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Impact of
Automation
on Metal Fabrication



An in-depth survey of the industry
reveals a fresh take on an old story

The typical North American manufacturing narrative goes something like this:



Click for video summary



If your job can be automated, it one day will be.

In spring 2021 Salvagnini, *The FABRICATOR*, and *Canadian Fabricating & Welding* surveyed the metal fabricating industry, and 320 manufacturers and job shops revealed that the reality of automation is more complex than simple industry narratives. The lack of skilled labor might be a factor for some in pursuing automation, but a far greater factor is increased throughput, meeting customer demand for quick delivery, and competitive pricing. **Automation doesn't always mean a company employs fewer people.**

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Automation and revenue

[Click here](#) to access the complete results of this survey.

During the past five years, your revenue has been more dependent on which of the following?

69% Employee Headcount

31% Automation

It's true that with most automation, fewer people touch the work as it flows through the plant. But automation also opens up opportunities, which in turn drive revenue growth. As further explained on the next page, **the nature of those opportunities affect the correlation between automation and revenue.**

As the above shows, among all survey respondents, higher employee headcounts usually point to higher revenue. That said, the answers varied somewhat by company size. In fact, **more companies with between 11 and 20 employees** said automation dictated revenue more than the number of employees, as shown here.

42% Employee Headcount

58% Automation

That said, **the situation might change at the very largest of companies, with 1,000 or more employees**, where some manufacturers use automation to scale up dramatically without adding thousands of workers, a story that's been central to the popular narrative. But as this survey shows, even at the largest manufacturers, revenue is quite often more dependent on headcount.

56% Employee Headcount

44% Automation

About the survey

The "Impact of Automation on Metal Fabrication" survey was sent to 19,114 subscribers of *The FABRICATOR* and *Canadian Fabricating & Welding* via email in late February and early March. Three-hundred and twenty completed the survey. Respondents indicated that they served various industries, the top three being construction, agriculture, and industrial/commercial machinery.

Who's automating? Nearly everyone.

Have you invested in machine automation during the past five years?

87.5% Yes

12.5% No

Do you plan to invest in machine automation during the next five years?

92% Yes

8% No

Automation has become ubiquitous,

from software that streamlines design and programming to machines that effectively set up themselves. Even within an industry as extraordinarily diverse as metal fabrication, nearly everyone is pursuing automation in one form or another.

But again, the popular narrative behind automation is different from the reality. Consider the results here with those on the previous page, describing the relationship between automation, revenue, and headcount. The popular narrative says that if you invest in automation, your revenue will rise faster than your headcount. That, it turns out, is an oversimplification.

What's going on here? As shown in the case studies in this publication, automation creates new jobs and new career paths. Many of these jobs involve work that occurs behind the scenes, before a job hits the floor. Automation minimizes or eliminates machine setups and minimizes the number of times work needs to be touched by a person. This causes workpiece velocity to accelerate dramatically. Increased throughput improves cash flow and, ultimately, opens up new opportunities.

Those new opportunities might lead to new products that automation can scale up effectively. That way, the company can sell more without hiring more. In other cases, new opportunities might lead to new markets that require more personnel, either in the office or certain shop floor positions. Bottom line: **Automation makes these opportunities possible.**

Automation and the manufacturing career

Has modern automation made training the workforce harder or easier?

25% Harder

43% Easier

32% No effect either way

Reality is complex. Some machines do indeed reduce the need for operator skill and make training easier. In other applications, automation doesn't reduce the need for skill overall; it simply shifts where those skills are needed. For instance, automated bending cells might reduce the need for sheet metal bending expertise at the press brake, but such technology still requires software-savvy personnel in engineering and programming.

Compared to five years ago, have most job applicants today come to you with more or less previous metal fabrication experience?

7% More Experience

66% Less Experience

27% Stayed the Same

A majority of metal fabricators indicate that they are dealing with much less experienced job applicants, which might be a bigger issue if those same fabricators needed experienced operators to run automated equipment. Almost half of those surveyed said that experience isn't a factor when it comes to who's operating that equipment. **Automation makes hiring easier for these metal fabricating companies.**

Which operators do you put on your most automated equipment?

39% Those with more experience

16% Those with less experience

45% Experience is not a primary factor

Market effects

What is the dominant driver behind your automation investment?

55% Increased throughput and shorter lead times

30% Lack of skilled workers

15% Improved quality

What are your customers most interested in?

42% Lower prices

27% Shorter lead times

26% Better quality

5% Technology Innovation

The results above reinforce the fact that automation isn't always a reaction to the lack of skill in the labor market. In fact, **throughput is the major driver**. Of course, all three of the above are related. Fabricators need **talented people** to run **productive machines** that **quickly produce quality products**.

