

# MYNNews

A magazine from Mycronic

2019.02

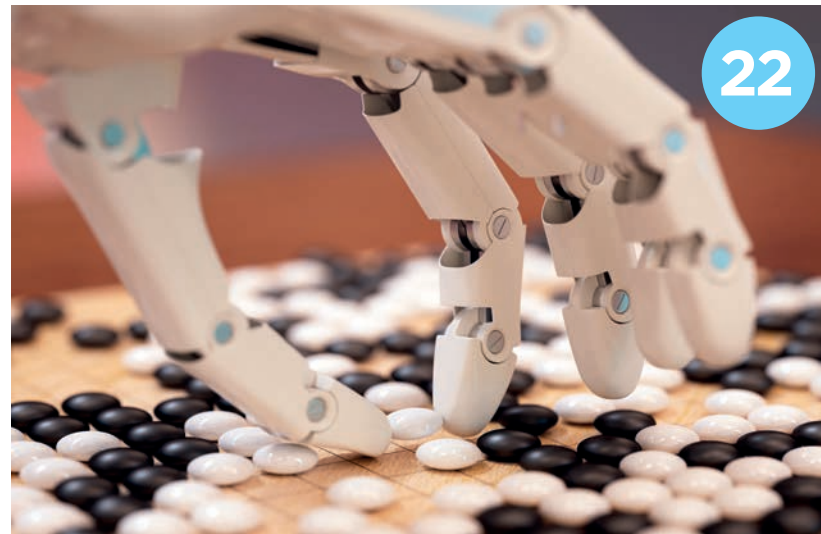
**Bigger  
challenges.  
Bigger  
perspectives.**

**CONTROLLED PASTE DEPOSITION**  
Closing the loop in solder joint quality.  
Achieving zero stencil defects





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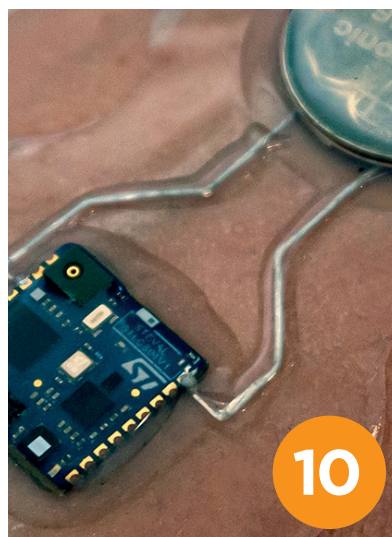
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**ANOTHER YEAR, AND YET ANOTHER MAJOR STEP FORWARD FOR EFFICIENT ELECTRONICS ASSEMBLY.** In the race to find new ways to improve quality, productivity and flexibility throughout the SMT factory, Mycronic customers are well equipped to profit from the growing opportunities that lie ahead.

At this year's Productronica, we'll be showcasing more ways than ever before to close performance gaps across the entire SMT process.

With more Hermes-compliant platforms, more full-line capabilities and more automated material handling possibilities using collaborative robotics, several of our prioritized initiatives are already bearing fruit for customers.

As part of the Hermes Standard Initiative, Mycronic has made significant steps toward ensuring that most of our machines are Hermes-compliant. The advantages for manufacturers are clear: standardized M2M communication throughout the SMT line will mean that process and programming changes can become increasingly product-driven, rather than machine- and vendor-dependent. These standardized interfaces will enable a key change in mindset going forward, as more producers move beyond thinking in discrete manufacturing steps and towards a more holistic view of end-to-end productivity.

For the highest levels of line performance, our integrated MYPro Line demonstrates a number of new capabilities. The SIGMA Link software enables more intuitive process controls with features like data correlation between SPI and AOI to improve inspection efficiency and improve first pass yield. An active inspection interface (SPI/jet printing repair loop) and Hermes support close several data feedback loops to automatically increase yield and product quality over time. And our new dashboard and analysis software simplifies production scheduling to further improve overall equipment effectiveness across wide-ranging batch sizes.

Finally, Productronica visitors will also experience the next generation in automated material handling with our demo of an advanced collaborative robotics system. This solution, developed in cooperation with industry-leading partners ABB and Ericsson, will highlight the potential for entirely operator-independent retrieval, kitting and distribution of component reels. As skilled floor staff become an increasingly scarce resource, this is a strong step towards addressing some of our customers' most central labor utilization challenges.

Alongside all these new capabilities, we'll also be presenting for the first time Mycronic's entire assembly solutions portfolio, including ultra-high-precision die bonding systems and the world's leading automotive camera module assembly solution. Our experts behind both systems will provide insights into the future of advanced packaging as well as vehicle sensor systems enabling enhanced car safety and ultimately autonomous driving.

Together, all of these developments point toward an exciting new future for our industry. With more and more Industry 4.0 building blocks falling into place, we're committed to putting new levels of performance in your control.

// Thomas Stetter  
Senior Vice President Assembly Solutions

## Worldwide events 2019–2020

Productronica  
**Munich, Germany**  
November 12–15, 2019

SPIE Photonics West  
**San Francisco, USA**  
February 4–6, 2020

IPC APEX Expo  
**San Diego, USA**  
February 4–6, 2020

OFC  
**San Diego, USA**  
March 10–12, 2020

Productronica China  
**Shanghai, China**  
March 18–20, 2020

SEMICON China  
**Shanghai, China**  
September 18–20, 2020

Laser World of Photonics  
**Shanghai, China**  
March 18–20, 2020

IS Auto Europe  
**Stuttgart, Germany**  
April 21–22, 2020

IMAPS New England  
**Boxborough, USA**  
May 12, 2020

SMTconnect  
**Nuremberg, Germany**  
May 5–7, 2020

**MYCRONIC**

**ADDRESS:** Mycronic AB, Nytorpsvägen 9, PO Box 3141, SE-183 03 Täby, Sweden **TEL:** +46 8 638 52 00  
**INTERNET:** www.mycronic.com

**PUBLISHER:** Thomas Stetter, responsible under Swedish law **EDITOR:** Cathrin Wisén **CONTRIBUTING WRITERS:** Grant Baldrige, David Gray, Mattias Jonsson, Jeff Leal, Yan Manissadjian, Viktor Olsson, Simon Sandgren **GRAPHIC DESIGN & LAYOUT:** EXPEDITION 46™ **PRINT:** TMG Sthlm, Sweden, 2019 **ISSN:** 1651-4882 P-001-0252/October 2019. This newsletter is produced with the intention of providing general information about Mycronic and our products.

