

COMPETITIVE PRODUCTION

VOLUME 13.1



INSIDE FEATURES



OUT FRONT



BOB HENRY

(513) 573-7425

robert.henry@makino.com

MACHINE-TOOL RELIABILITY: THE CORNERSTONE OF AUTOMATION

Like the proverb of building a house on sand, so too would be the development of an automated manufacturing system built with unreliable machines. The very purpose of automating machining processes is to establish robust, stable, around-the-clock production that lowers costs, increases throughput and improves part quality. Machine downtime is a crippling obstruction to attaining these goals. As such, a reliable machine platform is the enabler for a manufacturer's ability to automate a production process. In fact, it is absolutely essential.

The relentless demand that North American manufacturers face to increase efficiency, reduce costs, and improve traceability and throughput is a primary driver for the trend toward automation. It is through this type of advanced technology that manufacturers can level the global playing field and develop robust, reliable and cost-effective production processes that satisfy the needs of the market. In fact, some analysts forecast that the North American industrial robotics market is poised to grow at a compound annual growth rate of more than 10 percent between 2015 and 2019. With this rising demand for automation, it is essential for manufacturers to begin building a foundation for these technologies by investing in reliable machine tools.

Reliability and maintainability are fundamental principles in the design and construction of every machining center at Makino. Design elements such as one-piece way covers and dual-supported tool-change arms are examples of how our engineers carefully evaluate each machine component based on its ability to stand up to the toughest production environments 24/7, with minimal routine maintenance required. It is this level of design that enables leading manufacturers to confidently run their machines and their automated systems to satisfy their customers' cost and volume requirements.

The requirements for a reliable automated manufacturing system don't end with the selection of the right machining center. Manufacturers must also carefully consider their choice of an integrator of the automation solution. All manufacturers, particularly those investing in automation for the first time, need a reliable partner who possesses deep knowledge and experience in the planning, design, development and integration of complex automated systems. A reliable partner should be capable of effectively managing all aspects of an automated manufacturing system, including hydraulic fixtures, robot end-of-arm tooling, vision systems, 2D matrix stamping, blow-off stations and custom human-to-machine interface (HMI) control systems. In selecting the right supplier, manufacturers should be regularly informed of current project status and feel confident that project timelines are being met. Who better to manage those details than the people most familiar with the reliable machine platform, the machine manufacturer. It's counterintuitive to add more communication and interface challenges to any project.

With decades of experience in supporting manufacturers' investments in automation, Makino has become uniquely capable of developing robust production-ready processes—including the machines, fixtures, tools, programs and documentation—for parts with demanding tolerances and tight deadlines, challenging budget constraints and statistical quality standards. Our teams manage every step of an automation project with single-point-contact project management, project engineering, on-site supervision and post-installation training and support. Most important, customers benefit from guaranteed cycle times, improved process capability (Cpk) and cost per part that meet or exceed their objectives.

To remain competitive, North American manufacturers need to consider investments in automation, but not without first identifying reliable and enabling machines from a reliable supplier. By initially focusing on establishing a reliable foundation, manufacturers can expect to see success and competitiveness.

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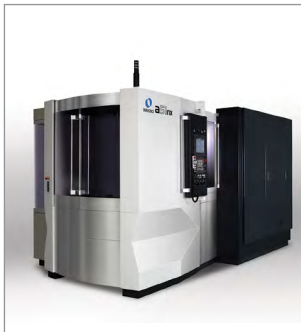
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MAY 19, 2016

Webinar: How Makino Can Help You Grow

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MANAGING GROWTH



DETERMINING A MACHINE'S TRUE VALUE



By Tom Clark, Vice President, Makino Inc.

Manufacturers typically purchase new equipment to obtain higher capacity or improved methods and technologies for production. With a significant capital investment, the purchase price is always carefully examined to determine return on investment (ROI) for these new machines, but it can be challenging for many shops to calculate the *true* ROI. Most manufacturers focus only on equipment price when making calculations and neglect to evaluate the total life cycle cost or anticipated performance of the equipment. This oversight can often dwarf the original purchase price.

FACTORS THAT IMPACT ROI

The acquisition, operating, maintenance and decommission costs all contribute to a machine's true ROI calculation. Acquisition costs include the purchase price, installation and training. Post-sale service, supplier reputation, warranty and support services offered are other important factors to consider. For example, a vendor's availability to conduct operations and maintenance training and improve employee competency is something that can prevent productivity loss.

When it comes to operating costs, manufacturers must determine the impact of new equipment on productivity. A high-performance machining center typically has a design and construction that improve these key aspects of operation:

Cycle time. The ability to complete more parts per shift over commodity machines affects profitability. Producing more parts and saving labor automatically lower the actual cost per part, easily overcoming the original purchase-price premium for high-performance machinery.

Tool life. High-performance machining centers have been shown to deliver improved tool life and performance, thanks to a rigid construction that means fewer passes with the tool are needed, reducing processing times. Many Makino customers report significant improvements in tool life, which enable them to reduce operator intervention and cut part costs. What would it mean to your ROI if you could reduce perishable tool costs by 20 percent—or even 30 percent?

Part quality. The accuracy and precision of a high-performance machine affect part quality. Even parts with complex geometries come off the machines with tight tolerances and high-quality surface finishes, reducing inspection time and eliminating manual finishing operations such that manufacturers can reduce operating cost and take on more orders. Eliminating just a small amount of scrap can have a large impact on ROI.

Reliability. Special programming features mean that operators do not have to continually stand at the machine to recall programs, and the equipment can run uninterrupted or unattended to reliably and consistently produce parts.

Maintenance can also factor into ROI calculations. Once production starts, unscheduled downtime can quickly erode any saving on purchase price. Similarly, when purchasing equipment, manufacturers also need to consider decommission costs. The residual value of the machine should be accounted for in the actual ROI.



HOW AUTOMATION CAN HELP IMPROVE ROI

Many manufacturers don't take into consideration the fact that automation can increase machine utilization to 95 percent. The minute one part is completed, the next part goes into production, sometimes running 24/7. Faster part turnaround results from eliminating direct setups on the machine. Higher throughput helps the business become more profitable.

Automation also allows for flexible production quantities and reduced lead-times. It also brings higher quality parts with less scrap and lower part costs.

IMPACT OF LEASING VERSUS BUYING

After evaluating cost per part from acquisition, operating, maintenance and automation, a manufacturer should next determine the best way to pay for the equipment. This transaction can be done with cash or through financing. Paying cash enables a business to own the equipment as soon as the transaction is completed, but it also reduces the company's cash flow for other investments.

Financing enables a company to better match monthly cash flow being generated from the equipment to the obligation of the monthly payment due under the financing vehicle. Making payments can be handled through a traditional loan or by leasing the equipment.

