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BOA Smart Cameras Solve A Pressing Problem

As any plant engineer can tell you, finding solid solutions to the simplest manufacturing problems often can yield the greatest benefits.

This was the case recently at Silver City Aluminum Corporation (Taunton, MA), a producer of aluminum products since 1952. Offering shorter tooling times at a lower cost than other metal forming methods, the extrusion process is straightforward. Large rolls of aluminum—called billets—are fed into the extrusion machine, pressed into a die, and heated, emerging as a slat, blind, or other shaped aluminum product.

The problem? After the billet has been pressed into the die and heated for about a minute, a knife drops down, guillotine-style, and shaves off the excess 3-4" of aluminum. At least, that's what's supposed to happen. Occasionally, after a billet has been cut, the excess fails to fall off. When this hanging piece hits the die, it can destroy it—to the tune of about $10,000 in replacement costs—or cause the machine to shut down, leading to expensive production losses.

The challenge for Silver City was finding a solution that could fit into a space-constrained area and perform reliably within harsh environmental conditions while not breaking the bank. Existing photoelectric sensor solutions weren't performing well, so Silver City's Larry Johnson contacted CPU Automation (Tyngsboro, MA) for assistance.

CPU specified and installed a dual-camera inspection system using BOA smart cameras from Teledyne DALSA (Billerica, MA). Incorporating all the elements of an industrial machine vision system within a tiny, smart camera-style package, the BOA is a highly integrated optical inspection tool for controlling quality and increasing productivity.

One BOA camera looks at the billet as it is loaded into the press to ensure that it enters the extruder properly. Since the press is located directly in front of a large window, Smart Vision IR lights are used to help reduce glare and reflections, allowing a clearer view of the billet, and preventing harm to workers' eyes.

The other BOA takes images of the knife when it drops to cut the billet and when it returns to its original position. If the image indicates that the excess aluminum was sheared off, then the hydraulic press and plunger resume operations. If the image shows that the billet was not cut properly, the BOA sends a message to an Allen-Bradley PLC, which stops the machine and activates an alarm alerting workers to the problem.

***Bad cut:** When a billet is not cut properly, the BOA alerts a PLC, which then shuts down the machine.*

***Good cut:** This BOA image shows a "good cut," when excess aluminum has been sheared off the billet.*

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The BOA system also is connected to Johnson's PC, allowing him to control the camera from his desk. Since the software is built directly into the camera, Johnson can program the BOA via a web interface. "I just line it up where the image looks best and then I can see what's happening on the machine from my office," he says. "Any programming and re-programming is done from my desktop. It's really easy to use this system."

The BOA software contains an extensive library of tools for solving most vision applications. At Silver City, a simple pattern matching technique is used. "We look at a clean cut and teach the system to run that specific pattern," says CPU automation engineer Mike Bray. "The image gets a score of 100% if it's an exact match, then the score drops with any variations. Any big fluctuations that occur—say, down to 20%--causes the BOA to alert the PLC to a failure."

Since the system has been up and running, Silver City Aluminum has not lost a dollar due to a damaged die or machine downtime. "These cameras have been 100% reliable, which is what we require in this application," Johnson says.

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