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# Bigger challenges. Bigger perspectives.

– how data-driven production is redefining tomorrow's workflows

TEXT: GRANT BALDRIDGE PHOTO: MAGNUS ELGQVIST

**New product mixes. New innovations. New perspectives. As electronics assembly grows more complex, Mycronic and its customers are expanding their visions for the future. It's all about leveraging bigger data and actionable insights to take broader control of fast-changing industry demands.**



We are striving to put our customers in control of future demands.

## SMARTER WORKFLOWS ARE JUST AROUND

**THE CORNER.** Imagine sitting down at your desk in the morning and opening a new ECAD file. It's intriguing. The substrate is stretchable. A few of the components you've never seen before. And the customer wants a prototype tomorrow. She also wants the first 10,000-board batch optimized, manufactured and shipped for assembly in Hanoi at the end of the month. It's all attached under the subject line: "Can you handle this one?"

## Anticipating change through deeper insights

In the near future, this simple question will reveal powerful new business insights. Your software might predict the new job's effects on ongoing production and purchasing, simulate the first run and adjust key parameters to the board design. It might tell you if you can meet the deadline, your overall equipment effectiveness throughout the job, and signal key staff to tell them where and when they're needed most. Before you even start, you've simulated the product's DPMO based on millions of points of past production data, and you know your line utilization will be 85%.

"These are some of the things we think about when we think about putting our customers in control," says Thomas Stetter, Mycronic, "and this scenario isn't as far off as you might think. In fact, we're investing heavily in making all of these capabilities possible."

## Preparing for tomorrow's opportunities

Ask industry experts what challenges tomorrow's electronics manufacturers will face and the list is bound to be wide-ranging. On the technology side, the trends continue toward miniaturization and higher material variability. On the business side, average PCB sales prices are on the decline, and customer expectations for faster time-to-market are on the rise. Simply put, the pressure is on to unleash bigger gains in quality and efficiency throughout the assembly process.

## Taking performance to the next level

Together with customers, Mycronic is leveraging its end-to-end expertise, software and solutions to unleash new levels in quality, flexibility and productivity throughout the factory. This means delivering not just higher-performance machines, but more actionable data flows, more compatible interfaces and more adaptive, predictive information loops. All of these are part of the company's vision to enable the zero-defect assembly line with the highest possible utilization for any product mix.

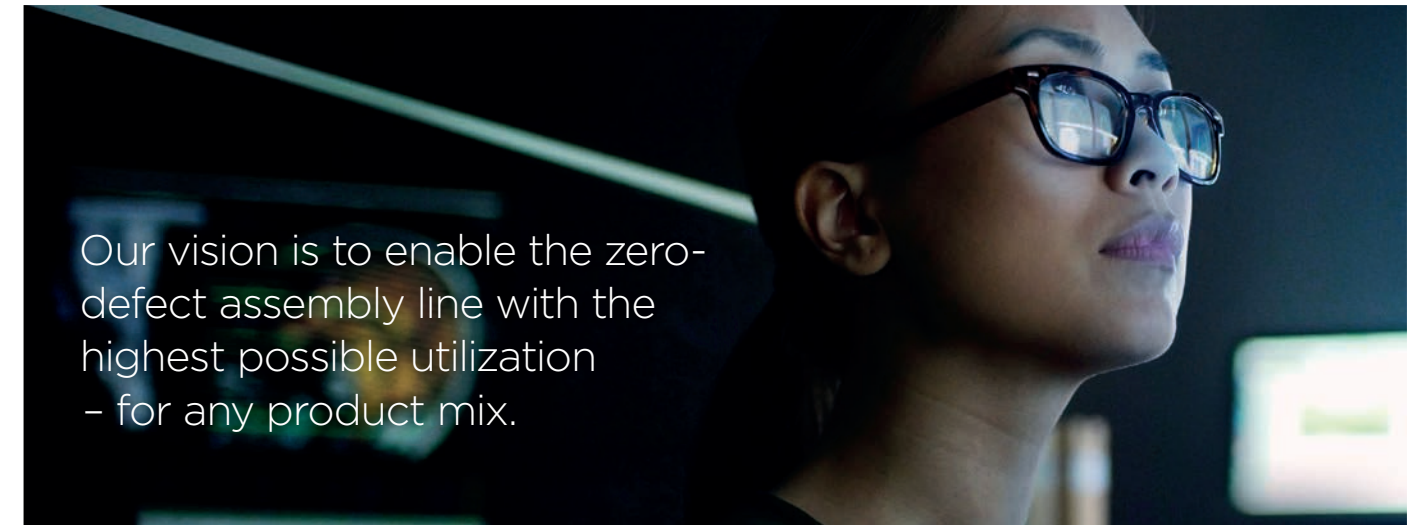
## A new mindset for a new era

To achieve this ambition, a new mindset is needed. A perspective that looks beyond individual process steps and ideal machine speeds to proactively identify and address

actual efficiency leakages – wherever they might occur. This involves better measurement, control and anticipation of process variations to reach new levels in product quality and process automation. It requires smarter data flows to minimize working capital and boost delivery output. And above all, it demands a clear vision for tomorrow’s agile manufacturing – a vision that is quickly becoming reality.