When buying an asset, it is critical to consider the long-term costs of ownership, such as maintenance and downtime that

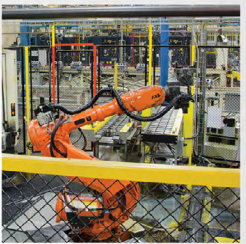
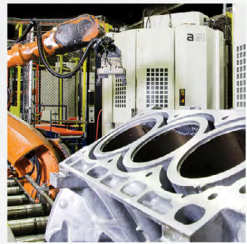
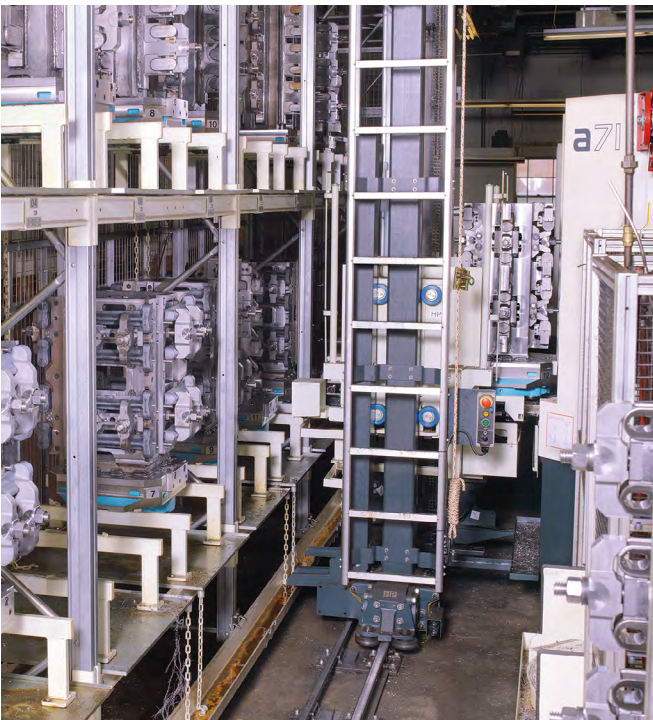


can mount when a company holds onto an asset over time. Looking toward the future can help determine the financing route that works best for the operation.

HIGH-PERFORMANCE CAN BE BETTER SOLUTION

To be competitive, manufacturers certainly want to take advantage of the most advanced technology available. In addition to the purchase price, many other costs factor in to the machine's true cost. When considering these expenses, long-term cost of ownership can be better determined. Investing in high-performance machining centers instead of the lower-cost option can ultimately be the better solution for the business.

Learn more about identifying the true value of a machining center and download an interactive ROI spreadsheet in Makino's complimentary white paper, "High-Performance Machining Center ROI: How to Determine a Machine's True Value."



WE AUTOMATE.
WE INTEGRATE.
YOU WIN.

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Learn how Makino is helping production companies reach their goals through 24/7 machining. Right now at makino.com/auto/win.



SEW-EURODRIVE DEVELOPS TRUST AND CONFIDENCE IN MANUFACTURING AUTOMATION



Confidence in your employees, your management, your partners and suppliers is essential to building a successful business. It breeds trust, which inspires loyalty. SEW-Eurodrive of Lyman, S.C., is built on this belief from the top down. The company has confidence in everyone it employs, providing these individuals with both the responsibility and the flexibility to make the right decisions and drive business growth.

“When you build relationships, when you build trust and confidence in the people that you work with, that’s what is important to us,” said Chuck Chandler, assistant plant manager at SEW-Eurodrive. “Building a relationship of trust really takes precedence over most other factors. In the 33 years that I’ve been with the company, there’s never been a project that we went into evaluating everything from a cost standpoint first. It’s all about obtaining the right solution and building relationships with suppliers that we can trust.”

Trust takes time to build, and it is extremely fragile. This was one critical lesson that SEW learned during its initial efforts at implementing automation. While early investments had helped build confidence in automated technologies and methodologies, SEW was unable to build a lasting partnership with a supplier that it could trust to execute critical automation systems.

According to SEW, the biggest issue with most machine-tool suppliers is their inability to offer machines,

“It’s all about obtaining the right solution and building relationships with suppliers that we can trust.”

engineering services and automation integration all under one roof. It is not enough for a supplier to just purchase or partner with a third-party integrator and say everything is covered. Chandler confesses that he’s even seen these types of relationships fall apart firsthand, as suppliers and integrators blame each other for errors and delays.

“If we don’t have confidence in our suppliers to get the job done right, how can we expect our colleagues, managers and customers to have confidence in us? It’s as simple as that,” explained Chandler.

“While more and more companies are attempting to provide a ‘single-source’ solution to automation, no one but Makino has been able to offer equipment, system design, process engineering, project management, integration and training under one roof. Our team has the highest level

of confidence in Makino’s engineers. They listen to our needs and concerns intently, not just spout off rehearsed sales pitches. If our team calls up Makino with a question, they know that they’ll get an answer that they can take to the bank,” said Chandler.

EARLY ADOPTERS OF AUTOMATION

SEW’s journey into automation began earlier than most other companies, with initial considerations and research beginning in the late ’90s. It was during this time that SEW’s management team observed an unsettling trend of growing fatigue among employees in their plant, resulting from increasing production demands and manual setups and part transfers. These issues were resulting in minor health and safety issues, lost-time accidents and extended seven-day workweeks in which employees were struggling to maintain efficiency. Not only was this workload stressful

on employees and their families, but it also led to limitations in their ability to help the company drive increased productivity.

In 1999, SEW assembled a team to begin evaluating automation as a potential solution for transferring exhaustive work and extended hours from the workers to the machines. The goal was to give operators a healthier work atmosphere and allow for a five-day workweek in which staff members could spend weekends with family.

“SEW prides itself on providing a safe and appreciative work environment for its employees,” said Chandler. “The average employee has now been a part of the company for 19 years! What other company do you know of that can say that today? We believe that much of this loyalty can be attributed to the decision we made to move into automation. This has helped us to continuously challenge our team, while providing them with the flexibility necessary to develop creative solutions.”

Similar to most other manufacturing operations across North America,



In 2007, Makino expanded SEW’s existing eight-machine robotic cell with four Makino a71 horizontal machining centers, a second coordinate-measure machine, two additional pedestal robots, a second gantry robot and a custom human-to-machine interface (HMI).

agreement was essential to long-term success and retaining the expertise that they had nurtured over the years.

SEW’s initial investments in automation started off simple with linear pallet systems. These systems helped the company increase machine utilization and familiarize itself with the methods and processes of automation, but it did not fully address issues of operator

of working with robotics was very positive and substantiated our team’s belief that this was the right direction to go; however, it also raised concerns about our selection of suppliers. Not only did installation of the cell take more than twice as long as the supplier initially quoted, but almost every issue that arose during the process resulted in arguments between the two companies. We came away from the experience with some degree of confidence in the technology, but not in the people or the suppliers that we worked with.”

“Our team has the highest level of confidence in Makino’s engineers. They listen to our needs and concerns intently, not just spout off rehearsed sales pitches.”

initial discussions of automation were met with some hesitancy among SEW’s staff due to fear of job loss. To quash these concerns, management made a commitment to everyone at the company that any current jobs would not be lost as a direct result of automation. Within a culture based on trust and confidence, owners and managers knew that upholding this

ergonomics. Several years later, once confidence was built in the capabilities of robotics, SEW invested in its first fully automated robot-tended system.

“Our first robotic cell was supplied by a reputable Japanese machine supplier and a third-party integrator that they had been partnered with at the time,” said Chandler. “The overall experience

A PARTNERSHIP BUILT ON CONFIDENCE

Despite installation issues, the value of the robotic system was clear in its improvements to both efficiency and operator wellness. Several years later, in 2006, SEW looked to expand its robotic system, but it was again confronted with the challenge of identifying a supplier for equipment and integration.

