

WHY AUTOMATION IS THE FUTURE OF MANUFACTURING

By the Automation Department
at UNITED GRINDING



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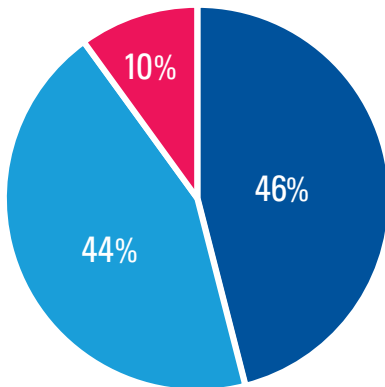
As the general plant manager of a U.S. manufacturing company ponders the future, he looks out at his most-experienced machine operators, many within a few years of retirement age, and wonders how he can maintain his current production levels, let alone plan for growth, with increasingly fewer skilled workers. His last few attempts to bolster his staff met with mixed results, as most candidates lacked the right experience or even the necessary basic aptitudes. Eyeing his equipment, he thinks yet again about using automation to supplement his workforce and boost production without adding personnel.

This manager is not alone, and his dilemma plays out in companies all over North America. A 2018 Deloitte Insights report in conjunction with the Manufacturing Institute found that the amount of time required to fill open skilled-production positions (welders, machinists, equipment operators, etc.) increased from 70 days in 2015 to 93 days in 2018. By 2028, the study shows, U.S. manufacturing output could lose \$454 billion because of the persistent skills shortage. As these problems intensify, manufacturers continue to look for new ways to raise production.



Automation offers manufacturers the promise of greater profitability and efficiency despite the shrinking skilled workforce. Two commissioned studies of manufacturer behavior reveal gaps between the desire to add automation and the actual adoption of the technology, along with changing trends in automation integration patterns. These patterns support a growing role for manufacturers in automating their own grinding equipment, and for machine tool OEMs in creating automation systems that meet manufacturer expectations.

2015 MANUFACTURER SURVEY



- Machine-tool OEM integration
- Automation integrators
- DIY integration

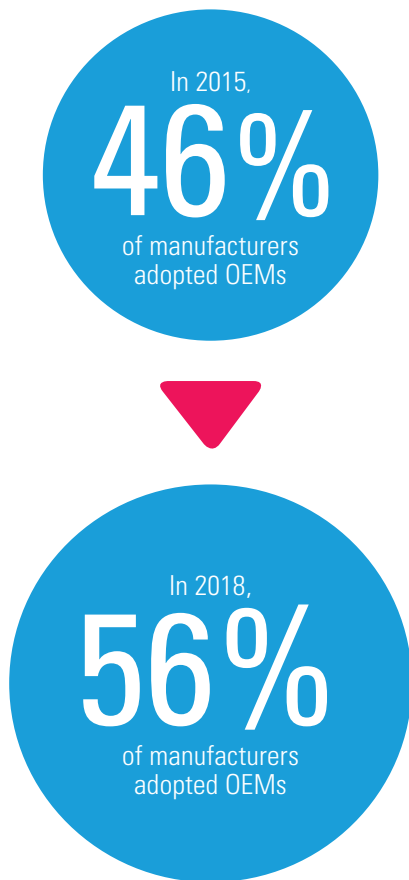
GRINDING MANUFACTURERS AND AUTOMATION

In 2015, a study of manufacturers who use grinding equipment showed that few had adopted automation technology but many wanted to deploy it in the future. Of the survey participants who had invested in automation, more had chosen robotic technology than gantry loaders. Even more significantly, only 10 percent of manufacturers had integrated their own automation systems.

Instead, 90 percent passed that responsibility to an almost equal mixture of machine tool OEMs (46 percent) and automation integrators (44 percent). Clearly, manufacturers lacked the ability or at least the willingness to undertake automation integration themselves, for at the time, only automation integrators possessed the expertise necessary to design and install these systems.

Three years later, re-surveying this manufacturer population showed persistent large gaps in automation adoption, although respondents overwhelmingly continued to plan automation investments. The technologies they chose had changed, however, along with how they chose to integrate them.