### Charting the course ahead

Guiding the course for this development are six key process pillars that Mycronic believes will unlock significant new gains in quality, productivity and flexibility in the years ahead. Although individual machine capabilities remain important, advances in these six key areas will redefine the industry’s previous conceptions of production performance.



Our vision is to enable the zero-defect assembly line with the highest possible utilization – for any product mix.

## Six key process pillars for the future factory

Data-driven manufacturing is redefining tomorrow’s workflows and unlocking new opportunities in quality, flexibility and productivity. Mycronic has defined six key process pillars that will be vital to capturing more value in tomorrow’s most demanding production environments.

### 1. Process control

The foundation for process control is a series of sensors that measure the process parameters and perform accurate data collection. This data needs to be refined into actionable information through software analytics and correlation, which increasingly requires AI to interpret the “soft” data. Extensive open APIs will also be required, since process data must be made available to all potential consumers in the factory, not only the machine or process point that collected the data.

### 2. Production scheduling and line performance optimization

The key challenge will be to reach high levels of performance and utilization while still allowing for a high degree of flexibility when it comes to ever-changing build schedules and urgent orders. Scheduling and optimization tools must take into account both historical data and a “best guess” future projection. Full visibility of materials, machines and staffing levels is key to creating an optimized, yet robust, build schedule. This will require integration with other key systems in the factory.

### 3. Quality management

Quality management systems will evolve from the traditional approach of capturing, classifying and recording defects, to the more value-adding approach of predicting and preventing defects. This will require self-learning systems with the ability to anticipate drift, correlate data to create actionable information, and close the loop to prevent defects before they occur. The goal should be to also make the quality system an integrated part of the design process, so that product developers can predict the quality outcome of their design choices.

### 4. Equipment automation

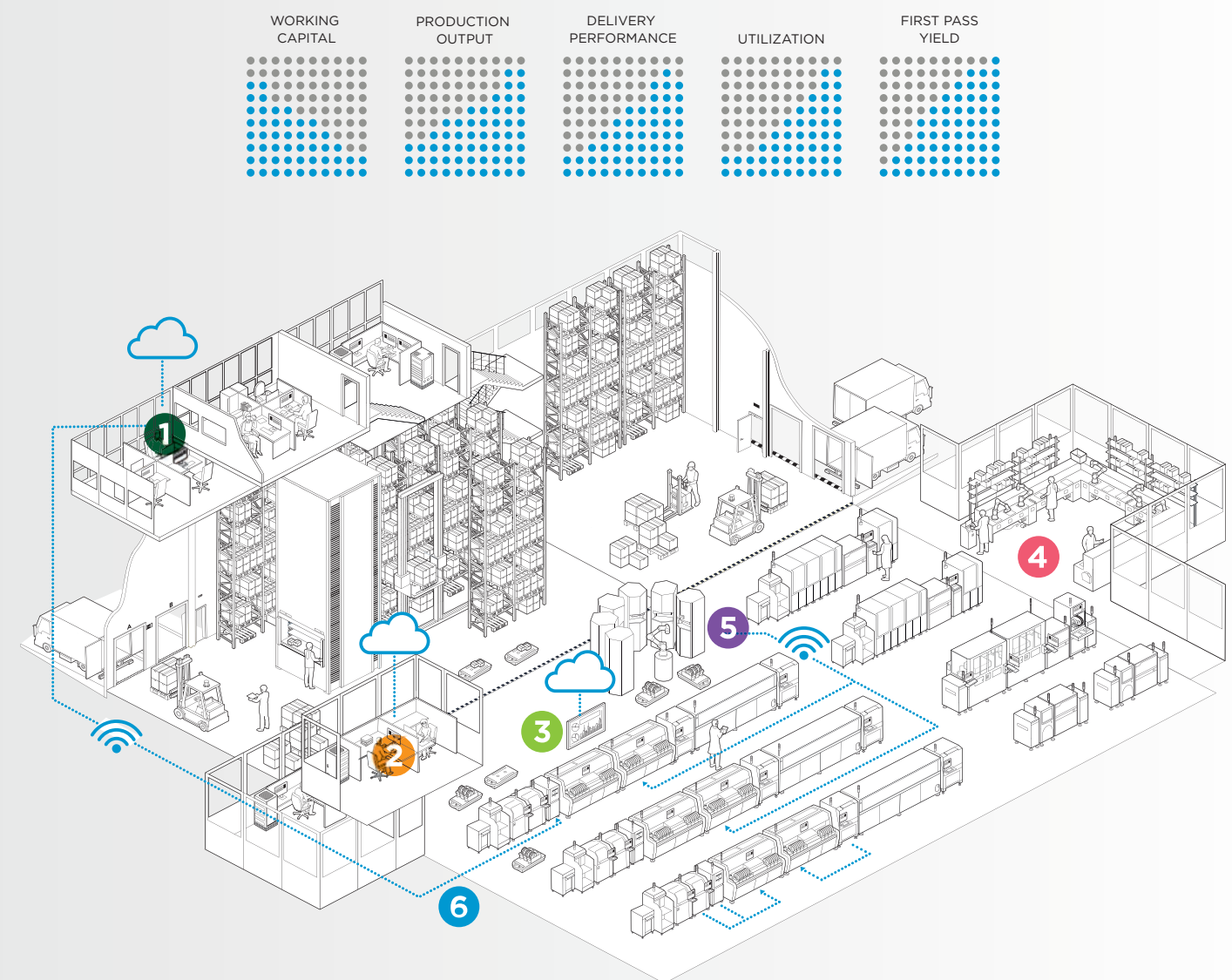
Automation is not only about reducing manual labor. It is also about improving quality by avoiding human mistakes. However, 100% automation in complex production environments is neither possible nor economically viable, today. A more collaborative approach to automation will be required in the future, where machines, robots and humans work better together to perform assembly tasks, and to verify the result of these tasks.