“The previous integrator was no longer in business, and even if they were, we knew we needed an experienced supplier that could be trusted to



Installation of SEW’s newest a81 cell system was completed within projected timelines, and SEW’s cell operated at peak performance on its first production run.

uphold their promises,” said Chandler. “Our team had always thought highly of Makino for their machinery, but previously considered their equipment to be excessive for the production requirements of our gearbox housings. However, at IMTS 2006, we saw an automation setup in Makino’s booth that immediately caught our eye. We spoke with their engineers about our expansion plans and learned about their automation and engineering capabilities. We knew they had the machines for the job, but we were pleasantly surprised to learn that they could also provide tooling, fixtures, automation and engineering all under one roof.”

In 2007, SEW-Eurodrive hired Makino to take on the expansion of SEW’s existing eight-machine robotic cell. The upgrade consisted of four Makino [a71 horizontal machining centers](#), a second coordinate-measure machine, two additional pedestal robots, a second gantry robot and custom software to facilitate communications between new and existing equipment. Makino managed all aspects of the system, including



Across each of SEW’s cell installations, Makino managed all aspects of the system, including third-party equipment, the HMI, process engineering, tooling and fixtures.

by hundreds of North American manufacturers investing in integrated flexible manufacturing systems—each benefiting from guaranteed cycle times, process capability index (Cpk) and cost per part. Every step of these projects is led with single-point contact project management, project engineering, on-site supervision and post-installation training and support.

“The detail-oriented knowledge and experience that Makino demonstrated gave us a higher degree of confidence than any other automation supplier that we’d previously worked with.”

third-party equipment, the human-to-machine interface (HMI), process engineering, tooling and fixtures.

[Makino Engineering Services](#) has engineers and project managers with decades of experience creating robust production-ready processes for parts with complex geometries, demanding deadlines, challenging budget constraints and Six Sigma standards. These services have been deployed

Makino was not only able to take on SEW’s expansion project, but it also made improvements to the efficiency and productivity of the original cell. Throughout the expansion project, SEW was able to run production orders in the existing cell with only minimal interruption when the final expansion was brought online. Today, the cell is operating 24 hours a day, five days a week, producing 4,500 housings each week.

“Several suppliers that we had talked to turned down this project due to its complexity; some others walked in with the same rehearsed presentation that they delivered to every other potential customer,” said Melvin Story, manufacturing engineering technician at SEW. “The biggest difference with Makino was that they provided good responses on the spot, demonstrated working knowledge and actually listened to our team members.”

According to Paul Woodbury, project engineering team leader at Makino, communication with the SEW team was crucial in overcoming the challenges of the expansion project.

“When you work on a system that was designed and programmed by someone else, you essentially have to reverse-engineer the whole system,” said Woodbury. “Oftentimes, you run into integrators that follow completely different methods and processes than your own, so there can be many challenges in trying to pick up the pieces. This is why full transparency and trust are so crucial for this level of systems engineering. Makino and SEW were able to establish clear definitions

and similar visions early on, allowing us to efficiently address issues as they arose and quickly reach the end goal.”

“We were told that the installation would be completed in three months; in truth, we were up and running nearly a week earlier,” said Chandler. “The detail-oriented knowledge and experience that Makino demonstrated gave us a higher degree of confidence than any other automation supplier that we’d previously worked with.”

ESTABLISHING LASTING TRUST

SEW spent the next several years investing in linear pallet systems to transition the entire plant to a five-day workweek. These investments included two [Makino Machining Complexes \(MMC2\)](#)—one system featuring four [A99E horizontal machining centers](#) and another with six [a81 horizontal machining centers](#).

“I think a lot of manufacturers look back to investments made in the years leading up to the recession with regret, but our investments in automation really ended up being a job saver,” said Chandler. “While shops all around us were shutting their doors and laying

“We trust the reliability of Makino’s machines and the processes that their engineers create.”

off their workers, we just had to cut off power to a handful of machines. I think it was during this time that our team truly started to see the benefits of our investments and trust the direction that we were heading. Had we approached our production methods similar to many other plants by putting an operator at every machine, we would have had to lay off 50 percent or more of our staff.”

As production ramped back up following the recession, SEW experienced rapid demand for a second robotic cell to produce a new line of gearboxes. Overall, the company needed to produce 500,000 units per

year in the Lyman plant while operating five days per week and without requiring any new hires. The only way to achieve this was through a new automated system.

“On every new investment, we look into multiple high-end suppliers to ensure that we are getting the best and most competitive offer; but not much had changed since our previous projects,” said Chandler. “The majority of suppliers were still outsourcing their integration services to third parties. We didn’t want to go down that path again.



With the Makino machines, SEW is able to consistently meet 13-micron bore tolerances and maintain repeatability within 20 to 30 microns on location tolerances.

In 2013, we selected Makino for their comprehensive package of service, support, spare parts, automation, engineering, tooling and fixtures.”

The new cell features an overhead gantry robot that services six a81 horizontal machining centers. Each machine fixture includes one location for machining a raw part and one location for machining a semi-finished part. The gantry robot shuffles parts during an unload/load sequence using a vision system that is attached to the robot carriage to generate offsets for loading parts onto the fixtures.

In order to keep the automated cell in operation, raw parts are continuously delivered by forklifts. The parts arrive in bins at two areas, where a pedestal robot uses a vision system to locate and pick parts from the bins. After removal

“Makino has earned our confidence, trust and loyalty. Any other supplier would have to work more than twice as hard to earn our business.”

from the bin, raw parts are presented to a separate vision system to verify that they are of the correct part type before they are placed on a dedicated “raw part” stand for the gantry robot to access.

The gantry robot transports finished parts from each machine and places them on a dedicated “finished part” stand for access by the pedestal robot. The pedestal robot presents the parts to a marking system, where they receive a 2D matrix code. Next, the robot moves the parts to a vision system that verifies the matrix code.

In the next stage, finished parts are transferred into a booth containing a smaller pedestal robot. There, the parts are air-blasted to remove residual liquid and debris. The booth helps limit noise from the cleaning sequence and captures the chips blown off the parts. Once the parts are cleaned, the robot transfers them to a coordinate-measure machine (CMM), where it is inspected and verified before being delivered to the finished part bin. Forklifts then remove the full finished part bins from the cell to be prepped for delivery.

The cell is managed by two HMIs, which were designed with custom control screens that enable operators to quickly and easily select part types, enable/disable functions, select inspection frequency and type, and view current system information status appropriate for the application.

Additionally, the control interfaces provide warnings and information regarding system alarms along with guidance about how to resolve the issue.

SEW’s system was designed to run two different part numbers at high volumes while providing flexibility within the programming to accommodate six other part types. Several of the robots execute tasks within common areas, so complex system coordination is handled by the cell’s controls.

Installation of the system was completed within projected timelines, and SEW’s cell operated at peak performance on its first production run.

“We trust the reliability of Makino’s machines and the processes that their engineers create,” said Story. “Part quality is non-negotiable for us, so repeatability and accuracy are essential. The a81 machines consistently meet our 13-micron bore tolerances and maintain repeatability within 20 to 30 microns on location tolerances. As a result, our scrap rate is under 1 percent every year, and that includes any casting flaws.”