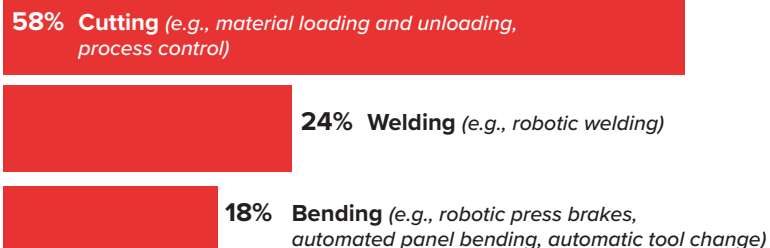
That's good, because metal fabricators' customers want it all: lower price, shorter lead times, and high quality. Increased throughput reduces manufacturing

costs. Automation reduces the human element during fabrication, increasing quality rates. Unattended operations simply produce parts faster than any manual operation could. Technological innovation makes a difference in improving the overall business.

Automation is not about solving the skilled labor crisis. **Investing in automation is about constantly striving toward a better business model.**

Different industries, similar constraints

Where does the greatest level of automation in the plant occur?

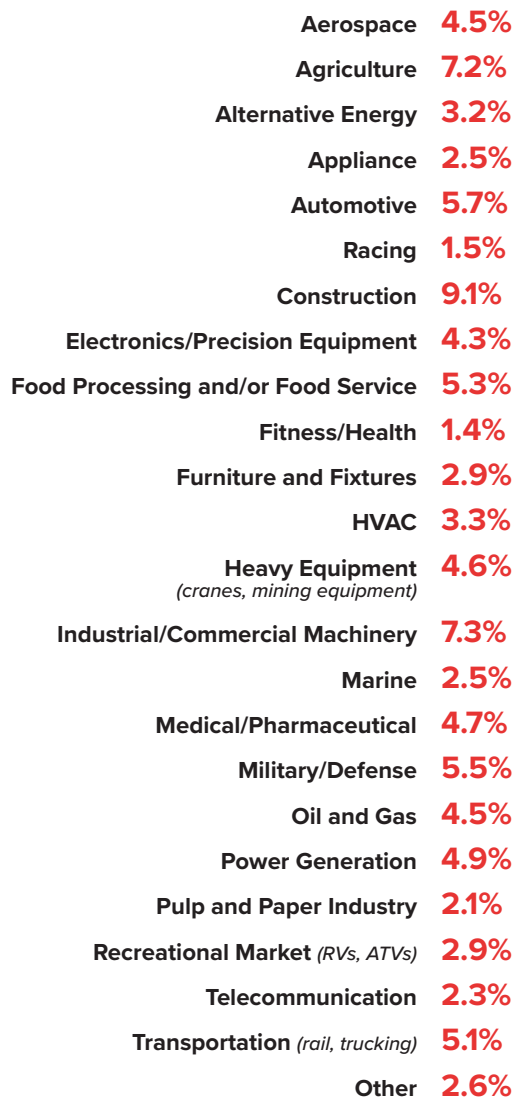


Where is your greatest operational constraint?



What industries does your operation serve?

(Respondents could check more than one.)



How many employees does your company have?

Fewer than 10:	2%
11-20:	3.5%
21-50:	24%
51-100:	29%
101-500:	30%
501-1,000:	6%
More than 1,000:	5.5%

The automation journey

Company size matters. Survey participants, 320 across the U.S. and Canada, represented growing metal fabricators. Synthesizing all the data points in this survey, one can imagine how that growth might happen.

A shop opens its doors and grows with manual or less automated equipment. The company reaches a critical mass—say, between 11 and 50 employees—and automation investment begins in earnest. Automation becomes the primary revenue driver as automated machines give an initial boost to productivity.

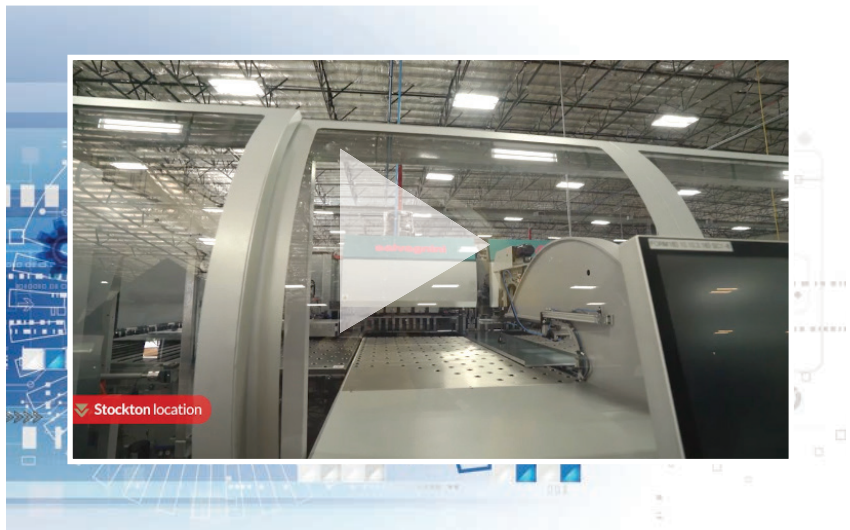
Rising throughput makes the fabricator more competitive, which in turn opens up more career opportunities as the fabricator expands into more product lines and more markets.

