



UNIVERSAL ROBOTS

A photograph of two men in a factory setting. The man on the left is older, wearing a white polo shirt and safety glasses. The man on the right is younger, wearing a white long-sleeved shirt and safety glasses, and is holding a blue tablet. They are both looking at the tablet. In the background, there is a blue robotic arm with the number '1' on its base. The scene is brightly lit, typical of an industrial environment.

COBOTS & LEAN INTEGRATORS

Bringing Automation to Small and
Medium-Size Enterprises

Lean integrators are leveling the playing field for SMEs in highly innovative and cost-effective ways.

Cover. Juan Rodriguez (right) with Universal Robots Certified Systems Integrator Crum Manufacturing, shows Craig Sivak (left) of T&W Stamping how to operate the Universal Robots' teach pendant. The UR5 cobot was programmed to do resistive welding tending, one of the most labor-intensive parts of the company's metal fabricating process. The cobot paid for itself in less than four months, delivering a 40% efficiency increase and freeing up three operator functions.

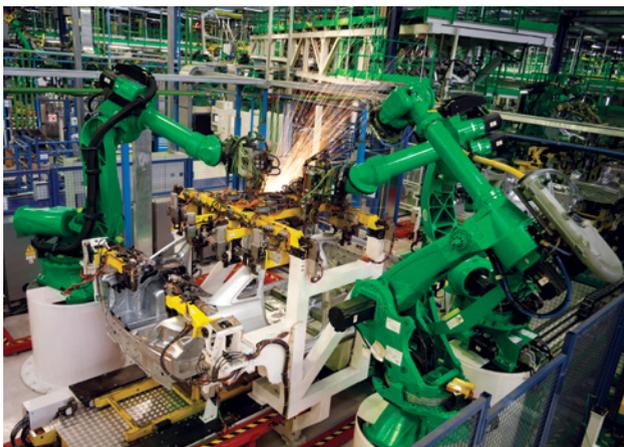
Until fairly recently, automation has been primarily been a big-company advantage. Several factors have now begun to level the playing field, including the emergence of collaborative robots, or cobots. Cobots have introduced many of the same benefits to small and medium-size enterprises (SMEs) that traditional robotics and automation offered large organizations. The big difference is that cobots provide a safer, more compact, and more intuitive solution that can be implemented quicker and more cost-effectively.

Like their large, traditional robot counterparts, cobots have also spawned a new class of integrators specially adapted to the needs of

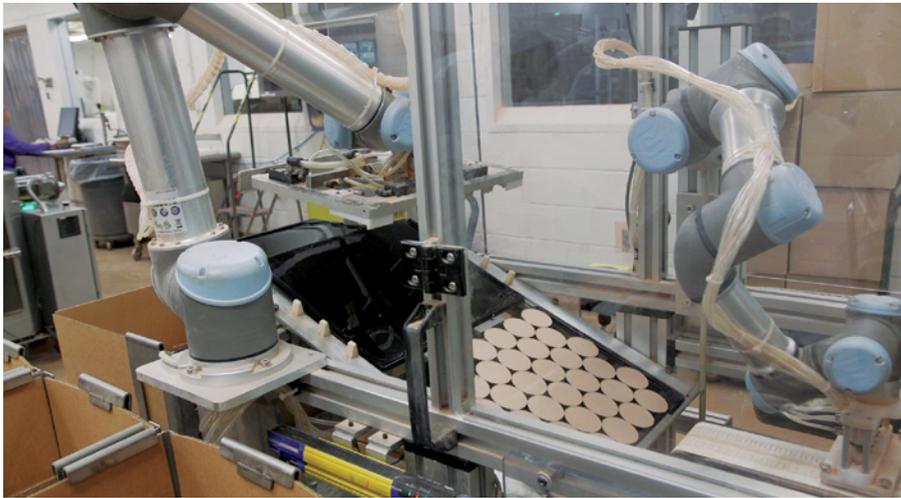
SMEs who wish to leverage automation. Unlike traditional integrators, these "lean integrators" are built for speed and cost/overhead containment rather than handling large, custom-engineered projects, and they typically specialize in serving highly targeted applications or markets. These lean integrators are further leveling the playing field for SMEs in highly innovative and cost-effective ways.

Bigger Isn't Always Better

The history of automation in large enterprises helps clarify the need for today's evolution. More than a half century ago, the emergence of industrial robots introduced revolutionary gains in productivity, efficiency, and consistency for manufacturing enterprises. From an embryonic start in automotive body shops and forging and casting operations, industrial robots quickly spread across all industries. Few manufacturers, however, possessed the resources or expertise to design and commission industrial robotic solutions in-house without help from outside experts. As a result, there emerged a new class of system integrators capable of tackling large industrial robot installations.