Since installing its first automated cell, the Lyman plant’s production output has grown tenfold with only a 6 percent increase in manpower.

Operators attended training at Makino’s headquarters in Mason, Ohio, which they found to be the most engaging and informative hands-on experience from any previous supplier.

Makino’s training provided operators with an in-depth understanding of their systems’ cell controllers, enabling them to manage systems efficiently with a high degree of confidence. “When developing the HMI, our team strives for simplicity through standardization of menus and messaging that makes it easy for operators to quickly identify and resolve issues. It’s all about balancing aesthetics and functionality for optimum performance,” explained Woodbury.

BUILDING BONDS OF LOYALTY

Through its more than a decade-long experience with complex automation systems, SEW believes that it has found the recipe for confident and trustworthy investing. The proof can be found across all areas of the business, including the Lyman plant’s production output, which has grown tenfold with only a 6 percent increase in manpower since the installation of the first automated cell. This has not only helped the plant to retain skilled labor during tough economic cycles, but it has also led to improved product costs and greater profitability for years to come.

The Lyman plant is now recognized as the most efficient operation among the company’s global manufacturing network, including its China operation. Nearly 80 percent of all products manufactured in Lyman are now being shipped internationally for assembly and sale. According to Chandler, the efforts made in Lyman are driving an automation trend across SEW globally. The global company is now developing plans for a new plant in Germany



Investments in two Makino MMC2 linear pallet systems have helped SEW transition the entire plant to a five-day workweek.

that is being dubbed the “plant of the future,” which is expected to draw upon insights from Lyman.


As for what’s next at the Lyman plant, Chandler and his team are already one step ahead of the challenges.

“Our investments in this level of technology make it more critical now than ever before to maintain loyalty among our staff. This includes both the older generations that are reaching retirement, as well as bringing in and nurturing new talent,” said Chandler.

SEW recently established several programs internally, and with local high schools and technical schools to help grow a new generation of engineers and machinists. As a part of these programs, the company provides inductees with two years of on-the-job experience while the students complete their schooling. The company attests that the majority of these trainees are sticking with the company.

“I think when these younger folks see our facility and the cutting-edge

technologies that we work with, it keeps them excited to stick around. This is exactly the type of people that we want and need to raise the bar for the future, so we will continue to provide them with the tools to keep them interested and growing,” said Chandler. “It all comes back to building confidence in people. We want our team to have confidence in the future of this company, the future of their jobs and the future skills that they can and will develop. Our investments in automation through Makino are a major contributor to this commitment. Makino has earned our confidence, trust and loyalty. Any other supplier would have to work more than twice as hard to earn our business.”



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RELIABLE MACHINING DRIVES OHIO FOUNDRY'S NEW GROWTH

It's only 19 miles from Brook Park to Avon Lake near Cleveland in northeast Ohio, but it's a world away from where Dennis Daniels started his aluminum foundry.

All Daniels wanted to do was cast aluminum parts, so in 1972 he set up shop in a small garage in Brook Park. He was the only employee. Secondary machining was never part of the plan.

Today, Daniels leads a company with 104 employees working in a 110,000-square-foot foundry and machine shop in Avon Lake, supplying aluminum cast parts and finished subassemblies to global manufacturers of heavy trucks, autos and industrial equipment. Secondary machining of those parts generates 40 percent of Alupalloy Metalcasting Co.'s revenue.

That's not the business Daniels expected to build, but it's how he chose to keep Alupalloy competitive in a fast-changing market.

High-quality parts, on-time delivery and the best pricing matter most to the company's customers. To win and keep their orders, Daniels and his team depend on 10 Makino horizontal machining centers, beginning with the

first a81 mill he purchased in 2007. The machines enable Alupalloy to produce repeatable tolerances as tight as 15 microns on some parts and to consistently meet deadlines in a demanding production environment.

"Reliability for us is paramount. If we can't keep the machines running every day, we can't serve our customers," said Matthew Cole, Alupalloy's machining engineer. "That's why our production relies on the Makinos for the big jobs we need to keep going every day."

ADDING VALUE

Nothing in Daniels' background prepared him to set up a machine shop, let alone turn machining into what powers Alupalloy's growth today.

He had worked for five years as a supervisor at a now-defunct aluminum sand casting company in Avon Lake. He quit that job to start his own business focused on a different approach to making aluminum parts called

permanent mold casting. As Alupalloy grew, Daniels moved his foundry from that garage in Brook Park to a larger facility in the old industrial area of Cleveland known as The Flats. When a customer needed secondary machining, Alupalloy hired third-party machine shops to complete the parts. Too often, quality issues would be blamed on casting, when in fact they occurred in the secondary operations. The third-party machine shops also frequently would push back deadlines, forcing Alupalloy to extend its lead-times.

To best serve his customers, Daniels decided Alupalloy would machine its own parts.

In 1989, Daniels purchased a used vertical machining center with fixtures. At that time, few foundries owned CNC mills or employed machinists. Alupalloy was an early adopter; and, as a result, the company's employees had to learn machining on the job. Daniels and his team sought advice from tool distributors and taught themselves



how to operate their commodity mill. Daniels sent Cole, then one of his second-shift bandsaw operators, to machining classes at a local community college. Today, Cole, with two degrees in industrial engineering, oversees Alumatloy's machine shop.

Alumatloy continued to expand its secondary machining, eventually adding four commodity mills and a lathe. The company struggled with extended lead-times, however, because of reliability issues, including poor chip removal and frequent way-cover replacements on the older machining centers. By 2006, while preparing to bid on a large job, Daniels decided to attend the International Manufacturing Technology Show (IMTS). He wanted to find horizontal

High-quality parts, on-time delivery and the best pricing matter most to the company's customers.

machining process. Daniels said he also became interested in other Makino capabilities he believed would enable Alumatloy to better compete:

- Continuous-pressure hydraulic fixtures
- Broken-tool sensors outside of the machine area (BTSOMA)
- Simplified machine design that reduces reliability issues

the aluminum foundry in Avon Lake, where Daniels began his career. Alumatloy recently finished converting a sand casting area that had been abandoned 20 years ago. Now the company has its mills in two well-organized lines in a clean, up-to-date facility with floor space to add more horizontal machining centers. Air conditioning has been added to provide consistent temperatures needed to hold part tolerances.

RESULTS: MORE PARTS, LESS DOWNTIME

Since investing in the a81 and a61nx machines, Alumatloy maintains the reliability needed to meet demand for annual production quantities of up to 50,000 parts per order. That improvement shows up every day on the machine shop floor:

- The company has not had to replace a way cover on the a81 and a61nx machines, eliminating what had been a constant problem with the commodity equipment Alumatloy previously used.
- Chip removal is no longer an issue, and downtime is limited to machine maintenance. The central coolant flush system on the a81 and a61nx machines effectively evacuates chips for improved quality and reliability.

"They're simple machines, especially the way they handle chips. Other machine shops struggle with chips. We don't," Daniels said.

Cole appreciates how the flexible control systems on the a81 and a61nx machining centers enable Alumatloy to move from conversational language to more complex programming "so we can do the kinds of stuff we always dreamed of."