The fabricator begins incorporating automation in the broadest sense. This includes not just hard automation—the physical cutting, bending, welding, and moving of metal—but automation grounded in smart use of data. Industry 4.0 and the Industrial Internet of Things make the shop floor more transparent than ever and allow fabricators to connect the dots in new ways: *What jobs are most profitable and why? Are there similar opportunities elsewhere?* And so the virtuous cycle of growth continues.

All this stems from automation technology in the hands of talented people.

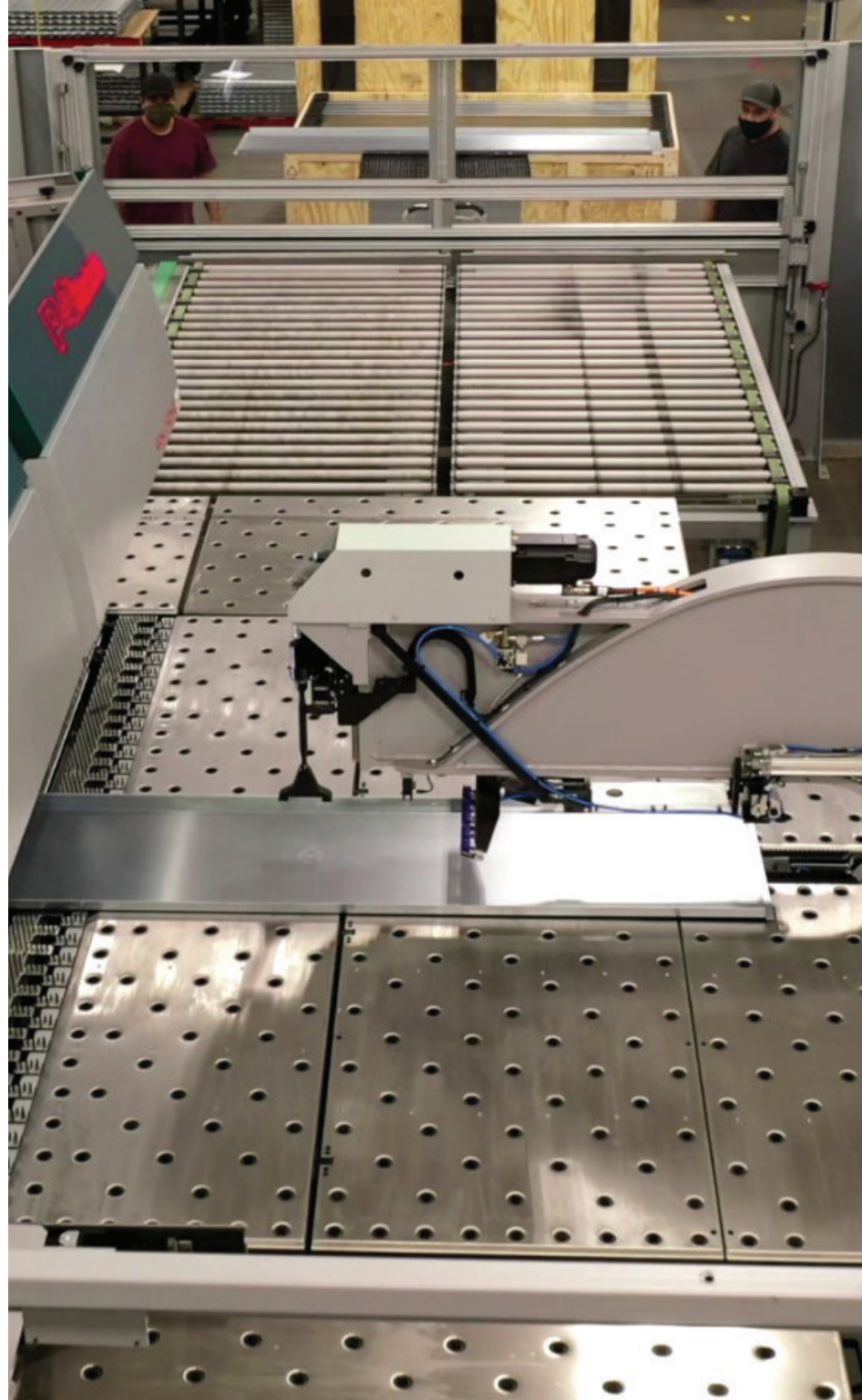


Embracing the future at



An automation strategy in three parts

1. Aim for **greater overall throughput**
2. Expand **training**
3. Focus on the **joy** of the job



Greg Biggs remembers riding his bike in the 1980s to his job in San Jose, Calif. Biggs was pedaling not toward some software startup, but to Vander-Bend, then a small sheet metal job shop. The place had a shear, an old kick press, one hydromechanical press brake, and some welding stations. Working the swing shift at one of those welding stations was Ted Perry.

