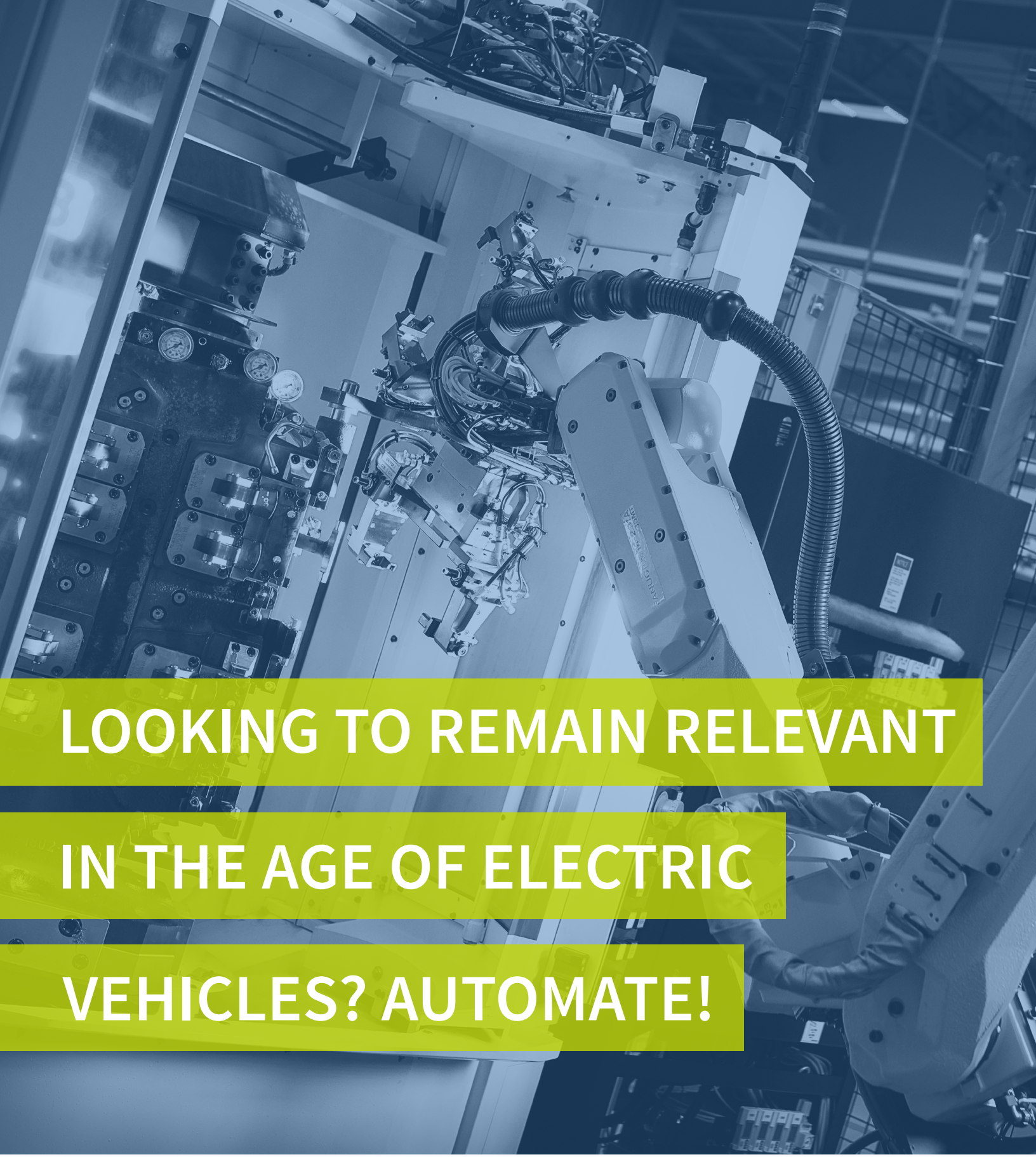
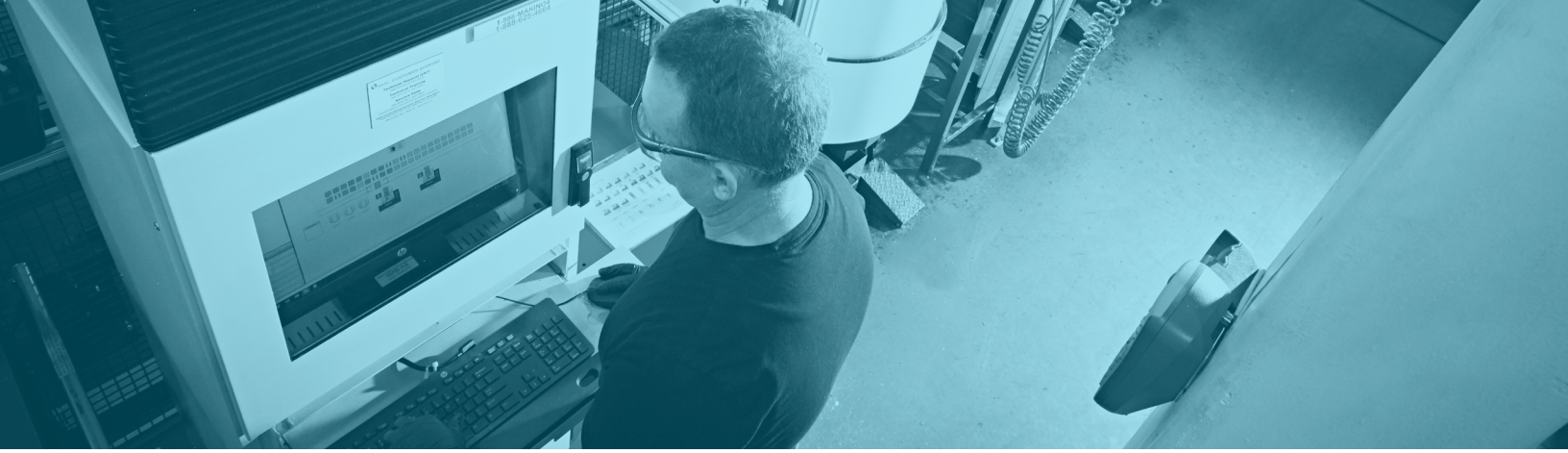