### 5. Material handling

Stock accuracy, traceability, and delivery performance are the key aspects of a material handling system. Today, most factories rely on manual handling, often with the support of barcode or RFID systems. But increased automation is required, and in many cases is already ongoing. Many Mycronic customers have already started to invest in robots and AGVs, and Mycronic is actively supporting them by adapting products for robot interaction. We have also invested in an in-house robotics lab in order to be prepared and to better support our customers in this area. We will also see more augmented reality solutions to better guide humans to carry out those tasks that cannot be fully automated.

### 6. Communication & Connectivity

The future smart factory will require integration on all levels, and in many cases this will require customization. Whether it’s product-to-machine, machine-to-machine and human-to-machine feedback loops or vertical integration to ERP and MES systems, Mycronic has the ability to offer custom-made software integrations in all areas where our solutions play a role. The need for customized horizontal and vertical integration is certain to grow in the future, as manufacturers experience ever-increasing demands for transparency. Industry communication standards such as Hermes, CFX and IPC-2581 (Digital Product Model Exchange) will play an important role in this development. Mycronic is supporting and actively participating in the development of these standards.







**The future is**  
a fully software  
controlled line with  
the highest utilization  
and zero defects.”



**Quality, productivity and flexibility redefined**

Where quality was once considered a final verification step, in the smart factory it is about producing fewer defects in the first place with the help of powerful in-line inspection systems, factory-wide sensors and advances in deep learning algorithms. Productivity, once viewed as machines and people performing at full capacity, is now seeing significant gains thanks to enhanced machine-to-machine, machine-to-human and collaborative robotics interfaces. And flexibility, previously defined in terms of machine capabilities, is now being expanded to include adaptive factory-wide systems with unprecedented levels of visibility.

All of this is becoming possible thanks to intensive collaborative innovation between Mycronic and its customers. “With multiple global R&D and application centers, together with process and integration engineers near our customers worldwide,” says Thomas Stetter, Mycronic, “we’re now able to bring our process expertise closer to the rapid new application developments in a number of key industries. Whether it’s automotive, medical or consumer electronics, we’re constantly learning and adapting to their needs.”

**Where can we give you better control?**

This brings us back to our original scenario and the question faced by every electronics manufacturer today: Can your factory handle the challenges that the future might bring? A future that demands zero defects and higher line utilization, even in the face of fast-changing product mixes, complex design for manufacturing collaborations and constantly smarter data management?

“At Mycronic, we believe the answer is ‘of course you can,’” continues Thomas. “According to our product roadmap, at least, we’re moving quickly to a production that’s more predictive, more adaptive to dynamic changes and far more data-driven. Because our customers work with innovative products, it’s our responsibility to give them innovative production solutions, together with deeper, more useful insights into their processes.”

“What this looks like on the factory floor will vary enormously depending on the customer’s business strategy, supply chain, cost structure, and so on,” he concludes. “What we aim to do is bring the system-wide perspective, the process expertise and the right technologies. Then it’s just a question of looking together at potential performance gaps to ask: Where can we give you better control?”



.....●●●●●●●●●● **Meet the new MYPro Line™**

The future just got smarter. With the MYPro Line, you can jet print perfect solder joints at the highest speeds. Ensure non-stop production with intelligent storage and proactive replenishment. And eliminate defects with 3D inspection systems that monitor and improve your process over time. It’s the best of Mycronic in a single integrated manufacturing solution. Now with more intuitive process controls, Hermes support and new dashboard and analysis software to simplify production scheduling and improve line efficiency. All to put the future back where it belongs: in your control.





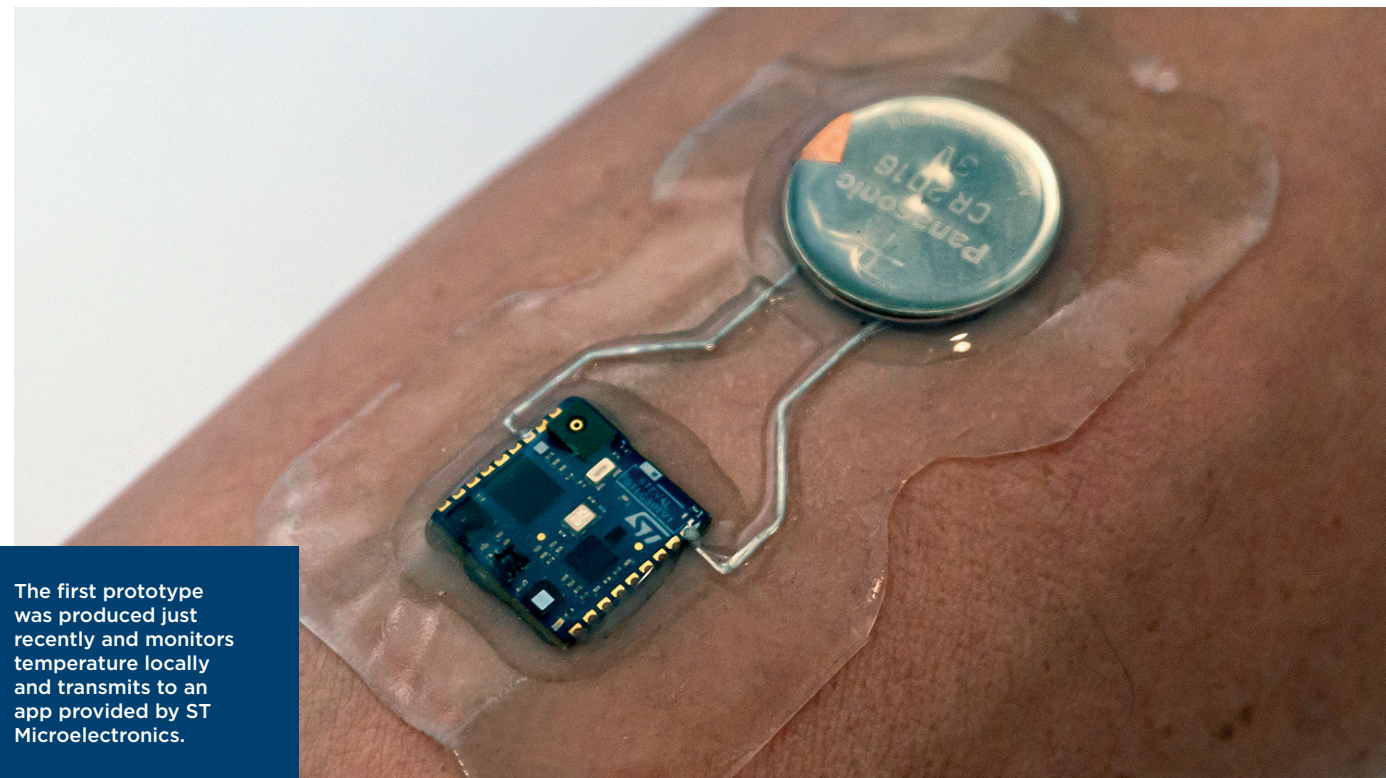
# Stretching the limits of wearable electronics