Fast forward to 2021. Biggs and Perry are still at Vander-Bend, which, now with more than 960 employees across multiple California plants, is one

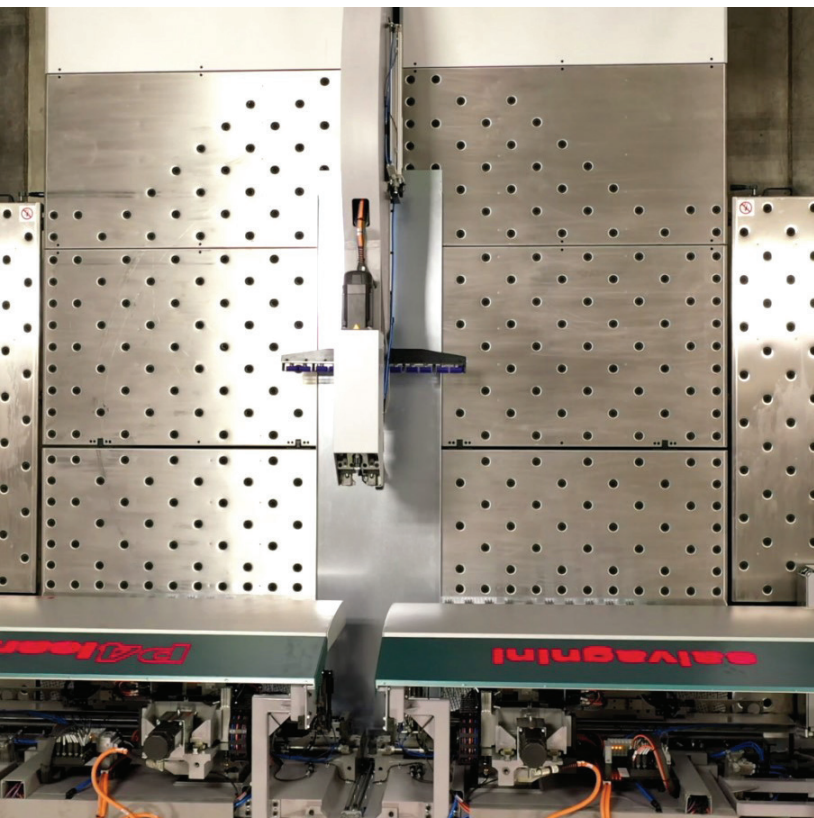


of the largest—and most automated—contract metal fabricators and machining operations in the country. Biggs is CEO, Perry director of metal manufacturing.

The company's evolution shows how automation, when embraced in the right way, can help turn a small job shop, operating in one of the most expensive areas in the country, into one of the most successful contract metal manufacturers in North America.

Vander-Bend's recently acquired Salvagnini P4 panel bender is now a key part of the company's Stockton, Calif., plant. Panels running through that machine previously required three conventional press brakes, each with two operators who supported the work through every bend cycle.

Putting edge flanges on large panels using conventionally tooled press brakes is tiring work. "Each part took about 10 minutes on average," Perry said.





Panels that once took 10 minutes to form now take 58 seconds.

The company's Salvagnini automation changed the game. Cut blanks flow directly off the punch to the panel bender. "Nobody touches the parts," Perry said. "The machine autoloads, and operators take a completed part off every 58 seconds."

Quick bending cycle time matters, but even more important is the way parts move through and leave the cell. A conveyor presents them to material handlers, who quickly package them for their journey downstream. The machine produces parts on the move, not a stationary pile of work-in-process. Even more important: Operators no longer spend strenuous days handling large workpieces through manual bending.

Broadly speaking, it's not just about how many parts per hour a workcell produces. It's about overall throughput, from order release to the shipping dock.

To that end, Vander-Bend's Stockton facility takes a focused-factory approach—centered on a few key product families—while the San Jose plant



has a process-focused layout designed to handle a broad mix of jobs. This doesn't mean the San Jose plant shies away from automation. In fact, the plant's use of technology, including automated panel bending—tailored for quick changeover and kit-based production—shows just how flexible automation has become.

Technology has changed the worker demographic. Few today grew up fixing their own cars, but they did grow up with touchscreens. At Vander-Bend, new technology has changed the nature of the metal manufacturing job.

With older technology, rookies learned gradually as experienced operators passed on tribal knowledge. Though imperfect,



the tribal system worked at a lot of fab shops, and it worked at Vander-Bend. But times, and technology, are changing.

Automation has put more demands on those who maintain, troubleshoot, and program machinery. An operation might have, for instance, numerous robot welding cells, each with its own idiosyncrasies regarding the control, the wire feed, programming, and fixture development.

Even though programming has become more intuitive in recent years, programmers can't rest on their laurels. To be competitive, they push the technological envelope and discover new paths to greater productivity.