Large, custom built, and attainable by only larger companies, the first robots required significant capital investment, and had to be isolated with safety cages to avoid accidental injuries.



Coty Cosmetics in Maryland used the integration services of Sydorko Automation to develop mobile carts with UR cobots mounted on them. The carts are moved between powder presses where the cobots pick up “godets,” metal pans with pressed powder, place them on trays and pack the trays in boxes. After the initial application development, the Coty team is now able to manage the cobot-system internally. “If there’s ever any troubleshooting that’s needed, the integrator is always a phone call away,” says Paul Baublitz, project manager at Coty Cosmetics.

The general business model, staff structure, and project execution methodology of traditional integrators evolved from the demands of large-scale traditional robot customers. In addition to the significant capital investment required to implement a new robot-based production line, the process often requires disruptive changes to a facility’s power structure, floor plan, and operational procedures. The risks implicit with trying to tackle such installations internally are exacerbated by the prohibitive downtime cost. It makes good business sense to outsource a large project (and the associated risks) to a traditional system integrator who can bring the resources and expertise to specify, build, install, program, and troubleshoot the installation in as little time as possible and with the highest probability of success.

The traditional integrators that emerged were often vertically integrated operations that encompassed multiple shops for machining, fabrication, welding, and assembly, as well as factory floors spanning hundreds of thousands of square feet. Execution of a single project

often begins with a kick-off meeting among representatives of multiple departments, including mechanical and controls engineering, project management, sales, software, application engineering, and possibly even finance. (The client meeting generally followed later.) The integrator’s agenda for a kick-off meeting might include a review of ISO process documentation; discussions about project overhead, capitalization, and cash flow; and the designation of a dedicated project team.

Like industrial robots, these integrators were built for scale. To handle the implementation demands of highly capitalized corporate players, they were necessarily big, well-resourced organizations that could tackle large, complex robotic engineering, programming, and installation functions. Unfortunately, large scale also meant large overhead from management, personnel, floor space, and processes. Due to the overhead of such projects, the typical contract from a traditional integrator was rarely less than \$250,000; often the cutoff was much higher.

This business model made these integrators ill-equipped to adapt to the needs and means of SMEs. As a consequence, these smaller manufacturers have benefited far less from the operational advantages that robotic technology has offered. The impact of this is evident in the 300% productivity growth that large enterprises gained during the first decade of this century alone, versus the 200% productivity gains achieved by firms numbering fewer than 500 employees.



Troy Ojalehto (left) at Rapid Design Solutions, a Certified Systems Integrator of Universal Robots, developed the initial machine tending application with UR cobots at Toolcraft. The Seattle-based machine shop's automation engineer, Brian Laulainen (right), was able to handle the daily operation in addition to developing a parts rinsing and drying station as an application add-on for the UR5e. Laulainen did the training through the UR Academy, then supplemented with a few hours hands-on training with Ojalehto.

Laser-Focused on Lean Solutions

In contrast, the lean integrator evolved precisely to address the SME market's growing demand for robot installations that yield higher productivity at a lower price point and that can be installed in a fraction of the time of a traditional robot work cell. Like the SMEs they serve, lean integrators are small

enterprises themselves. The two features that distinguish lean integrators from their traditional counterparts are size and speed.

Lean integrators typically focus on mastering one or two end applications within a regional market and often employ no more than 10 to 15 people, including the principal or owner, who often doubles as the project manager and head of finance. Their operational footprints rarely exceed 10,000 square feet, and they tend to deploy capital on knowledge workers rather than equipment for vertical integration. All this translates into much lower operational overhead while spurring innovation, which enables lean integrators to be successful even when taking on projects under \$100,000. It also allows them to commission cobot installations within weeks rather than the months-long process required to integrate industrial robots.

Less vertical integration means that lean integrators tend to favor off-the-shelf cobot peripherals and accessories over fabricating every tool in-house to meet a unique specification. The make-versus-buy debate usually ends with a buy decision, keeping overhead down and speed of execution up. This approach has facilitated the growth of partner ecosystems around cobots. The largest of these, Universal Robots+ (or "UR+" for short), is a global ecosystem of components, software, and application kits that have been validated and certified to be compatible—mechanically, electrically, and digitally—with cobots from Universal Robots (UR). This approach further

drives down time, cost, and risk as compared with a traditional automation approach.