TEXT: DAVID GRAY PHOTO: SINTEC

Deep in the snow-capped mountains of Sweden, the national cross-country ski team will soon not only be pushing their limits in the tracks, but testing stretchable electronic sensors to monitor heart rate, stress, glucose levels and more. Unlike standard wearable devices that tend to be bulkier, stiffer and create friction, the new multi-sensors stick like hair-thin tape (100 microns) to the skin, are ultra-light and stretch to fit the contours of a finger, arm or leg.

“IF ALL GOES WELL, this next generation of wearable electronics can be used not only for sports but healthcare and other applications,” says **Gustaf Mårtensson**, an expert in complex fluids at Mycronic, one of eight companies in the EU-financed SINTEC project.

“For me personally it feels like a gift not only to be enabling the future of electronics but improving the health prospects for millions of Europeans – and even creating jobs for a whole new industry. All of us on the SINTEC team are really fired up about making it happen.”



The first prototype was produced just recently and monitors temperature locally and transmits to an app provided by ST Microelectronics.

## Next-generation wearables

According to Mårtensson, the growing interest in advanced physiological monitoring is being driven by a global trend towards wireless-enabled wearable devices. “Most people know how a smart-watch, for example, allows you to measure steps walked, heart rate, quality of sleep and other metrics. Now we are taking this to a whole new level in terms of lightness, accuracy, comfort and the possibility to capture hidden data by being in direct contact with the body.”

## Robust, stretchable and sustainable

“Imagine applying a tape-thin sensor to an elderly patient that hugs their body and moves with them, monitoring their heart and other functions,” Mårtensson says. “The big challenge is making it robust enough to stretch and twist, while containing ultra-thin, interconnecting circuitry on multiple levels. Another challenge is utilizing sustainable, non-toxic materials, such as Galinstan, a metal alloy for liquid circuitry, that stays liquid down to  $-19^{\circ}\text{C}$  ( $-2^{\circ}\text{F}$ ).”

## Goal: develop a working production line

As a high-tech company with fully integrated PCB manufacturing technology, Mycronic was asked to help develop this hybrid stretch PCB technology. The goal of the four-year project, which ends in 2023, is to find a commercial solution for the actual production of stretchable electronics, including achieving a higher degree of maturity in several technical challenges. For Mycronic, this means implementing a working production line using the products and technologies in its product portfolio, including conformal coating, dispensing, pick-and-place, and inspection. “Now, it’s full speed ahead!” says Mårtensson.

→ The project envisions the development of thin, stretchable substrates with embedded electronics and or printed components.

## Eight partners in the SINTEC project

The European Horizon 2020 research project SINTEC (Soft Epidermal Communication Platform) includes the following partners:

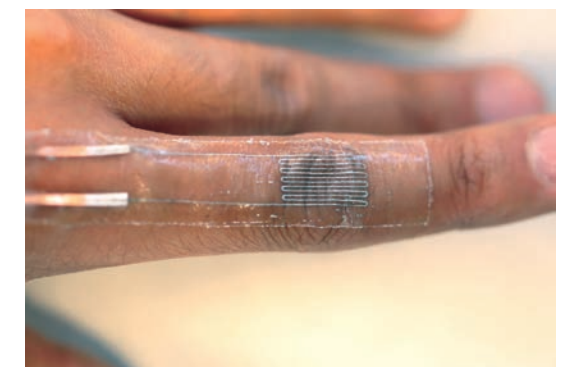
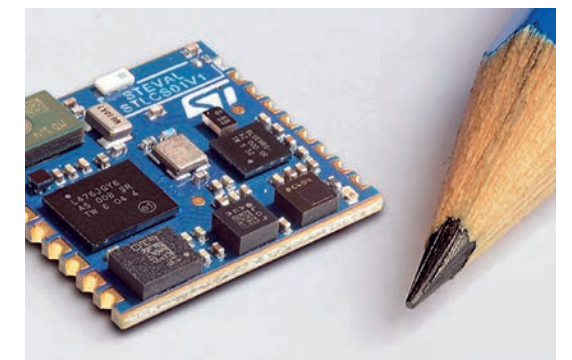
### Academic Partners

- Engineering Sciences at Uppsala University (Sweden)
- Swedish National Winter Sports Center at Mid Sweden University (Sweden)
- LINKS at Polytechnic of Turin (Italy)

### Company Partners

- Mycronic AB (Sweden)
- ST Microelectronics (French-Italian)
- Warrant Hub (Italy)
- Evalan (The Netherlands)
- MySphera (Spain)

This project has received funding from the European Union’s Horizon 2020 research and innovation program under grant agreement no. 824984. [www.sintec-project.eu](http://www.sintec-project.eu).