Vander-Bend began with simple, manual equipment, including a hydromechanical brake still on display in the lobby. Automated bending, both robotic press brakes and panel bending, now plays an increasingly critical role.

Biggs and his leadership team knew that a business like theirs needed people who could get the most out of automation. Over the years they worked with local technical colleges, sat on advisory boards, and scoured the area for talent. But alas, like at so many fabricators, Vander-Bend's hiring efforts remained stubbornly difficult. "So eventually we threw up our hands and decided to bring it all in-house," Biggs said.

The fabricator used funds that came in part from the state of California's Employment Training Panel and developed its own education program. Vander-Bend hired Matt Howell, who creates training programs for people who have never thought about sheet metal in their life.

He uses online resources like SME's ToolingU, but he also simply interviews experts on the floor to learn what they want



a beginning operator to know. Beyond learning the basics of blueprint reading and shop floor tools (like how to measure parts), all employees learn broader aspects of manufacturing management, including lean manufacturing and the waste created with excessive batch sizes and unneeded movement.

Such training provides the foundation for novices to learn more, which has become even more important in the age of automation. In fact, Howell sees automation as something that has "flipped the issue" of worker training. "Instead of trying to document tribal knowledge of people, you need to bring someone with knowledge to the machine. Good programmers and operators need to know what to input into those machines to get the most out of them."

Formal training provides the foundation and, in the long run, guides employees toward (ideally) fulfilling careers. At

Vander-Bend, automation has shaped those career paths in new ways.

For instance, Perry described how an operator of the company's Salvagnini panel benders might start as a material handler, then move up to machine operation, eventually becoming a lead operator on a shift.

"They're responsible for machine startup, cleaning the tools, and making sure we're following the right startup procedure. That main operator is critical to the success of that machine."

Perry added that to progress beyond this, an employee might move up to become a manual press brake operator and then learn how to manage a robotic bending cell.

Throughout it all, **cross training is continual**. Just because someone learns to become, say, a principal panel bending operator doesn't mean he'll spend no time moving material.

"We understand peoples' relative skills as they relate to different work centers," Biggs said. "In fact, cross training was part of our thesis when we launched our Stockton facility. About 70% of our workforce there is malleable between different departments. And the same philosophy carries over to our other facilities."

Vander-Bend's continual adoption of automation has introduced career paths calling for new kinds of technical expertise. "As the company has grown," Perry said, "we've added more robotic specialists." Specialists also push the company to use automation in ways beyond the obvious applications.

Vander-Bend's automation and career-path strategies are intertwined, and both "focus on the joy," Perry said. "We're taking the monotonous work people struggle to find any joy in and letting the automation take over, and in turn really allowing them to apply their skill set."

Evidently, the market has rewarded Vander-Bend's strategy. The company today now serves some of the largest names in business, including prominent players in Big Tech and medical technology. Within the next five years it hopes to open at least one facility east of the Mississippi—bringing the company one step closer to its goal of having a national footprint. **Not bad for what was once a small job shop with a few manual punches and a kick press.**



Automation increases competitiveness at

CASASANTA

COMPLETE BAKING SOLUTIONS



Increasing competitiveness with automation

Most fabricators will tell you that the pressure to deliver lower prices while maintaining or improving quality is an unrelenting one. And no industrial sector is immune from this drive. In part, this is why Casasanta began investing in automation. That said, productivity increases and the ability to expand its market reach have also driven the company to automate more.