The continuous-pressure hydraulic fixtures Daniels shopped for at IMTS are installed on three of the a81 machines. Alumatloy runs bigger parts in large quantities for truck transmissions on these machines, and continuous-pressure hydraulic fixtures reduce the time needed to load and unload parts while delivering repeatable part locating and consistent clamping force. As a result, Alumatloy holds tolerances as tight as 15 microns on the heavy-truck transmission housings.

With high-performance machining capabilities in-house, Alumatloy is also able to use secondary machining as a quality assurance process for its foundry. The company today identifies exactly when and where any true quality issues arise and moves quickly to resolve them before parts are shipped.

For a company originally centered on making aluminum parts with one casting method, the makeover is remarkable. Alumatloy today offers a complete casting and secondary machining operation, ensuring consistent high quality and on-time delivery.

Alumatloy's customers seek this start-to-finish capability across a wide range of part types and sizes. For Volvo, Alumatloy makes various engine and transmission parts and completes some subassemblies for its customers' Volvo and Mack trucks. For General Motors, Alumatloy makes safety-critical suspension sway bars, along with windshield corner brackets for the Chevrolet Corvette.



With high-performance machining capabilities in-house, Alumatloy now has full process control to ensure the highest degree of part quality for its customers.

"We can offer the customer a full part that they can put on their vehicle. Without that, we'd be one-fourth the size we are today," Daniels said.

QUALITY STARTS WITH MACHINE RELIABILITY

Daniels and company control the quality of every part, from the pouring of castings, to secondary machining, to subassembly as needed. The capabilities Alumatloy offers, from raw materials to finished parts, set the company apart from competitors offering only foundry or just machining services. Alumatloy has even won back 18 parts orders that had gone to competitors in China.

"Some of the customers we get now will only entertain a bid because we can do everything under one roof," Daniels said.

To deliver "everything," Alumatloy runs one extended shift and depends on the reliable performance of the

a81 and a61nx horizontal machining centers. Alumatloy has more than 100 part numbers with short runs, so the mills must be continually available.

"We don't have that many machines, so obviously we do a run, changeover, do another run. If a machine is down for some reason, we would never be able to keep up," Cole said. "Some jobs are put on the older machines when they are not as critical. If those machines go down, we can always move the jobs to one of the Makinos. We put our most important jobs on the a81 and the a61nx because we know they are going to run. They're incredibly reliable machines."

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The reliability of the a81 and a61nx machines has enabled Alumatloy to meet demand for annual production quantities of up to 50,000 parts per order.

machining centers to expand capacity to fulfill the new contract—and that would improve his company's reliability and productivity.

WHAT MATTERS: BETTER RELIABILITY

At IMTS, Daniels researched machine builders. He visited Makino's booth and was impressed by their engineers' knowledge of all aspects of the

That trade show visit prepared Daniels to select the next path for his company. In 2007, Alumatloy purchased its first [a81 630mm horizontal machining center](#). Since then, the company has added four more a81 machines and five [a61nx 500mm horizontal machining centers](#).

To accommodate what's become a full-service machine shop, Alumatloy purchased buildings that once housed

FLEXIBLE

MANUFACTURING SYSTEMS DRIVE PRODUCTIVITY AT NEW DIMENSIONS

Automation has never had so much potential to transform a business. It puts companies in the driver's seat to lower costs, increase throughput and improve quality as market conditions continue to change.

"Several years ago, we used to do a lot of what I like to call 'highway driving' production," said Brian Halwix, director of team development at New Dimensions Precision Machining. "We had vertical machining centers that would run large batches continuously, which allowed us to coast for miles and miles without changing gears. But all that has changed."

Today, customers do less annual forecasting, they reduce inventory in favor of just-in-time (JIT) delivery, and they do not combine shipments. Customers want parts in small batches, the need for quick turnaround is urgent and there is continued pressure to keep pricing low.

"Now it's all about 'city driving' production, with many starts and stops—we can only go a few blocks before hitting another traffic light. In this type of environment, it no longer makes sense to spend a half hour doing setup on a vertical machining

center, only to run one hour of production. To be competitive these days, we have to be able to get better city mileage. Our flexible manufacturing systems and high-performance machine tools put us directly behind the wheel. We can be efficient no matter what the road conditions or where that road takes us," Halwix said.

New Dimensions knows that flexibility is the key to handling such requirements as it strives to lead the industry in efficiency. The company has found that it can meet these demands by moving toward a fully automated production environment.

For the last decade, New Dimensions has led an aggressive plan to add this type of flexibility. It started by replacing its vertical machining centers with high-performance horizontal machining centers. Then in 2007, the company began to automate, first purchasing four Makino [a61 horizontal machining centers](#) and an [MMC2 automated pallet-](#)

[handling system](#) that links the horizontal machining centers, cell control software and pallet loaders. The success it saw with this flexible manufacturing system led the company to add two a61nx machines to that cell.

Today, the company has three flexible manufacturing systems on its shop floor. In addition to the first, another was created with four a51 horizontal machining centers and two [a51nx machines](#). A third cell features six a51nx machines. All six machines, within each of the three flexible manufacturing systems, are running parallel processes with five jobs in production at a time. These jobs are prioritized and coordinated by a Makino [MAS-A5 cell controller](#), which puts New Dimensions directly in the driver's seat.

IF YOU ARE GOING TO DO SOMETHING, DO IT RIGHT

The Union, Ill., company was founded in 1987. It specializes in the production



of precision hydraulic manifolds and has gone from its early years as a small job shop to becoming a world-class organization. Despite the large growth over the years, New Dimensions remains very much a family business. Today, four of the owner's sons work in the business alongside other family members and many employees with over 20 years at the company. While New Dimensions continues to excel in the fluid power market, its strong backbone of automated technologies gives it the capabilities to handle most any job—from small job-shop projects to larger production orders. These days, 70 percent of New Dimension's parts are aluminum, and the rest are composed of iron and carbon steels.

According to Martin Halwix IV, who is the director of business development at New Dimensions, and Brian Halwix, the company's philosophy since their father started the business has always been "If you are going to do something, do it right." From the very beginning, New Dimensions has invested in high-

systems," said Martin. "Throughout the implementation of our initial flexible manufacturing system, Makino's application support was second to none. Their knowledge and responsiveness have proven to be an asset in this transitional period, solidifying our partnership. Our

that can stand alone. The competition is so fierce that we need a strong team."

He also pointed out that to be successful with automation, companies obtaining the new technology must be committed internally to working through any initial challenges related



Left to right: Mike Halwix, process engineer; Martin Halwix, director of business development; Brian Halwix, director of team development; and John Halwix, process engineer.

"Makino gives us support with every machine we buy, helping us with macros, problem-solving and cycle times on difficult parts."

performance machines to produce premium parts. The company's road to flexibility has been an evolution from 3-axis vertical machines to automated cells, and by setting up three large, flexible manufacturing systems, it has committed to a substantial investment in automation.

"We originally chose Makino for their manufacturing solution because they engineer their own automation

investment in these automated systems has been opening up new market opportunities for us to grow."

Brian agreed. "Makino gives us support with every machine we buy, helping us with macros, problem-solving and cycle times on difficult parts. They have assisted with so many issues that we consider them to be more of a team member than supplier. We have found that there is no man—or company—

to the learning curve. New Dimensions personnel traveled to Makino's Mason, Ohio, facility for training on macros and probes, since these had not been used with the company's stand-alone equipment.