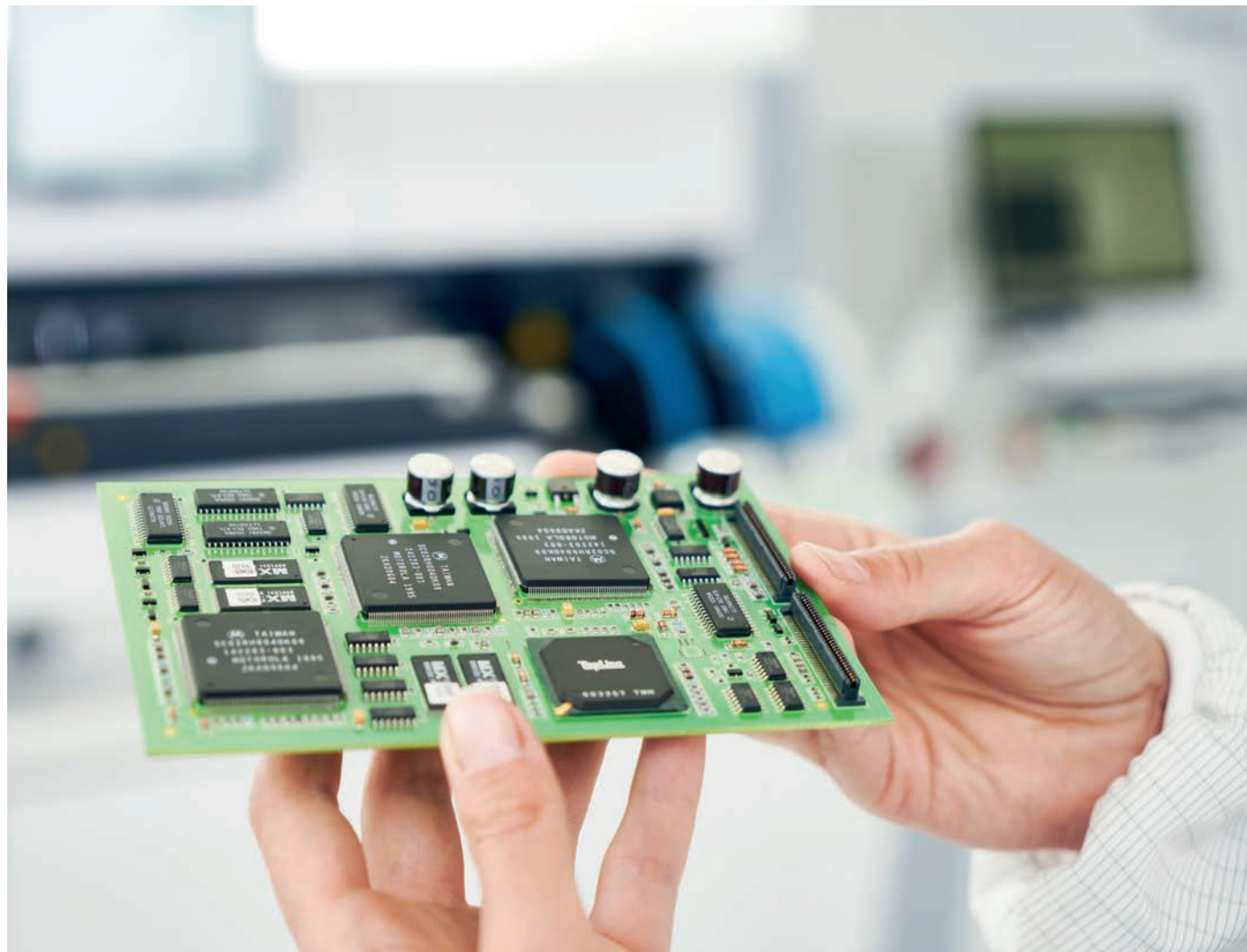




# Closing the loop in solder joint quality – eliminating stencil-related defects with Mycronic’s latest closed-loop solution

TEXT: GRANT BALDRIDGE PHOTO: MAGNUS ELGQVIST

**Integrated inspection solutions continue to pay off for customers, even at the highest production volumes. With Mycronic’s latest innovation, it’s now possible to automatically eliminate stencil printing compromises at any production volume with simpler stencils, perfect jet-printed solder joints and the highest possible yields.**



## Tackling defects at their source

For manufacturers running high-volume production lines, stencil-related defects are a constant challenge. In fact, this is where 61% of all SMT defects originate, according to a Vi TECHNOLOGY survey. As a consequence, more and more producers depend on a combination of stepped stencils, time-consuming solder repairs and advanced solder paste inspection systems.

## Automation meets precision

The MY700 3D SPI add-on and repair solution resolves these issues with a single, software-driven modular solution. It combines a PI series 3D SPI system in-line with a MY700 Jet Printer to automate solder paste inspection, add-on and repair at the highest throughput speeds. Added in-line after a stencil printer, the solution makes it possible to simplify stencil designs, eliminate stepped stencils and increase overall yield at high speeds by leaving the most difficult deposits to the fully software-controlled jet printing and inspection system. It can be used to repair missing solder paste from the stencil printing process, add solder paste in difficult areas on the board or automatically add solder paste with high precision to existing print patterns to achieve the perfect volume for specific pads.

## The power of intelligent SPI

In 2017, Mycronic acquired France-based Vi TECHNOLOGY, whose solutions were already used by leading global manufacturers of aerospace, automotive and consumer electronics. Part of an effort to offer customers the world’s most sophisticated closed-loop inspection systems, Vi TECHNOLOGY’s inspection solutions complemented the Mycronic portfolio with a uniquely integrated, accurate and scalable architecture.

Now, the company’s K series 3D AOI, PI series 3D SPI and SIGMA Link process improvement software suite are being integrated with Mycronic’s SMT solutions to bring more automated capabilities and higher quality process controls than ever before.