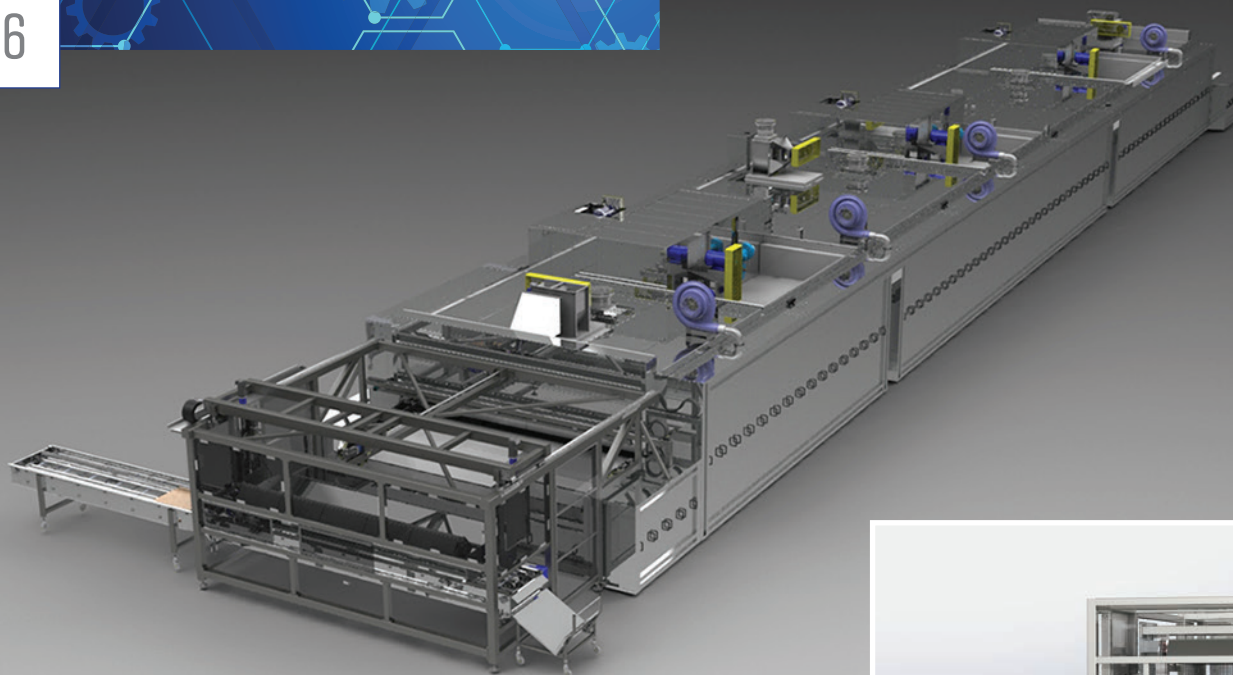
Casasanta was founded as LC Bakery by Luigi Casasanta in 1984. At the time it was strictly a 24-7 maintenance service company for all types of bakery equipment. However, when his sons graduated from university and began working in the company, it began to transition into a manufacturer of quality bakery equipment such as ovens, proofing systems, cooling systems, and conveyors.

Casasanta has since grown into a company that supplies machinery to bakeries all over the world, both commercial and industrial, with all its equipment being built in its 53,000-sq.-ft. Brantford, Ont., facility.

In 2019 the owners realized that the company needed to automate some of its processes if it hoped to compete on price with some of its competitors.

“We were finding that although our equipment is very robust, we still had competitors from Europe, Asia, and

All of the bakery equipment built at Casasanta is also engineered in-house.



elsewhere that could land their equipment here and still be cheaper than we were producing our equipment for,” said Robert Casasanta, the eldest of Luigi’s sons and vice president of engineering at the company. “So the drive for us was that we didn’t want to compromise on the gauges of steel we use, or the Allen-Bradley electronic components we use in our systems. We couldn’t sacrifice quality for price. The only thing we could do was improve our manufacturing efficiencies and reduce our costs that way.”

Metal cutting and bending were, for Robert, the easiest target for the creation of these efficiencies. The team chose to invest in a Salvagnini Flexible Manufacturing System with



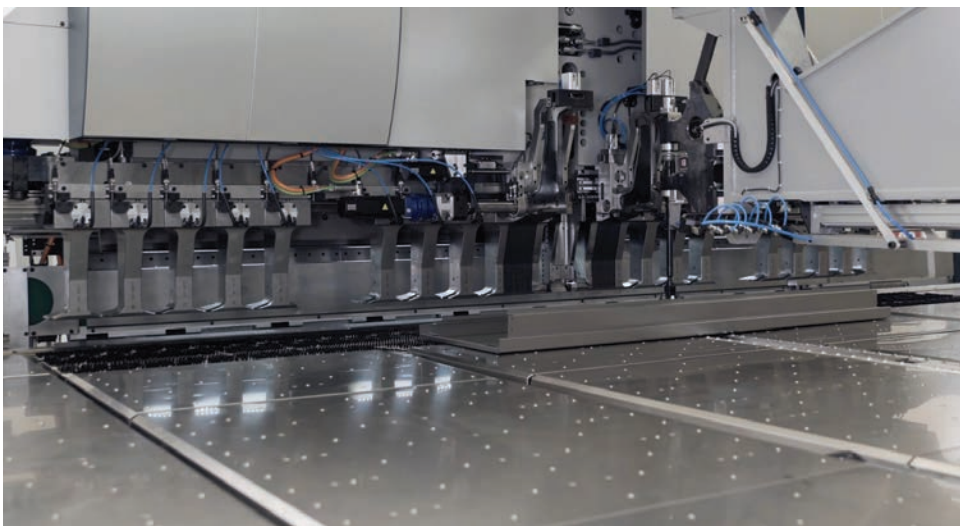
an S4 + P4 punch, shear, and forming line. The system is designed to operate in a totally automatic and integrated manner, optimizing production lead times and improving workshop logistics.