"At our training sessions, each Makino representative shared his or her experiences, to help make employees at New Dimensions more successful," said Brian. "We believe the key to success is staying on the cutting edge. We have to be the fastest and the newest in order to be number one. This automation investment will help us stay there."

Now, with the right tooling and training, New Dimensions has been able to produce up to 300 percent more parts per spindle than on its previous stand-

alone machines. Its new equipment has many options to customize the jobs, so New Dimensions can continue to dial additional parameters to further optimize efficiency.

"The flexible manufacturing systems with the software-driven MAS-A5 system have given us the tools needed to make producing parts on demand a reality," said Martin. "Because of the flexibility of these systems, we are now able to run 50 pieces quickly while charging per-piece prices that are comparable to what we charged when we were running 500 to 1,000 pieces. These systems give us that changeability, with the larger pallet capacity and large tool capacity. We are able to store up to 300 registered programs in each cell for active orders, and these can be accessed at any time without doing any setup and without taking tools in and out of the machines."

These flexible systems are a perfect complement to the company's long-standing tradition of customer responsiveness. "When our customers are in a jam, they know we will not let their urgent job sit on the bottom of a queue of work. We will always move around production schedules to get those jobs on a machine as soon as possible, oftentimes the same day it is ordered," said Marco Alejandre, general manager at New Dimensions.

Adding to the flexibility afforded by the automated systems, each cell on the floor at New Dimensions has a 218-tool magazine, high-pressure coolant. The systems have over 100 pallet storage locations and five different workset stations. The flexible manufacturing systems have given New Dimensions the vehicle it needs to keep up with the flow during high-mix, low-volume jobs. The company can handle the starting and stopping of city driving, and it has the efficiency to

With the right tooling and training, New Dimensions has been able to produce up to 300 percent more parts per spindle than on its previous stand-alone machines.

keep cruising through orders 24 hours a day, six days a week.

Ever since day one, the goal at New Dimensions has been to efficiently complete the job for the customer, no matter what it takes. Many companies cannot be this flexible, especially if they have a long line of work in the queue. For New Dimensions, it is all about

process flow. Speeds and feeds are the focus if there are big lots to run; but for smaller runs, the focus is eliminating setups.

A UNIQUE PROTOTYPING SOLUTION

In addition to the large- and small-run production work, New Dimensions also machines a lot of prototype parts. The



Since investing in automation, New Dimensions is now able to run 50 pieces quickly while charging per-piece prices comparable to those when running 500 to 1,000 pieces.



prototype work may go through several revisions before moving into production, and some may never make it into production. Not wanting to interrupt the workflow on these automated cells in order to perform prototype work, the company sought an alternative solution. While many companies perform this kind of prototype work on their stand-alone machines, New Dimensions has taken the concept two steps further, using a custom pallet pool system created with the help of [Makino's Engineering Services](#).

Makino and New Dimensions customized the pallet pool with an MAS-A5 system, akin to those used within the company's MMC2 systems. With the MAS-A5 software added, they then linked the prototype machine to the three MMC2 flexible manufacturing systems via the company's internal network.

“Our investment in these automated systems has been opening up new market opportunities for us to grow.”

The programming and tooling on the prototype machine are also tied into the MAS-A5 system so that this data can be sent directly into the flexible manufacturing systems, should a job go into production. The prototype machine was designed to accommodate larger tool capacities and additional fixtures, enabling the company to pair this machine's capabilities identically to the setups and processing methods conducted within the MMC2 cells.

Each system uses detailed tool and fixture drawings for the jobs it produces. This information is shared between the prototype machine and the flexible manufacturing systems via the MAS-A5. This approach keeps all processes standardized.



The Makino flexible manufacturing systems have helped New Dimensions produce up to 300 percent more parts per spindle compared to previous stand-alone machines.

This capability has enabled New Dimensions to transition prototype applications into full production orders quickly and easily. When these proven jobs are sent into production at one of the flexible manufacturing systems, all of the programs, fixtures and tooling data used in the prototype machine can be sent too, because they are identical to those found in the flexible manufacturing systems.

TOOLING AND MAINTENANCE

The cells and pallet pool were certainly the catalyst for change at New Dimensions, but what also enhances performance is the dedicated personnel assigned to each flexible manufacturing system. There is an offline tooling manager

and maintenance technician to keep things running smoothly for all three flexible manufacturing systems.

An automated tool management system is also in place in each cell, tied to the MAS-A5 cell controller, which directly links from the line to the tooling department. It is monitored 24/7 and can feed tool data into the cell and adjust the machine's parameters or prompt a new tooling order. This system is notified before a tool expires so that an order can automatically be placed and the new tool sent.

Another key to New Dimensions' uptime is a preventive maintenance area that handles the grease, oil, lube and filter needs for the machines. The dedicated personnel, regular schedules and automated inventory systems are in place to make sure that all machines are being serviced proactively.

“While the machines have not needed much maintenance because they stand up to tough environments, we want to get the most out of them,” said Martin. “So we have a dedicated person assigned to attend to preventive maintenance.”

LABOR IMPROVEMENTS

Thanks to the company's automated equipment, it has the capability to produce additional parts with the same number of employees. By transferring work to the Makino machines, New Dimensions was able to more than double production per employee and offer customers a reduction in cost. This saving helps the company deal with continued pricing pressures.

Changes in the equipment technology also mean that the availability of technical positions at New Dimensions has increased. However, these are the very jobs that companies today are



Since its first automation investment in 2007, New Dimensions has invested in three Makino MMC2 linear pallet systems featuring six machines on each cell.

“Having high-tech equipment in place shows our people that we are committed to and are focused on the longevity of this company.”

struggling to fill. To find a solution for this labor shortage, New Dimensions has been working with local high schools in order to encourage young people to enter the manufacturing field.

“Many parents do not encourage their kids to pursue careers in manufacturing,” said Brian. “This is because they remember back in the day when workers in the industry were lifting heavy equipment or dealing with dangerous chemicals. That is no longer the case. Today’s

manufacturing facilities are clean, safe and filled with high-tech equipment. When we host student tours, we encourage students to bring their parents. We want everyone to understand the types of opportunities that exist.”

Brian says that one of the keys to attracting and keeping these young people is to have the kinds of technology that appeals to them. “Mobile phones can start and stop our machines. Younger workers are

easily able to adapt to the high-speed growth of manufacturing. While technology is continually changing, New Dimensions is easily able to keep up with it.”

New Dimensions tries to encourage new solutions by creating a company culture of creativity through forming problem-solving teams, especially after seeing many of its ideas come from machine operators. “I believe America’s manufacturing strength lies in creativity. It’s why our country is so innovative,” said Brian.

The way New Dimensions has applied creative thinking in attracting new talent through the high schools has also paid off. In 2012, the company brought along 200 students to the International Manufacturing Technology Show (IMTS)

to showcase the manufacturing industry. The success of New Dimensions’ mentoring programs has enabled it to hire several of these students.