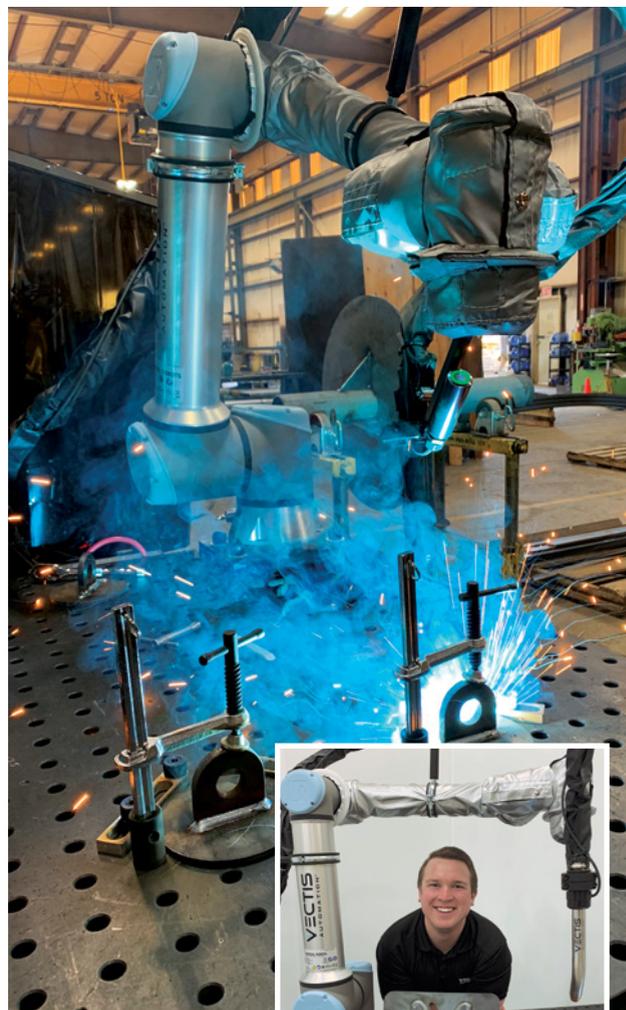
Specializing in serving smaller enterprises that have very specific application needs may seem like a losing business model. The truth is, however, that lean integrators address a much larger overall market for their services. Most manufacturing firms in the United States are SMEs, according to U.S. Census Bureau statistics on U.S. businesses. Of the 248,039 U.S. manufacturing firms the bureau listed in 2017, with 83% employing fewer than 500 people. Nearly 70% of manufacturing firms have fewer than 20 employees.

The unique value proposition of many lean integrators boils down to a highly targeted specialty defined by the targeted customer and application, as illustrated by examples of two lean integrators. Both focus on improving the efficiency and productivity of a specific application for a particular class of customer. Also, notably, both have built business models that would have been difficult to impossible to achieve before the emergence of cobots.

Two Portraits of the Lean Integrator

Vectis Automation: Focused on Welding

Founded in 2019 in Fort Collins, Colorado, Vectis Automation assembled a team of engineers with more than 75 years of combined expertise in traditional robotic welding applications.



Josh Pawley of Vectis Automation, shown with the Cobot Welding Tool.

In addition to their technical fluency, team members can also attest to the positive impact robots have had in helping large enterprises bridge the burgeoning skills gap in welding.

The welding profession, like so many manufacturing-related trades, is experiencing a graying effect that points toward a future shortage of experienced workers. The average age of a U.S. welder is 55, according to research by Deloitte, and most welders are likely to retire within 10 years. Comparing this pending wave

of retirements to the current talent pipeline, the American Welding Society projects that the shortage of welding professionals in the U.S. will reach 291,000 in 2020. This labor gap affects organizations of all sizes. But for SMEs, which have struggled to leverage traditional robots due to cost, support, and specialized engineering requirements, the labor gap could be painfully acute.

Recognizing this as a market opportunity for a cobot solution, Vectis' founders launched the company with the specific strategic aim to leverage lower-cost, lower-risk, easily implemented cobots to help smaller welding operations improve productivity through automation.

"There are a lot of small to medium-size manufacturers who have more production POs coming in than they have the capacity to fill given the current—and worsening—shortage of welders," explains Josh Pawley, director of business development and Vectis co-founder. "They cannot leverage traditional automation because there are significant barriers to entry involving capital costs, programming, implementation, lead time, cost, risk, and training." But welding shop owners, Pawley adds, often have a do-it-yourself mindset, and are willing to adopt cobot tools with the product and application support that Vectis provides.

"We evaluated all the options and chose Universal Robots as our cobot supplier of choice," Pawley explains.

Vectis' business model embodies the lean integrator methodology. The company has streamlined its cost structure by creating a system-level product and by partnering with

a single cobot provider—Universal Robots—to support it.