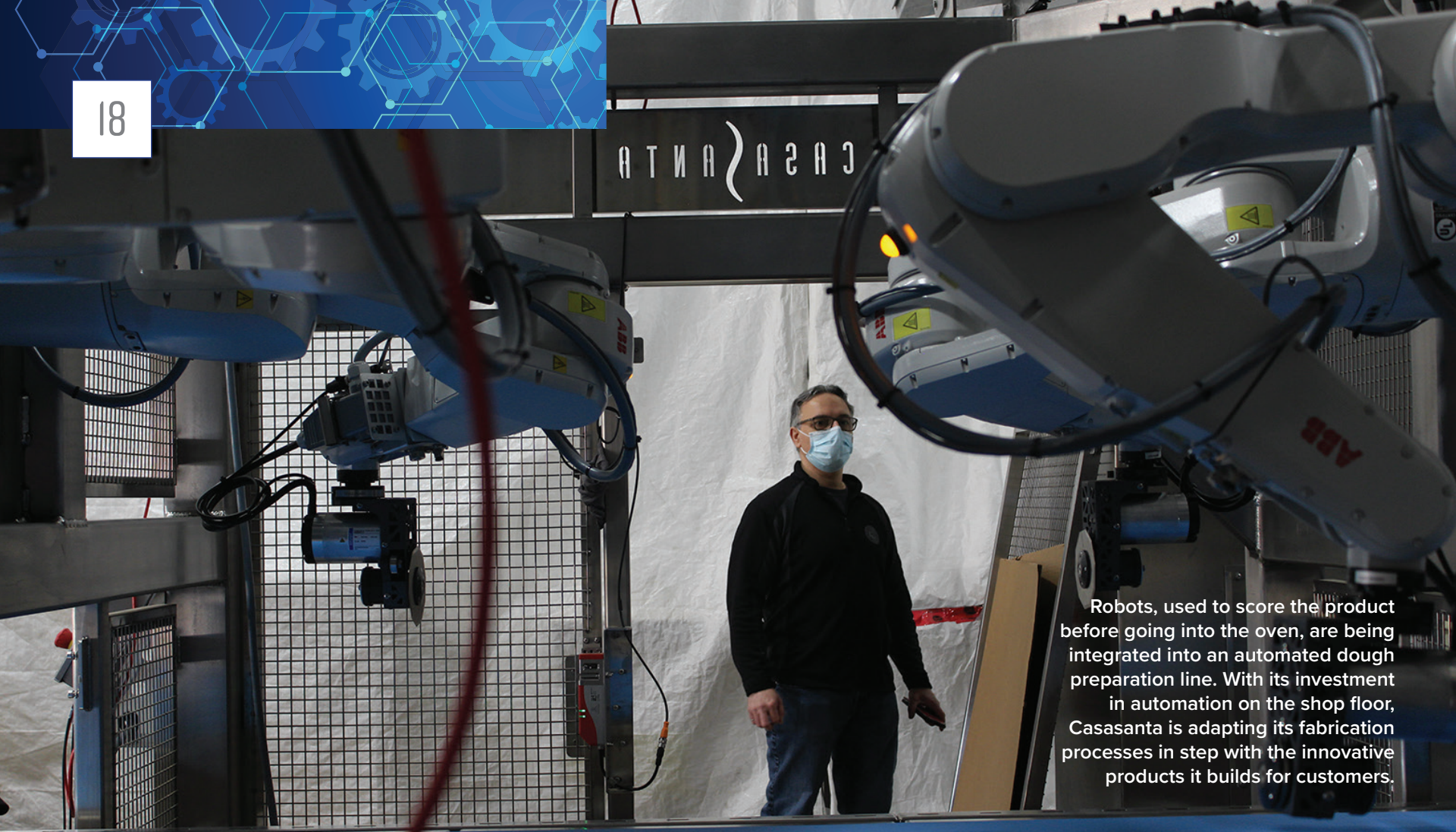
“We have a philosophy that the less we touch a part in processing, the better it is,” said Robert. “We wanted a complete automated system, and that’s what the S4 + P4 provides.”

The introduction of automation to a shop floor can be a challenge. “To the credit of our employees, they were really enthusiastic to learn the equipment and picked up on it very quickly,” said Robert Casasanta about the S4+P4.

Just because employees don't touch the part doesn't mean they don't require extensive training. Quite the contrary. As Robert explained, “If there is an advantage to buying a stand-alone machine, it is that the knowledge you need to have to run the equipment is somewhat less,” he said. “But we are interested in **investing in good people, and we feel that by doing this we are bringing on and bringing up people with a mindset of wanting to do something different.** We knew the system was more sophisticated, but our mindset was always that once people were trained on it, they could flex their intellectual muscles. To the credit of our employees, they were really enthusiastic to learn the equipment and picked up on it very quickly.”

It's only natural that Casasanta should be investing in more automation. The bakery equipment the company makes is becoming increasingly automated, and it makes sense that Casasanta's own production environment should follow suit.





Robots, used to score the product before going into the oven, are being integrated into an automated dough preparation line. With its investment in automation on the shop floor, Casasanta is adapting its fabrication processes in step with the innovative products it builds for customers.

“A good example of the work we are doing for customers is an automated system that removes bread dough from its proofing pans, then automatically sprays the bread to allow the machine to then coat it with flour or seeds,” said Robert. “After the dough is coated, robotic arms then score the top of the dough. After that it is conveyed straight into an oven.”

