

# Vive le ROI



*Increased throughput and reduced downtime, scrap, and warranty costs are just some of the tangible vision system benefits that contribute to ROI.*

- Justifying the numbers
- Replacing human labor
- Risk management
- Quality has cost

In today's competitive business environment, capital outlays require detailed justification. It's not enough to show that a technology will improve performance or enhance the product. If you can't point to bottom line improvements and state conclusively why and how a system will pay for itself, you're not likely to get the money to buy it. "Let's face it," said Nello Zuech, president of Vision Systems International (Yardly, Pa.), "the general criteria for how you spend your money is, 'Are you going to reduce labor? Are you going to improve production in some form?' A plant manager has to sometimes make decisions between investing in quality technology or investing in capital expenditure technology."

There is little argument that a machine vision system can improve quality and efficiency, offering a host of tangible and

intangible benefits. The key, then, is distilling down those benefits into a cogent argument for return on investment (ROI) — and making good on the promise.

## MAKING THE CASE

Machine vision systems range from about \$5,000 for a low-end system, to roughly \$15,000 for a mid-range system. High-end systems such as the types used in semiconductor manufacturing can run from several hundred thousand dollars to a million or more.

So how do you justify the numbers? In some industries, like semiconductor manufacturing, the work simply can't be performed without machine vision. In others, for example medical device and pharmaceutical manufacturing, it's considered part of best practices and required to remain competitive. Outside of such industries,

you need to approach the question more analytically, focusing on tangible savings.

Ultimately, making a solid case for ROI comes down to understanding and measuring your business, said system integrator Ross Rawlings of Radix Controls Inc. (Oldcastle, Ontario) "ROI increases when companies can quantify the cost of downtime, poor quality, final product scrap, or re-work and warranty."

Automated inspection can replace human quality control officers, not only reducing labor costs but potentially increasing throughput and revenue by streamlining the inspection process. Semiconductor probe manufacturer Point Technologies, for example, used machine vision technology to cut inspection time from 20 minutes for 12 probes to two minutes. That's a factor of ten in throughput improvement that directly affects the bottom line.

Achieving 100 percent acceptance test-

portant ROI consideration — intangibles.

### INTANGIBLE BENEFITS

Not all of the benefits of machine vision technology can be quantified as neatly as increased production or decreased returns. Some, like improved quality control, offer less tangible benefits such as increased customer satisfaction and return business. In the case of suppliers, being able to tout automated inspection and 100 percent quality control can add to the story for customers, and perhaps help net that big contract. In other cases, a customer may require it.

A benefit that lies somewhere between tangible and intangible is risk management. This can range from the liability faced by companies in the pharmaceutical, medical device and automotive industries in the event of faulty products, to insurance against production-line downtime.

**"Enhanced quality control leads to fewer returns, which can represent significant cost savings."**

ing with machine vision means that value-added parts can be sent back down the line for rework, which means less scrap and less value-added work performed on scrap. "That to me is one of the soundest arguments to justify the technology," said Zuech. Lower-end parts such as screws that don't merit rework can be discarded before they compromise the performance of the line or the performance of a subassembly.

Enhanced quality control leads to fewer returns, which can represent significant cost savings. In the case of the auto industry, for example, warranty service or factory recalls represent enormous amounts of money. For smaller products, shipping and handling alone can be costly. In the case of a supplier, shipping faulty products can be more costly still, in the form of cancelled contracts. Which brings us to another im-

In the case of medical device manufacturer Bepak (Milton Keynes, U.K.), for example, machine vision provides insurance against costly equipment damage. The company encountered a fault in which a non-ejected part left on a mold collided with a core protruding from the tool when the two faces came together, snapping it off. Equipment damage alone reached \$4,000, not counting production losses suffered from the 10 days of downtime during tool repair. Justifying the cost of the \$15,000 system they subsequently installed on the line was easy — if it prevents tool damage even once, the sensor has paid for itself.

### SKIRTING THE PITFALLS

Switching to machine vision is partly an exercise in managing expectations, which should be taken into account when calcu-

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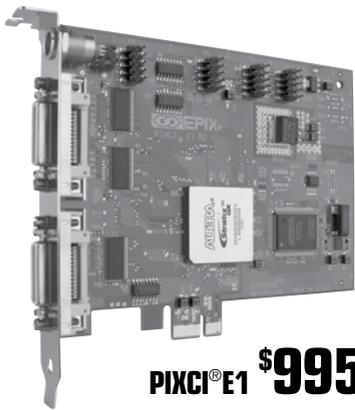
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## MANAGEMENT COLUMN

lating ROI. If more parts are pulled for rework, for example, you have less scrap and lower storage and disposal fees. On the other hand, you have higher rework costs, which may come as a surprise to companies whose manual inspection processes have made them feel assured they are producing a quality product.

"That's probably one of the biggest pitfalls," said George Blackwell of Cognex (Natick, Mass.). "If you've been relying on human inspectors, you may assume your quality level is higher than it really is. Once you have consistent criteria being applied, all of a sudden the rejection level goes up." The disparity between manual and automated inspection can, in fact, be a rude awakening.

Companies face a choice between adjusting process to allow them to live with the new quality levels — or adjusting the new quality levels by adjusting the vi-

requirements, leaving them no margin for additional demands, whether they be for additional inspection points or inspection of new products with more demanding characteristics. The lower initial figure may yield faster ROI, but if user demand forces additional investment — especially if the design is not upgradable — that faster ROI suddenly slows way down. "People learn about their process once they start getting their results from the vision system," he said. "Often, they'd like to add an inspection. If the vision system is already maxed out as far as performance goes, they're in a corner." A good rule of thumb is to plan for 10 to 20 percent of excess performance.

"Systems should be capable of being scaled upward for more speed and accuracy and also across production lines," said Frost & Sullivan (San Jose, Calif.) technical insights research analyst Vishnu Sivadevan. "Readily upgradable vision system

**"If you've been relying on human inspectors, you may assume your quality level is higher than it really is."**

sion system. It's not as easy as it would appear, though. "Many times, vision systems aren't designed to be detuned," said Blackwell. "If you haven't thought about that in advance and you just try to change something on the vision system to make it more forgiving, that's when you get unexpected results."

The issue of detuning in fact raises the question of whether companies should use in-house developers or hire an outside system integrator, which can cost double the price of components. For low- to mid-range systems, implementing a working vision system is certainly possible. Optimally leveraging that system and building it to scale with future needs, however, can be a bigger challenge.

A common error with homegrown designs, Blackwell said, is that users often put together a system that only just meets their

architectures should be selected. This saves on re-investment costs."

Other pitfalls include changing your operating assumptions, like the Radix Controls customer who called to complain that their new vision-guided robotic system wasn't working any more — and then revealed that over the previous weekend, they'd installed three 20 ft. skylights.

ROI varies with application, of course, but the sources interviewed for this article agreed that it typically ranges from a few months to two years. With careful analysis and a methodical approach to design and implementation, a vision system can economically improve the performance of almost any manufacturing operation. **AI**

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