

► BY BILL KENNEDY, CONTRIBUTING EDITOR



Multiple metalcutting operations are accomplished on an aluminum transmission component called a solenoid module body in a custom-designed machine from New Vista Corp.

New Vista

Motivation for Automation

By fostering creativity and teamwork among its equipment suppliers, an auto parts maker creates cost-effective automation technology.

It's easy to decide whether or not to automate a manufacturing process—as long as the part volume is very big or very small. The decision is harder to make when the process falls somewhere in between.

Automation clearly doesn't make sense when you are machining just a few parts. When production numbers for a part reach seven figures or more, however, creating dedicated transfer lines or flexible CNC cells with automated workhandling can pay big dividends. Between these extremes, maximizing part making efficiency requires careful attention to the type and degree of automation employed.

Blue Ridge Pressure Castings Inc., Leighton,

Pa., has been successful employing tailor-made automation systems for production of midvolume automotive parts. Using a collaborative problem-solving process that involves its key suppliers, the company has been able to fashion automation solutions for producing parts that don't break the bank but get the job done.

Seeking 'Challenging' Parts

Founded in 1946 as a die casting shop, Blue Ridge employs about 150 people in the production of value-added, die-cast parts. "We like to provide all the services that we can—specifically machining—

to meet our customers' demands," said Andy Behler, vice president of Blue Ridge. The shop casts, finish-machines, cleans, inspects and packages aluminum components, usually for truck manufacturers.

Behler defines the midvolume area broadly, in the range of 5,000 to 400,000 pieces per year, as opposed to millions. "We've done some high-volume automotive, but to be honest, there are guys who are better at that," he said.

The company seeks out jobs that offer a manufacturing challenge. Said Behler, "We look for niche products that are a little more difficult and complicated than run-of-the-mill parts. We try not to do something that everybody can do, because then it becomes a commodity. We make products that require engineering on our part. We think that may help prevent them from being taken offshore."

Behler pointed out that Tier 1 suppliers for large OEMs such as GM, Ford, Cummins and Caterpillar are usually larger than Blue Ridge. "We've continued to remain Tier 1 to those big names by doing parts that are complicated enough that other guys either have a problem doing them or don't want to do them at all."

Price Pressure

The global nature of the automotive industry creates considerable pressure to maximize part-making efficiency in order to provide low prices, reliable delivery and top quality. Blue Ridge meets those demands while producing midvolume products by selective automation of its manufacturing process, achieved through a collaborative, team-based approach.

"The idea is to start with an open mind and be creative," Behler said. "When we receive a drawing of a part we think is a good fit for us, we brainstorm the most effective manufacturing methods. We weigh the advantages



New Vista Corp.'s Jack Wickham (left) and Blue Ridge Pressure Castings' Andy Behler discuss machining options for an aluminum transmission component.

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and disadvantages and come up with a hand-figured cost model that would describe those methods."

Behler said the aim is to "minimize the impact on the 'man'." The operator should be free to maintain the equipment, monitor the process and assure part quality, while the machine sets the production rate. At Blue Ridge, one person often tends two cells. "In today's environment, you're not going to just work the guy harder to get more productivity. It's just not realistic for

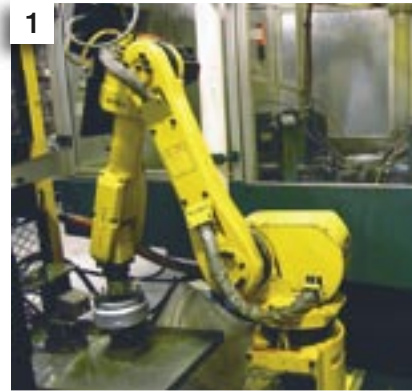
the long term," Behler said.