Now, 36 percent of respondents integrated their own automation systems, and increasingly, those who looked to third parties for automation systems chose machine tool OEMs (56 percent) over automation integrators (31 percent). As a result, 92 percent of manufacturers now either handled automation needs themselves or took advantage of options available directly through the company that created their grinding equipment.



Comparing these trends across the span of three years shows that although automation adoption rates climbed and interest in adding the technology continued, barriers to entry persisted, as nearly half of respondents used automation on only a small percentage of their grinding equipment. Both the types and sources of automation technology these respondents did select had changed, as manufacturers increasingly chose robotic technology over less-sophisticated gantry-loader options.

The rising rate of in-house automation integrations signaled an equivalent increase in manufacturer knowhow, either through hiring personnel with specialized experience or through training existing employees. At the same time, machine tool OEMs had become an increasing source of automation implementation, as OEMs began to offer standard options with increasing functionality and flexibility, and their in-house automation specialists worked with increasing numbers of manufacturers who chose to integrate their own automation. At the same time, automation integrators lost ground to these other options.

MISCONCEPTIONS SURROUNDING AUTOMATION IMPLEMENTATION

Manufacturers face growing pressure to thrive in a marketplace that demands higher production levels at lower per-part costs, often in a high-mix, low-volume environment, with increased competition for customers and a dwindling skilled-labor pool. Automation adoption patterns reflect some of these complex stresses, and the trends within these results offer enormous opportunities for machine tool OEMs to assist customers who want to obtain automation systems directly from them. To take advantage of these opportunities, however, machine tool OEMs must counter misconceptions that continue to deter automation adoption. These persistent, recurring objections reflect past history rather than present-day realities.

TECHNICAL RESTRICTIONS

Both grinding automation research studies cited above found that technical restrictions, investment costs, project complexity, integration of ancillary equipment, quality risks and operating costs ranked in descending order as perceived obstacles to automation technology adoption – but the respondents identifying technical restrictions as a barrier to technology adoption dropped from 71 percent in 2015 to 40 percent in 2018. Real technical restrictions do exist in some cases – including the need to function within FDA guidelines when creating products for the medical industry – but some manufacturers overestimate the presence of these limitations. Additionally, many of these constraints vanish with the seamless integration of machine-tool OEM automation.

COSTS

Many manufacturers continue to believe that automation technology costs more than they want to invest, which creates an opportunity for OEMs who can introduce capable, relevant, appropriately priced systems that serve defined customer needs. The studies cited above discovered that many manufacturers value cost over unattended operations, opting for \$100,000 systems that may require human intervention twice an hour instead of \$300,000 systems that can handle an entire production shift.

SKILLS GAP

Interestingly, the 2015 survey also found that manufacturers plan to invest in grinding automation first to increase productivity, second because of the skilled labor shortage,

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followed by an interest in raising repeatability and quality on the production line. At the same time, however, even if employers do not yet feel the full pressure that will apply when the majority of the Baby Boom generation retires from full-time employment – taking with it an in-depth mastery of many complex manufacturing processes – that skilled-labor drought will arrive by 2028, adding to the rationale for and urgency about automation adoption. In fact, research conducted by Deloitte indicates that during the period between 2018 and 2028, the skills gap may include 2.69 million jobs opened through retirements and 1.96 million new positions created through economic growth, for a total of 4.6 million open manufacturing jobs during that 10-year period. Out of those positions, Deloitte predicts that employers will fill only 2.2 million, leaving 2.4 million – 53 percent of openings – to lie vacant.

THE REAL BENEFITS OF AUTOMATION

Price competition and equipment diversification have accompanied the continued maturation of automation technology. Although robotics hold the lead among automation types, gantry loaders remain useful in some installations while pallet changers expedite parts fixturing and loading to increase machine throughput.