“Our team enjoys having these young people come on board,” said Brian. “They jump right in with CAD/CAM, and we help to develop them as workers. All of our employees— young and old—are excited that we have the technology to machine just about anything out there. We have the best machine tools, the best fixturing and many in-house classes teaching leadership and success.”

NEW OPPORTUNITY

As New Dimensions builds its team and builds efficiency, what matters most is fostering a culture with new opportunities

that keeps its employees engaged, all while growing the company.

“People today want to be part of something that is bigger than themselves,” said Brian. “They want something that they can be proud of. When a team loses vision, its morale drops, growth stops and there’s the tendency to lose good people. Having high-tech equipment in place shows our people that we are committed to and are focused on the longevity of this company.

“In the future, I see New Dimensions continuing to grow. We will be moving jobs from one cell to another, responding to our customers’ needs to make them successful, applying the flexibility to compete in any industry and serving global customers.

Machining will continue to be our core competency, not necessarily a specific industry.”

Martin agreed. “American manufacturing is all about responsiveness, flexibility and adaptability. It is that road that New Dimensions continues to steer toward, while partners like Makino keep us in the driver’s seat.”

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THE BENEFITS OF SELECTING A SINGLE-SOURCE AUTOMATION SUPPLIER



By: Dave Walton
Engineering Manager –
Production Machinery,
Makino Inc.

Suppliers play a crucial role in the delivery, performance and overall satisfaction of capital equipment, especially when it comes to automation. While automated systems provide numerous benefits to enhance and grow a business, the process of designing, specifying and integrating these technologies can be extremely challenging. This is why the selection of knowledgeable and experienced suppliers is equally or potentially more important than choosing the actual equipment.

TAKE A TURNKEY APPROACH

Oftentimes business owners force themselves into a narrow list of suppliers by placing an emphasis on upfront investment costs or the use of existing, potentially outdated equipment. As a result, they soon find themselves spending valuable time managing multiple vendors rather than focusing on customer needs and growing the business. In order to prevent these issues, businesses should seek single-source automation suppliers that can ensure seamless deployment and integration of the following system components and processes:

- Purchasing
- Design
- Machinery
- Third-party equipment
- Material handling
- Application engineering
- On-time delivery
- On-site installation
- Test runs
- Training
- Post-production support

When working with a single-source automation supplier, manufacturers should expect the service of a dedicated

project coordinator from the moment a request for quotation (RFQ) is submitted. This representative's role is to coordinate every aspect of the project, from sourcing to servicing, for a comprehensive, cost-effective solution. This level of support is essential in simplifying installation,



training and maintenance of the system, and it ensures that all objectives are met according to the original proposal during installation and post-installation phases. Manufacturers should expect the best solution for their application, with no compromises.

KNOWLEDGEABLE AND ACCOUNTABLE

No one wants to experience finger-pointing between suppliers, should an issue occur with the system. When companies require the highest levels of accountability in terms of technology, service and processes that effectively balance quality and cost, it's critical that they identify an automation supplier with extensive knowledge and experience in these areas:

- A deep understanding of the markets a company serves
- Advanced expertise with machinery and automated systems
- In-depth process engineering capabilities
- On-site training, documentation and post-installation support
- Effective and responsive regional support

A single-source supplier ensures the system is up and running, and all equipment works cohesively over time. They should possess extensive process and operation experience and have intimate knowledge of the machines, making sure that what is delivered is a tightly integrated system, where the



cutting process, machine control, robot, fixtures, interfaces and automation systems work together seamlessly. They ensure fast resolution of any engineering issues. For example, Makino's integrated engineering group has been around since 2000, has experience automating hundreds of machines with several types of robotic and cell controller platforms, and takes prime contractor responsibility for complete system installation and start-up.

Automation should be an integral part of the supplier's business. The supplier should offer a comprehensive range of products with full system integration capabilities, in addition to having a dedicated team to execute the project. For example, at Makino, teams include project managers, personnel responsible for application and fixture engineering,

machine process and option engineers, automation integration engineers and field service engineers for installation. These personnel need to be experienced in integrating auxiliary processes, like part identification, part debur and inspection. They should also be familiar with overhead automation, robot end-of-arm tooling design and program development, the best ways to orient the machines and keeping the machines clear for easy access.

Equipment should include an interactive cell controller that is capable of performing the series of automated functions, such as an overview of the cell status, control robot start/stop and access to robot work area, gauge cycle counters, cell runout, part-type selection and part tracking.

The ability to provide this degree of engineering support in a single-source partnership is what enables a supplier to validate claims with guaranteed results, including cycle times, process capability index (Cpk) and cost per part, that meet or exceed production goals. One of the most powerful benefits that Makino customers share is the elimination of stress and uncertainty that comes with self-managing multiple vendors independently.

In addition, financing an automated system can be simplified through the support of a single-source supplier. By consolidating investments down to one supplier, manufacturers can better visualize a return on investment (ROI) and rest assured that costs remain compliant with initial estimates.

TIMELY INSTALLATION

Long lead-times can be costly when it's necessary to react quickly to market opportunities. If a business is facing short lead-time requirements for new equipment, it's important that an automation supplier is capable of meeting deadlines for installation and deployment in order to initiate production runs on day one without delay.

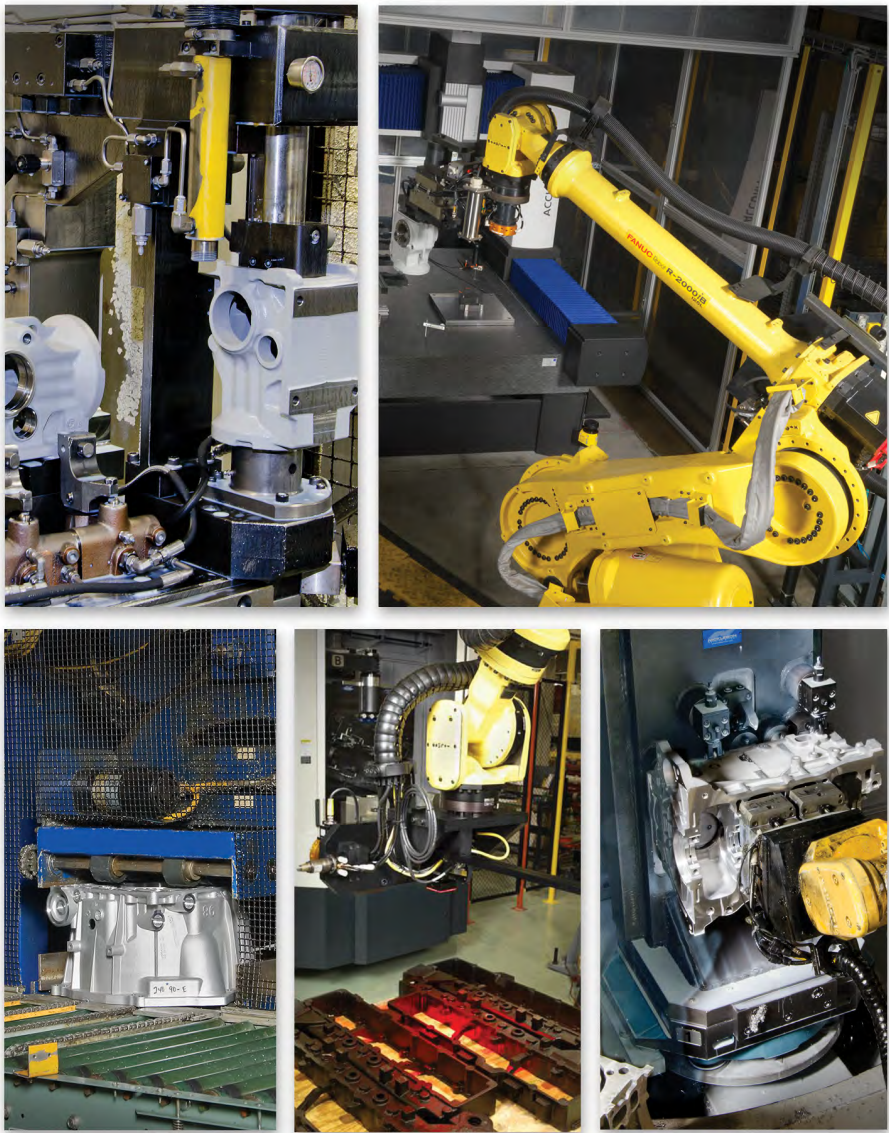
With many parties coming in and out to install equipment, a single-source supplier can take on the brunt of the scheduling, communicating between all parties in order to handle tasks such as machine setup, tooling and probing.