Assembling the 'A-Team'

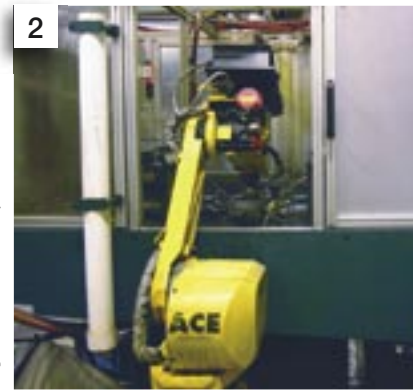
After developing a basic manufacturing system concept, Behler calls in a team of suppliers he has developed over time. Generally, the team includes representatives from Daewoo Machine Tool Div. of Doosan Infracore America Corp., West Caldwell, N.J., for standard machine tools; Automated Cells and Equipment Inc. (ACE), Painted Post, N.Y., for Fanuc robotics and other automation; and New Vista Corp., Baltimore, for specialized machines and material handling. "We meet with the group to see if what we are thinking makes sense, and they also can brainstorm and provide ideas. From that meeting we put together a suitable cell concept," Behler said.

New Vista President Jack Wickham said Behler "has done what very few people in the U.S. have done—taken volume that is not that high and done a really good job of getting the labor out." Wickham said the successful formula involves running partly with standard machines and partly with custom machines, and linking them with robots and specialized material handling devices.

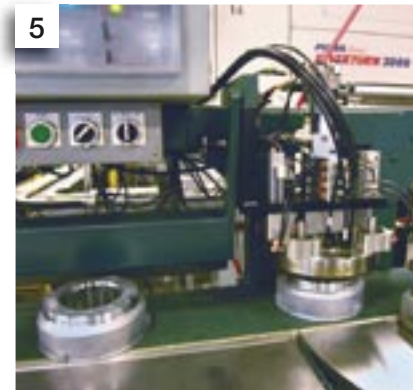
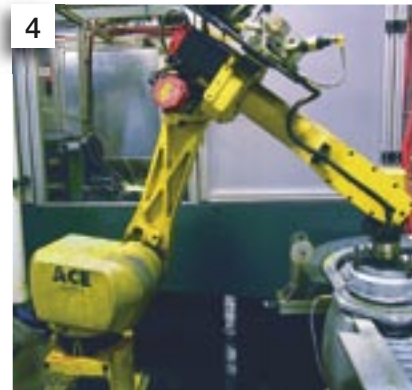
In addition to machining equipment, the part making systems include washing, drying and pressure testing units.



Images 1, 2, 4, 5, 6: B. Kennedy



New Vista



Wickham feels that "midvolume work is very interesting because nobody quite knows what to do, and we can evaluate two or three different approaches."

Making the 'Marriage' Work

Darryl Smith, automation project manager for Daewoo, said many organizations are pursuing the same goals as Blue Ridge but "they don't create an atmosphere of teamwork. We work together to solve a particular need."

Regarding competition among suppliers, Jim Morris, president of ACE, acknowledged that "there are some places where a robot is overkill." But, compared to hard automation, he said, where a robot usually provides greater flexibility. "With some small changes—adding fingers on the robot, changing the chuck jaws—they can run different parts. That's where robots are very effective." When a process such as inspection requires moving and rotating a part

through a number of planes, the robot is often the best choice, Morris said. A major factor in choosing automation methods is determining the capital investment appropriate for the part being made. That determination is hard to make because shops are usually unsure of how long they will produce a certain part. New Vista's Wickham said a supplier "may be hesitant to invest in a machine that would save them a lot of money but would give them payback in 4 years. What is [the value of] a 4-year payback if in 2 years you're not going

to have the part?" New Vista, he said, generally doesn't design machines that offer longer than a 2-year payback.

Brainstorming and teamwork at Blue Ridge rarely happen at a leisurely pace. While the company occasionally has ample time to design a manufacturing method for a part, "usually we have to come up with something in a matter of a few days," Behler said. "It's seldom that we get more than 3 or 4 weeks." Many times, decisions must be made without having all the facts.