Vectis can then add value by tailoring the cobot, equipment, and software to the customer's application. The Vectis team's collective background in welding allows them to bring unique expertise to customer application support and develop software targeted to welding fabricators. They know what makes a good weld, and they're able to apply that knowledge to the cobot product kit.

The decision to partner with UR was a strategic one when Vectis launched. "We evaluated all the options and chose Universal Robots as our cobot supplier of choice," Pawley explains. "They pioneered the technology and have now had 10 years and tens of thousands of shipments to refine their technology. Their products are robust both mechanically and electrically, and they are part of a mature support network. Additionally, UR offers us the ability to tailor software to the application."

Vectis' customers range from users who have never touched a robot to shops operating up to 20 traditional robotic welding cells. But they all value cobots for their comparative ease of implementation, programming, and training.

And with Vectis' help, cobot technology can be installed in hours or days instead of weeks or months. One Vectis customer claims they were removing shrink-wrap from UR's product in the morning and were in production on their own by the afternoon. "And that was a customer who never used robots," says Pawley.

Fusion Cobotics: Focused on CNC Machine Tending

Located just southwest of Chicago, Fusion Cobotics didn't begin as a lean integrator. The company launched in 2002 to offer contract assembly services to OEMs that wanted to outsource assembly of their legacy equipment. It wasn't until 2018 that someone on the production team suggested using a UR cobot to tend Fusion's CNC machines. The cobot worked so well that Fusion added another and then another, until it eventually leveraged its internal application expertise to create a new business model.

Today, Fusion helps small to medium-sized job shops focused on high-mix, low-volume applications to automate the tending of CNC mills and lathes, as well as press brakes for sheet metal. Fusion partners exclusively with UR, which provides a familiar technology base that Fusion can tailor to customer applications.

Even by lean integrator standards, Fusion's physical operation is small. It dedicates 15 by 15 feet of floor space and an engineering staff numbering under 10 people to assemble and test a customer's system before installing it within

weeks of the initial meeting. Such projects require an investment between \$60,000 and \$150,000, depending on project size, but 80% are under \$100,000, according to Craig Zoberis, Fusion's president.

"UR's ecosystem enables everything we do to be menu driven, which is what makes us lean," Zoberis says. "Basically, we offer four Universal Robots products—the UR3e, UR5e, UR10e, and UR16e—that, like a suit, we tailor to your application and quickly deploy."

UR's cobot technology effectively enabled Fusion to adopt its lean integrator business model. "We chose to partner with UR because they offered the most proven ecosystem by virtue of their market share and the number of applications they've deployed," Zoberis explains. "It also came down to the software their tools integrate. The shell program is like an Excel sheet into which you add the values. It's much easier for us to configure, reduces training time for the customer, and allows the cobot to be up and running more quickly."



Craig Zoberis of Fusion Cobotics.

By basing its services on UR cobot technology, Fusion can often formulate the total project cost for a new customer within hours after a first meeting and can provide an electronic quote within days. Shipment of the robot might take seven to 10 days, and Fusion's team is on-site with the customer shortly after to connect the cobot to the CNC machine. The team typically spends another day training the customer and ramps to full production on day three.

Fusion's customers typically see a 25% to 30% improvement in efficiency, says Zoberis, which routinely translates into a return on investment in 10 to 11 months. Importantly, with Fusion's cobot-enabled solutions, customers also achieve more predictable output than they would with manual machine tending—assuming they can even find and retain machine tenders. "There's not a lot of people signing up for machine tending jobs, especially at smaller shops in rural areas, where Fusion sees the greatest demand for its business," Zoberis notes.

A Parallel Future for Cobots and Lean Integrators

Cobot technology and lean integrators emerged in parallel, and for now, their futures are similarly linked. Cobots enable lean integrators to implement smaller-scale automation solutions with minimal overhead, while lean integrators are introducing robot automation to the massive and largely untapped SME market.

The outlook for both is bright. Analyst MarketsandMarkets credits demand from SMEs as a key driver behind the remarkable 50% compound annual growth rate (CAGR) it projects for the cobot market from 2018 to 2025—when the market should top \$12.3 billion.

Much of the business from SMEs will be serviced by specialized lean integrators and possibly by lean integrators that consolidate their services to form larger firms that manage several application-focused departments. For now, it is clear that the emergence of cobots is introducing revolutionary gains in productivity, efficiency, and consistency to SMEs for the first time since commercial robots emerged. The demand is there for entrepreneurs with the expertise, resources, and ambition to capitalize on it. 

Ask UR experts how cobots can put automation within reach.

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