The PI Series 3D SPI is not only the world’s first auto-programmed SPI unit. It is also capable of capturing extremely precise paste volume measurements on the smallest pads, combining a patented Z-referencing technology and an ultra-large 50 x 350 mm 3D field of view. Together with the unprecedented speed and solder paste volume control of the MY700, it offers unmatched control of first pass yield.

→ Mycronic’s Jet Printing and 3D SPI add-on solution.



Interview with new Mycronic CEO Anders Lindqvist

# Innovation is our rocket fuel

TEXT: DAVID GRAY PHOTO: MAGNUS ELGQVIST

**A true internationalist with a global track record of growing technology-based companies, Anders Lindqvist, new CEO of Mycronic, says the company will continue to invest heavily in R&D, grow organically, acquire new companies where it makes sense and stay close to its customers to add big value.**

**ANDERS LINDQVIST KNOWS** his way around a factory. With more than 20 years of experience in international positions at Atlas Copco and most recently as CEO of Piab, a global leader in automation and materials handling, he's seen, first-hand, the challenges facing companies as they struggle to achieve digital transformation, automate, embrace Industry 4.0 and more.

## Diverse global experience

A Swedish engineer by training with an MBA in marketing from University of California, he and his family have done tours in places like Shanghai (five years), Belgium (seven years), and France (two years). This diversity of international experience is a perfect fit for Mycronic, where 99% of all customers are located in electronics hubs outside Sweden.

"I'm not the guy asking for Swedish meatballs," Lindqvist says with a laugh. "For me, it's not just about work; I really enjoy experiencing other cultures - the people, food and traditions. I feel totally at home anywhere. When in China, I even brought local food home to Sweden."

## Family man and world citizen

Married for more than 20 years, with two children in their early twenties (boy and girl), the Lindqvists have spent most of their life abroad. "My kids speak several different languages and my son is pretty fluent in Mandarin," he says.

## Many countries, one global industry

While cultures may differ, he notes, the fundamental needs and purchasing criteria of the electronics industry are strikingly similar across borders. "It doesn't matter who you talk to, they all want to boost their productivity with faster, safer and more efficient systems. New technology can make a big difference, but you need to see the bigger picture of where the market is moving. I believe this is where Mycronic can really support our customers, helping them to invest wisely, handle current and future challenges and be even more successful."

## Building on a strong foundation

So what attracted him to Mycronic, and what does he plan to change? "You know, I've admired Mycronic from a distance for many years. The electronics sector is a very cool, fast-moving and visible industry that I find personally very exciting: New smartphones, self-driving cars, OLED flat-screen TVs, space ships. It's all happening now and changing at lightning speed. Mycronic is doing a good job and will continue to improve - always nimbler and more customer-centric than ever."

## Innovation is more than R&D

"For me, innovation is about being brave and encouraging people to dare to try new ideas or methods - everything from logistics and sales to manufacturing. Innovation covers a wide range of actions and processes that could result in significant change - for us and our customers. This might involve adopting creative financing plans, a machine refurbishing program or more.

As an example, he cites how Mycronic virtually pioneered a whole new level of precision and speed for pattern generators used in the display market, single-handedly invented solder paste jet printing, Agilis feeder technology for faster pick-and-place changeovers and more. "These are all examples of organic growth," he says. "They show how we listened to the market and then harnessed our R&D capabilities to meet a huge customer need."

Innovation is about being brave and encouraging people to try new ideas or methods.





### Open for strategic acquisitions

“But we should not rule out acquisitions as a means of building out our product portfolio. For example, we recently made a strategic acquisition of Automation Engineering Inc., a high-tech developer of camera technology, because we see a huge need in the emerging autonomous vehicle market. And we bought a company called MRSI specializing in ultra-high precision die bonding systems. The addition of Vi TECHNOLOGY also expands our coverage of the entire electronics assembly line, which is something we’ll continue to focus on.”

### The ski coach for kids

Asked about his management style, the low-key and thoughtful Swede pauses for a moment, gazing out the window of his spotless corner office in Stockholm. “Growing up, I worked as a professional ski instructor for children. The pay was terrible, the hours bad, but seeing people having fun, developing and achieving remarkable things really motivated me.”

“You might think that leading a group of kids in ski jackets sounds adorable, but it comes with plenty of challenges. You need to make sure they’re feeling comfortable, enjoying it and overcoming their fears to achieve their goals. And you’d be surprised. Once they move a little outside their comfort zones, amazing things start to happen.”

### Delegating with responsibility

Today, he carries with him that same coaching mindset and is no micro-manager. Not surprisingly, he warmly embraces a decentralized, entrepreneurial management style, an approach he learned and used successfully at Atlas Copco. This involves delegating authority, but with responsibility. “The best decisions are taken as close to the customer as possible. When you push decision-making out to the local markets, it allows for better speed, responsiveness, efficiency and uses people’s intelligence in better ways.”

### Setting clear targets

“It’s my job to set the framework, rules and targets, but how these are achieved is very much up to the manager in charge. They can use their own creativity and entrepreneurial skills to find the best way. But they can also expect to be held accountable.”

### Staying top of mind

“My goal is for Mycronic to always be top of mind with our customers when it comes to helping and supporting them to be successful. I will continue to expand our global footprint, bringing our expertise out closer to the market. We already have a great team in place, an ever-improving product portfolio and we will only continue to get better and better. I look forward to an exciting journey ahead.”



# The future is the same Mycronic flexibility with twice the throughput.”

The best decisions are taken as close to the customer as possible.



### .....●●●●●●●●●● Introducing the MY300HX and MY300EX pick-and-place machines

The industry’s most flexible pick-and-place solution just got faster. With the compact MY300HX and MY300EX machines, you can build lines with the same high utilization Mycronic is known for and achieve speeds up to 100,000 components per hour. Thanks to comprehensive hardware and software upgrades, now you can expand your business to higher volumes while reducing changeover costs to a bare minimum. The result is a versatile, balanced solution that boosts your bottom line and puts the future back where it belongs: in your control.