Robert suggested that seeing Casasanta invest in automa-

tion is encouraging for companies buying this type of equipment from them.

“It does matter to them,” he said. “We want our customers to see our processes because I think it speaks to who we are as a company. We have no trouble investing in ourselves, and we’ve always done so.”

“If you’re working with a company and you know that they are willing to invest in themselves with new and different technology, it gives you greater comfort about the way you are going to be supported. An investment in ourselves benefits everyone, ultimately.”

And for other customers who may be hesitating to invest in the automation options Casasanta’s products can offer them, the company is leading by example with its own automation investments.

“We can demonstrate to our customers how much they can gain by this kind of investment,” Robert said.

The value of the technology has more than proved itself in the year and a half since being installed. **The company has grown from 30 to 120 employees in a short time, driven by the need for assembly talent but also increased needs elsewhere.**

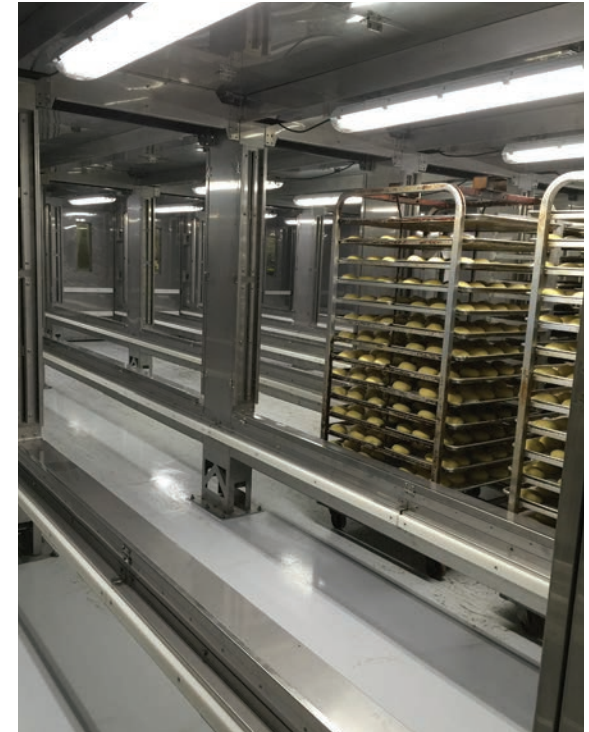
“We have grown in the sales department, assembly, accounting, engineering, shipping—everywhere,” said Robert. “We are a tight-knit, family-run business, and we try to maintain that feel, but our growth is demanding that we function more like a corporation. It’s a nice challenge to have, finding the balance between the two.”

The expanded capacity of the team created by automation has also given Casasanta the opportunity to explore new markets.

“We are now doing custom fabrication work for a variety



of industries,” said Robert. “For instance, the cannabis industry, which is growing rapidly in Canada, requires drying equipment that really isn’t radically different from some of the equipment we make for the bakery industry. Given the strength of our engineering department, we can help companies with their needs.”



The introduction of the S4 + P4 has opened up the flood-gates in terms of automation discussions at Casasanta. “Once we experienced how an automated setup could help us, we automatically started thinking about what would come next,” said Robert.

As it turns out, the next machine will be an automated load/unload fiber laser machine. But Robert insists that is just the beginning.

“When we first thought about automation, a weld cell didn’t make any sense because of the variety of products we

build,” he said. “However, with recent developments in robotics, and our own comfort with the implementation of new technologies, it seems suddenly possible.”

Right now, Robert’s biggest concern is that Casasanta has outgrown its current facility.

“We are at capacity and are looking for land to build and grow on,” he said. “With that new facility, I expect we will invest further in automation that will allow us to continue to innovate and compete in the market.”

Automation's future

Imagine rookies in 20 years stepping onto the shop floor for the first time. What kind of career will they have? This study, including the surveys and case studies, reveals a few hints.

They likely won't spend their career standing in front of one machine or one welding cell. They might specialize in one area of fabrication, be it cutting, bending, welding, or finishing, but they won't spend a career doing mindless, repetitive tasks.

Employees learn fabrication fundamentals in new ways. No longer do they spend years shadowing experienced personnel on a laser or press brake. They learn manufacturing fundamentals and grow into a specific technology area. But they also spend a career learning new processes. Cross training is the norm. Machines can produce umpteen parts all day every day. But even the most automated cutting and bending machine can't walk to the welding department and pick up a torch to free a constraint.

For the vast majority of fabricators, investing in automation simply will be a given, driven less by volume of specific products and more by a machine's ability to increase a company's overall throughput. **With Industry 4.0 in full swing, production will be autonomous.** Employees will focus on exceptions and opportunities. Manual operations will be reserved for those exceptions. **Shop employees won't be production workers. They'll be technology workers, and their talent will be a fabricator's key differentiator.**