LOOKING TO REMAIN RELEVANT IN THE AGE OF ELECTRIC VEHICLES? AUTOMATE!

Sponsored by

MAKINO



The automotive industry is in a state of change. Most notably, the move towards electrification is finally taking shape. And, it's time for anyone within the industry to take the trend seriously. Case in point – the International Energy Agency's Global EV Outlook, the number of electric cars will grow at a compounded annual growth rate of 33 percent to 125 million by 2030.

What does this ongoing industry evolution mean for part suppliers? As the trend intensifies, it's imperative to establish a competitive edge. According to a recent Deloitte insight, "Traditional parts suppliers may need to tweak their strategy to align themselves to the new landscape and take advantage of this long-term shift. Many suppliers, particularly those involved in the manufacture of traditional engine components, will likely be affected as there are far fewer individual parts in a battery powertrain than in a traditional combustion vehicle."

Of course, as the shift towards electronic vehicles grows, this does not mean that automotive manufacturers are abandoning traditional fuel-based offerings. Although European and Asian consumers are all-in on the electric vehicles, North American car buyers in particular still prefer gasoline-fueled automobiles. Yet, the movement still has a meaningful impact, and it is intensifying consumer expectations–meaning automakers need to boost vehicle performance and reliability. This often translates to an upstream push for tighter tolerances on critical part features–often at lower costs.

Addressing Demands through Automation

When properly designed and utilized, automation serves as a means of addressing ongoing shifts in the demands of your customer base. Of course, automation can take on a lot of different forms depending on the type of shop operation – part type mix and individual part volumes.

Part handling automation

Also known as machine tending, part handling is the most commonly utilized form of automation. By definition, parts are automatically transported between processes and different operations within those process. This is very typical of an automated machining application for automotive parts due to the high volumes and single part type associated with these parts. By limiting operator involvement in the load and unload processes manufacturers can reduce labor costs, improve safety [by reducing accident claims], and improve part quality through more consistent handling and loading of the parts. Allows for unattended operation, increasing the machine utilization.

Part handling automation in itself can take on different forms including overhead, floor-based, flexible general-purpose robots as well as hard single-purpose auto-

mation. Other forms of part handling automation include automation of the movement of pallets, fixture plates, and transfer plates that contain the parts in a fixtured state. This form of automation moves the pallet/fixture plate between processes and machining operations rather than moving the parts directly. This form of automated operation typically involves operator intervention to transfer the individual parts between the fixtures on different pallets/fixture plates and processes.

For instance, a simple form of automation would be a machine with a dedicated pallet changer managing between 2 and 12 pallets. The pallets could support the same machining operation or multiple machining operations. Other pallet systems could contain several machines being serviced by a single pallet delivery system and controlled by a high-level cell controller.