What many suppliers would consider unnecessary procedures during the integration phase can easily become origins for headaches and failure later in the system's life span. It pays to have a supplier that is mindful of details from all parties involved, ensuring the system as a whole reflects the same level of reliability for years to come.

HIT THE GROUND RUNNING

A single-source supplier delivers not only tightly integrated machining systems but also the support needed to get an automated system up and running immediately following installation. This factor is especially important when it comes to an automated cell; manufacturers need to understand how the system operates to become familiar with any advanced machining features, such as managing tool life, so they can begin focusing on profitable production time.

A supplier that offers robust on- and off-site system training opportunities and system documentation, including user manuals, schematics, drawings and



models, can help operators to quickly understand and feel comfortable with the new equipment and processes. At Makino, training opportunities are accommodated based on installation schedules in order to minimize downtime and make installation a productive period for operators.

Additionally, a quality supplier should not disappear after installation. Those providers who can bring post-installation recommendations and help

optimize the system further bring more value to the investment and ensure ROI on every job.



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a40:
PURPOSE-BUILT FOR NONFERROUS
DIE-CAST APPLICATIONS

Die-cast part production by default equates to high-volume parts production. With volume requirements ranging from 200,000 pieces to well into the millions of pieces per year, die-cast shop owners face unique and specific manufacturing challenges. This is a highly competitive market, where per-piece production costs frequently determine the shops likely to win or lose program opportunities.

The traditional machining solutions of 400mm horizontal machining centers (HMCs), vertical machining centers (VMCs) and drill/tap centers were not providing the necessary productivity to succeed in an increasingly demanding marketplace. A new and innovative approach was needed.

Makino listened and developed the [a40, a purpose-built 400mm horizontal machining center](#) specifically designed to address the challenges of nonferrous die-cast machining.

Using general-purpose HMCs or VMCs has been the traditional approach for machining die-cast parts. These machines are designed to address a wide variety of materials: aluminum, steel, iron and occasionally even hard metals. Challenging materials require powerful spindles. While a 40-hp, 220 ft-lb spindle is ideal for steel and iron applications, these same characteristics are actually a detriment to machining die-cast parts. When machining near net-shape die-cast parts, the spindle power of traditional machines produces sluggish performance and unnecessary investment costs. The a40 gives die-cast shop owners a better option.

REDUCE CYCLE TIMES INTELLIGENTLY

Cycle time drives per-piece costs. It's cycle time that determines the number of machines required and has far-reaching cost implications affecting labor, floor space, utilities and durable tooling. The a40 features Makino's intelligent Reduction of Inertia (R.O.I.) design and innovative technologies that slash unproductive time. Included in this collection:

- Responsive #40 spindle acceleration reduces common tapping operations by 0.5 second per hole.
- R.O.I. casting designs minimize feature-to-feature positioning times. The linear axis reaches full rapid traverse rates 14 to 20 percent faster than typical competitors.
- Direct drive (DD) B-axis rotates 90 degrees in 0.93 second to quickly present new part surfaces to the spindle for machining.
- Inertia active control (IAC) evaluates fixture and tool weights to optimize acceleration performance of multiple machine systems.
- Advanced motion control streamlines mill path cutting and drill positioning motions.

COUNT ON THE a40 WHEN YOU NEED IT

Unplanned downtime is another cost that can devastate high-volume die-cast production machining. Thus, machine reliability is paramount.



a40 BY THE NUMBERS

Pallet	15.75"
X	22.0"
Y	25.2"
Z	25.2"
Spindle RPM	12,000
Rapid Traverse	2,362 ipm
Cutting Feedrate	2,362 ipm
Maximum Workpiece	ø24.8" x 35.4"
Maximum Payload	880 pounds
ATC Capacity	40

To achieve higher reliability, the new a40 incorporates robust, proven systems from Makino's 1-Series horizontal machining centers, including single-piece X- and Z-axis covers, center trough chip/coolant management and dual-supported ATC mechanisms.

The a40 advances Makino's industry-leading reliability with new systems targeting typical system failures in die-cast operations:

- Standard vision-type broken-tool detection supports unattended operation by quickly validating the condition of the cutting tools after each tool change.
- Dedicated cleaning nozzles wash the tool taper with 20µm filtered coolant with each tool change, ensuring contamination-free tool clamping.
- Three-stage coolant filtration with 20µm hydro-cyclone extracts coolant tank sludge common with nonferrous

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part machining, extending time between coolant system preventive maintenance or cleaning.

ENGINEERING SERVICES EXPAND PRODUCTIVE BENEFITS

For many die-cast part manufacturing facilities, machining is a secondary capability that demands specialized labor skill sets and expertise. Machine shops seeking to maximize the productive benefits of the a40 can turn to Makino for engineering support that maximizes the productive capabilities of their machine investment.

Makino Engineering Services have an unmatched history of creating robust production-ready processes—including machinery, fixtures, tools, programs and documentation—for parts with complex geometries, demanding deadlines,

challenging budget constraints and Six Sigma standards. While many North American manufacturers face difficulty finding skilled labor, Makino Engineering Services have experienced engineers and project managers that can manage every step of a project with single-point contact, project engineering, on-site supervision and post-installation training and support. Hundreds of manufacturers in need of integrated flexible manufacturing solutions have taken advantage of these services, each benefiting from guaranteed cycle times, process capability index (Cpk) and cost per part that meet or exceed their production goals.

With Makino automation integration services, manufacturers are able to combat fierce pricing pressures from low-labor-cost countries by providing complete, automated cells and

systems. Whether demands call for simple machine tending or complex, high-volume robotic cells, Makino's automation integration services offer the equipment, skills and manpower necessary to reduce labor costs, increase throughput, and ensure and enhance part quality, all while retaining the flexibility to adapt quickly to changing volumes or new parts.

To learn more about Makino Engineering Services and automation solutions for the a40, visit www.makino.com/engineering-services.

LEARN MORE

Watch the webinar, "A New Solution for Nonferrous Die-Cast Parts"