OEM development and integration of automation systems for grinding equipment continues to rise as manufacturers increasingly expect OEMs to offer standard options with new machine purchases or as retrofits for recent-generation equipment. Manufacturers who adopt OEM automation on new machines skip the need to integrate, assemble and troubleshoot diverse products, or to select a system integrator and rely on its ability to accomplish the task.

For example, once UNITED GRINDING established its Automation Department to develop new automation products and systems, it began to produce an increasing roster of standard systems along with custom automations of specific equipment combinations from among the company's eight grinding machine brands. The department provides complete support for complex projects from design through implementation, producing turnkey results that integrate directly into grinding machines from STUDER and other UNITED GRINDING brands.

CREATING THE PERFECT AUTOMATION SYSTEM

The best automation systems start with objectives that customers identify and use customer feedback to refine prototype designs. The UNITED GRINDING Automation Department took exactly that tack – understand and meet the customer need – in creating its flexLoad system, a standard loader for many STUDER models of OD and ID grinding machines.

Additionally, customer input prioritized load/unload times of six seconds on a system that can include statistical process control (SPC) for parts inspection and handling of rejects. An operator can open any of up to three completed-parts drawers while the grinding machine continues to run at full speed, all without altering the machine's internal working temperature.

To clear coolant from chucks or tooling, UNITED GRINDING added an air nozzle mounted on the flexLoad system's robot arm. The system also can incorporate gauging, barcode scanning and other operations that add functionality without increasing cycle time unduly.





Along with production speed, safety tops the list of necessities for automation systems. For this reason, UNITED GRINDING Automation Solutions opted to create a full-system enclosure for its flexLoad with a flanged side door between the machine and the robot. Because this portal remains closed unless the machine operator issues an explicit request for entry, the system provides necessary safety precautions without using a collaborative robot.

This side-entry design also cuts six to eight seconds from overall cycle time compared to a front-door access design. Additionally, UNITED GRINDING Automation Solutions engineered an ID-machine version of flexLoad that puts the system on the left side of the machine instead of the right, which necessitated creating a mirror-image design.

AUTOMATION INTEGRATION: DIY OR OEM?

Whether manufacturers add grinding automation systems through new hardware purchases or as retrofits for existing equipment, they face important considerations that shape the options they buy and how they use them.

Engineering expertise becomes critical in selecting and installing automation products as manufacturers increasingly either opt to integrate their own grinding automation systems or look to equipment OEMs such as UNITED GRINDING to supply the technology. Ideally, automation integrators offer detailed, thorough knowledge of the technology they sell, but they may lack detailed understanding of the grinding machines that host the automation. By contrast, selecting a machine tool OEM as the source of an automation system assures that skilled personnel with intimate knowledge of the grinding machines themselves as well as the automation systems take on the responsibility for installation and training.

To keep automated equipment operating correctly, manufacturers must consider the effects of systemic failure and plan ahead to overcome them. Some manufacturers simply bring in temporary workers and revert to manual operations because they lack a stock of repair parts and the proficiency to install them.

In dealing with automation problems, manufacturers who buy their automation equipment with their grinding machines from an OEM such as UNITED GRINDING can take advantage of the direct parts and service capabilities in a single-source relationship, speeding and simplifying the process of getting back up to speed if a problem occurs. At the same time, a machine tool OEM offers the engineering expertise to create an automation system that captures and takes advantage of the full potential of each grinding machine.

SUMMARY

Manufacturing stands on the verge of an automation boom, with an upcoming dramatic rise in the number of jobs that technology will replace, redefine or create. As these changes arrive, some manufacturers will source and implement their automation systems themselves while others will rely on machine tool OEMs to create integrated, tested turnkey solutions.

Those manufacturing companies that opt for systems specifically designed for their equipment will benefit from the cross-functional talents of an OEM staff such as the UNITED GRINDING Automation Department, with leadership drawn from all of the company's machine tool groups to provide advanced engineering and support. Machine tool OEMs such as UNITED GRINDING see the future clearly and support its positive impact on the businesses their customers operate, elevating the state of the grinding industry at the same time that they dispel misconceptions that slow down automation adoption.