Familiarity and trust among the supplier team helps speed and solidify the

The following companies contributed to this report:

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Automation helps produce 'reasonably complicated' parts

Blue Ridge Pressure Castings' creative approach to automation helps the company produce an array of different parts. Providing an example of the development of automation for a particular part, Andy Behler, vice president for Blue Ridge, described what he called a "reasonably complicated casting," a 5½"-dia., A-380 aluminum filter cover used in a truck transmission. Blue Ridge produces about 300,000 of the parts annually.

The part is cast to near-net shape to minimize machining and post-process operations. A typical casting strategy involves forming the areas around holes higher than the eventual finished profile. Then, a simple facing operation will open the holes and produce burr-free edges requiring no post-machining cleanup.

Prior to automation, an operator machined the covers on a conventional CNC lathe. After machining, the operator took the part out of the lathe, dipped it in a washing tank, blew it dry with an air hose, pressure-tested it and put a sticker on the part.

The goal, Behler said, was to machine, wash and pressure-test the part automatically and "have it completed when it comes out of the cell." After initially considering a "hard" automation system—using pick-and-place devices to move the part—Behler decided that having a robot interface would

be more cost effective. One of the key advantages of using the robot is freeing up the operator to handle machine maintenance and monitor part quality.

Robot Handling

In another case, a bowl-shaped transmission part called a piston required six 3mm holes around its perimeter, each with a 6mm off-center spotface, as well



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Blue Ridge Pressure Castings produces 300,000 A-380 aluminum truck transmission filter covers per year, casting it to near-net shape (left) then machining, washing and pressure testing it automatically in a custom-designed cell.

as finish turning of the casting. (See photo sequence on previous page.)

The solution was a cell consisting of a robot, a Puma inverted vertical turret lathe from Daewoo, a specialized drilling machine and a pressure-testing system from New Vista. The drilling machine employs multiple spindles to drill and spotface the piston extremely rapidly, while maintaining the exact relationship of the holes to each other.

The robot first picks up a piston and

manipulates it at an inspection station to locate part features and also assure that the piston isn't already drilled. After placing the part in the drilling machine and retrieving it after spotfacing and drilling are completed, the robot performs another inspection sequence to confirm the holes were drilled correctly. The robot then places the piston on a conveyor that takes it through the VTL and out to the automatic pressure-testing unit. An operator visually inspects each part at the end of the process.

Multiple inspections aimed at producing error-free products are part of every Blue Ridge process. A variety of inspection technologies are employed as well. For example, the company's hole verification methods include mechanical probes, light-beam-based proximity sensors and laser systems. The reason for the intensive inspections is that the plant's parts generally go directly to customer production lines with no further quality checks.

Said Behler, "The customers accept no defects. If we send a casting that doesn't have the holes drilled, somebody has a transmission that doesn't shift and there are very big consequences for a little company like ours."

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quoting process. Said Wickham, "We run the numbers both ways. In other words, we'll come out with what we think is the least expensive thing for the customer." If using a standard machine tool alone is the least expensive alternative, Wickham will recommend that and "at that point we are out of it."

To justify the investment in a specialized machine, he said, the custom equipment should generally be able to run a part three times faster than a standard machine. A part that runs

three shifts, therefore, could be produced on a single shift. If that specialized machine is run three shifts, it can replace two standard machines as well, at which point, "the numbers really can pay off," said Wickham.

ACE's Morris said that, because much of the work at Blue Ridge is familiar to his company, it can provide an estimate "usually with a phone call. We know what size of machine we are reaching into so we know what size robot we need." The robot's size

and capabilities basically determine its price, so "We get the quote in the ballpark, which is all you can do until you get some sample parts," Morris said.

Behler said the atmosphere in automotive manufacturing today can be described as nerve-racking. "That is one of the big disadvantages, and it is not the best situation," he said. "I think cooperation breeds the best result." The success of Blue Ridge Pressure Casting demonstrates the positive results that teamwork makes possible. △