use them increased slightly, 16 percent to 18 percent. Increased spending on integration and on vision systems may suggest the market's pleased, according to Robert Lee, vision product marketing manager, Omron Electronics. Expansion "is specific to the nature, progression, and development of vision technology products, focusing on its simplicity, product-rich features, and high success rates," he says.

Market evalution continues after more than 30 years. Ben Dawson, director of strategic development for the Intelligent Products Division of Coreco Imaging, says, "Machine vision was introduced in the early 1970s and found its first major market in electronics inspection and assembly starting in the 1980s. Factors in this success include the precise nature of manufactured electronic parts, the highly controlled environment for inspection, and willingness of electrical and process engineers to struggle with the technology. OCR and bar-code scanning evolved in the same period but were driven by different market forces. In the last 15 years vision vendors have pushed machine vision technology to inspect parts with more variability and in messy environments, and have made a major effort to make their products easy-to-use."