Process automation

The entire goal of this form of automation is to improve the efficiencies and output of a system. Many manufacturers turn to process automation as a means of continually optimizing the machining process and ongoing automation efforts. Automated inspection and feedback to adjust or stop the process based on the inspection results are a prime example of process automation. Likewise, automated part inspection prior to the machining process can provide for automatic adjustments of the machining process based on the raw condition of the part to improve the part quality and reduce scrap.

Automating the inspection process dramatically improves ongoing monitoring of the machining process. Through automation, it's possible to quickly identify when a process happens to be out of spec, which is key in reducing the number of scrap parts. For certain applications, the inspection data can be used to automatically adjust the machining process to keep the process in control.

Part deburring is another process that lends itself to automation. By eliminating manual deburring and polishing of machined parts, manufacturers can eliminate or reduce tedious labor, while potentially improving part quality.

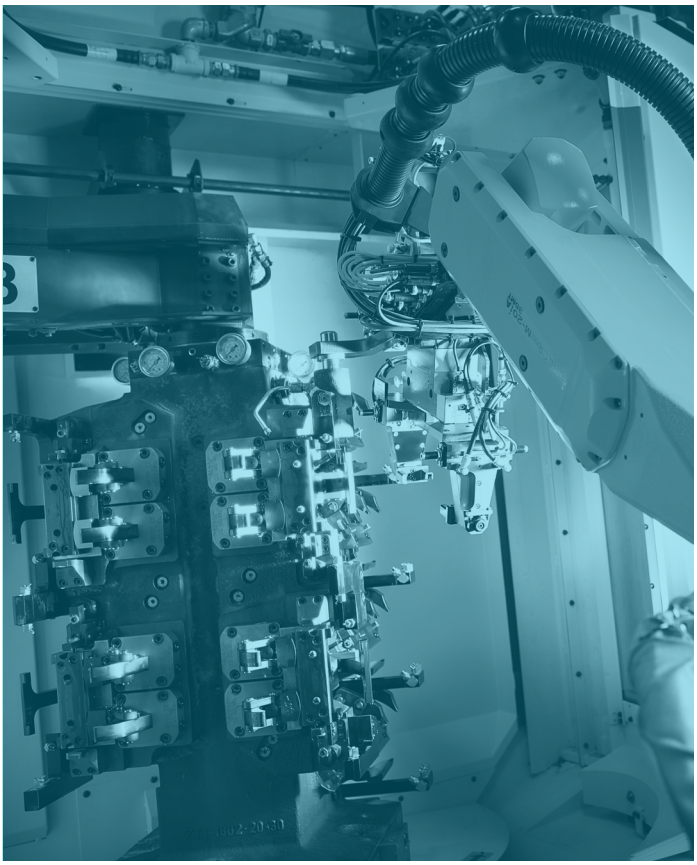
Weighing Benefits Against Obstacles

The typical and most common benefit of automation is the improvement of the efficiencies of the process, increasing

the throughput and uptime. This is done through maintaining the process operation through breaks, shift changes, and unattended time periods. Typical improvements in automated machine tending versus manual are an increase in utilization of the equipment from 50-80 percent for manual operations to 85-95 percent for automated operations.

Automation also improves utilizations by servicing the machine process equipment when required, not when, for example, an operator is available to service the machine.

The goal of automation should not be solely about eliminating manpower but to be more productive with the same or, potentially, less manpower. The operator rarely goes away completely. In most instances, organizations are able to utilize operator talents in a more effective way whether its inspecting parts, improving a process or identifying new approaches to organizational challenges.



Other benefits and savings organizations realize when embracing automated solutions include:

- Reduction in scrap by eliminating the manual handling of parts that may cause parts to be rejected by damage from part handling or the consistent loading of a part into the machine, eliminating variability in the manual load process;
- Reduction in hazards to the work force, reducing costs associated with work place accidents; and
- Reduction in overhead costs, such as power and utilities required to operate the facility.

Of course, automation is not exempt to obstacles. As with any change, securing buy-in from senior management and the user base before venturing into automation is crucial if a manufacturer hopes to realize the desired results. One way to maintain buy-in is to start with proper expectations, especially when embarking on the initial venture with automation. Depending on the complexity of the automation, it may take several months and a number of adjustments to finetune performance before realizing the full benefits. Understanding upfront that successful deployments of the initial automated systems are rarely as initially concepted is key.

Upfront costs can also serve as an initial obstacle. And, the initial justification may be difficult to obtain depending on the required payback. After all, the investment in automation is often significant. While the initial automation investment can be that of buying another machining center,

the long-term benefits of moving away from a completely manual operation are often far more significant and could potentially eliminate the need for the additional machining capacity.

For instance, a quick look at the metrics from an automation perspective, spindle utilization changing for 40-80 percent with manual to 90-95 in an automated system can be a significant improvement in utilization of the existing machining equipment. This can be difficult to initially understand, but ultimately results in the type of efficiency and productivity that serves as the long-term reward for investing in automation.

The Makino Difference

Not all automation providers are created equally. With an automated system, one weak link can stop the complete system. If the machine tool is not reliable, customers are not realizing the full benefits of the automation. This is where having the right partner makes a significant difference.

As a single-source provider for automated machining systems, Makino develops the machine options and the machining process to support the automated systems. Makino will provide the machining process to support an automated system, whether that is material handling or process automation. With an intimate knowledge of the machine's operation and close working relationship with the machine option engineering group, the machining process can be designed to work seamlessly with the automation.

Makino takes pride in its ability to provide turnkey automation solutions. With a group dedicated to providing the machine tending automation, Makino's automation systems are tightly integrated with the machining centers, making the support, recovery and updates to the complete automated machining system simpler than if the system was developed with the involvement of several different companies. As a result, it is unnecessary to work between different entities to solve the challenges encountered with an automated system.

The availability of Makino's engineering services plays a meaningful role in differentiating its offering from other machine tool and automation providers as well. Unfortunately, bringing on new projects often requires significant amount of engineering time, which can put a strain on internal resources, especially within lean operations. Makino helps address this by offering its expertise including fully engineered processes that take a project from the print to a finished part coming off the machine.

The engineering service goes beyond designing the automation process to finetuning operations. For instance,

everyone benefits from quicker cycle times, which is one reason why Makino also takes cycle times seriously. Based on current tooling technology there is a limit to how fast you can actually cut. Assuming everyone is using the latest technology, the only thing left is the not-cut time – pallet changes, tool changes, or any machine motions to move from feature to feature.

Makino is focused on continuously improving its control software and m-codes that minimize non-cut time and maximize cut time. Some of the benefits include process design such as optimizing fixture setups or looking at the number of parts machined in one cycle. The real benefit of focusing on cycle times only intensifies as volumes increase. Specifically, when a manufacturer is producing a million plus parts per year, a 2 percent change in cycle time is significant.

Simply put, Makino machining centers are built for reliable operation in a production environment including an array of features that increase the reliability and operation of the machine to maintain an efficient/optimized 24-hr, 7-day operation.

Ready to Start Your Automation Journey?

Here are 5 Keys to Success

1. **Find a Champion.** Establish an internal champion with the task of investigating and implementing automation. Involve the operators in the area to get their buy-in and begin training the workforce to accept and work with the automation.

2. **Seek a Partner.** Developing a relationship with an automation partner can play a pivotal role in guiding you through the process and realizing your productivity and efficiency goals. Investigate several to be sure that you have found a partner that you can work with and trust. Consider a supplier who can provide the correct automation solution and able to be a single source supplier for the complete system. Having a single source supplier, who is responsible for the complete system, helps to eliminate issues that may arise between different suppliers

3. **Explore Opportunities.** The best way to kick off an automation project is to identify an existing process that has significant inefficiencies and may best benefit from automation. Work on the automation opportunity, developing a system concept and working towards a description of operation

for the system that defines the requirements for the system to be a success. While the first project will have it's hiccups, don't be afraid to adjust the automation concept and design to meet the challenges or major obstacles that may be encountered during the course of the project.

4. **Select Appropriate Automation.** There are several different types and levels of automated systems, including custom fit systems, each based on the type of automation that best suits the individual production environment. When producing millions of pieces of one specific part number, a fully customized automation solution is appropriate. When a manufacturer has hundreds of part types at smaller volumes with the aggregate production numbers in the millions, there are still benefits to embracing automation. These situations lend themselves to semi-automated systems. Although not operator free, the pallet-based automation allows for the storage of multiple fixtures for different part sizes to be automatically scheduled and loaded into available machining equipment.

5. **Big Picture.** Always think long term. Perhaps the biggest mistake organizations make when embarking on the automation journey is that they fail to look at the costs over the complete life of the program. While the initial cost of a system may not be very appealing, the cost savings associated with the elimination of maintenance, repair, scrap parts, additional labor costs due to running overtime can turn a program into a losing proposition.