**MYCRONIC**  
When passion meets innovation ●

# More volume, less manpower

– how the new MY300 Trilogy line boosts throughput with fewer shifts

TEXT: GRANT BALDRIDGE PHOTO: MAGNUS ELGQVIST

**Has your production expanded to higher volumes? Do you still need the flexibility and quick changeovers to handle half a dozen different products a day? And are your line operators paying the price for these conflicting demands? With the MY300HX and MY300EX, the newest MYPro series pick-and-place machines make it possible to build lines that maintain the highest utilization levels at speeds up to 100,000 components per hour.**



The new MY300 Trilogy mid-volume line has been received as welcome news among electronic manufacturers.

**FIRST LAUNCHED IN 2017**, the MY300 pick-and-place machines were introduced to ensure a fully automated material flow for all next-generation boards and components. Thanks to a comprehensive redesign, they also reduce the machine footprint of the previous MY200 by 50 percent.

#### Double the top speeds

Now, the new MY300HX and MY300EX are continuing this design evolution with an even further reduced footprint that introduces entirely new configuration possibilities. The fastest of these, known as the Trilogy line, guarantees the same flexibility as Mycronic's high-capacity DX Synergy line, but with up to twice the throughput.

A MYPlan 5.0 software upgrade applies new optimization algorithms to balance the line's two MY300HX high-speed placers with one MY300EX fine-pitch and odd-shape placer. But the secret is not only in the software.

#### A well-balanced pick-and-place trio

By distributing four Hydra heads and two high-precision Midas heads over three frames, the Trilogy line benefits from higher mount head utilization and a more balanced

and cost-effective platform. Because the Midas head occupies the optimal position on the MY300EX's X-wagon, the machine is up to two times faster than a MY300DX when it comes to high-precision mounting. The MY300HX machines, meanwhile, have a shorter Z-stroke, leading to shorter cycle times and an added boost to top throughput speeds.

#### The fastest way to stay flexible

The new MY300 Trilogy mid-volume line has been received as welcome news among electronic manufacturers who demand the future-proof automation and technical capabilities of an integrated Mycronic system by eliminating the need for a separate, dedicated high-speed line. When the first beta customers shifted over to full-time production using the platform, they experienced solid evidence of success.

Among these early adopters is Allelektronik, a Sweden-based manufacturer of electronics for air conditioning, climate controls and other facility automation systems. A long-time Mycronic customer, Allelektronik had been experiencing rising demand for higher production volumes, but lacked both the extra manpower and floorspace to expand throughput.



### Shifting the balance from three to one

As a result, staffing issues had become unsustainable. Running a single DX Synergy line on two shifts, line operators would work two six-hour shifts a day and still struggled to meet demand for new orders. Eventually, Owner and Production Manager Mats Landström was faced with a crucial decision: add a third shift or invest in an additional high-volume line.

“Fortunately, the Trilogy line came just in time for us,” explains Landström. “We’ve gone from average production speeds of about 25,000 to 40,000 components per hour. Of course, the actual speed varies a lot from board to board and the type of components, but still it’s been a solid boost to our volumes. The production is more stable, the machines are more robust, and we’ve gone from considering adding a third shift to deciding if we can reduce it to just one. So things are definitely going in the right direction for us.”

### Building the future of high-speed flexibility

Better yet, the new Trilogy line promises a strong return on investment for mid-volume producers with a demanding mix of products, boards and components. It includes three machines in a single, compact line at a price comparable to non-flexible lines with the same speed rating, and is available in multiple customized configurations. “The MY300HX and MY300EX are key to our MYPro Line design strategy, which distribute the most advanced capabilities across the most flexible modular technology platforms,” explains Clemens Jargon, VP SMT at Mycronic. “As part of an integrated end-to-end SMT solution, it’s really the only platform that gives you total automated control from mid-volume down to smaller batches.”

We’ve gone from considering adding a third shift to deciding if we can reduce it to just one.

**MATS LANDSTRÖM**  
OWNER & PRODUCTION MANAGER, ALLELEKTRONIK

→ MY300 Trilogy mid-volume line is a well-balanced pick-and-place trio.



# Beating the best with Artificial Intelligence

From millions of data sets to a single click – what’s next for deep learning in SMT?

TEXT: DAVID GRAY PHOTO: SHUTTERSTOCK

**The ability of manufacturing systems to predict and adapt to unforeseen situations, often referred to as Artificial intelligence (AI), promises to revolutionize the electronics assembly market. In a period of just five to ten years, deep learning researchers at Mycronic predict a highly automated SMT environment approaching zero defects with little to no human intervention.**



No human doing rule-based programming can achieve this.

This is not science fiction  
– we’re well on our way right now.

ROMAIN ROUX  
PHD DEEP LEARNING ENGINEER

**“THIS IS NOT SCIENCE FICTION – WE’RE WELL ON OUR WAY RIGHT NOW,”** says Romain Roux, a PhD deep learning engineer at Mycronic’s Center for Deep Learning in Electronics Manufacturing (CDLe) in San Jose, California. The center is currently conducting research into deep learning and AI applications for electronics manufacturing.

## Reinforcement Learning – the secret sauce

To illustrate the speed of development in AI, Roux recalls how already in 2017 Google’s DeepMind AlphaGo AI defeated the world’s number-one Go player. Regarded as far more complex than chess or poker, Go is an abstract strategy board game for two players involving black and white stone pieces in which the aim is to surround more territory than the opponent. “The milestone victory by AI was enabled by something called ‘reinforcement learning’ – meaning the use of autonomous new observations and decision-making based on studying previous patterns and playing thousands of games against itself,” says Roux. “At the time, everyone thought this achievement would have taken at least another 20 years!”

## From basic Chess to highly complex Go

According to Roux, it is this new level of deep learning and computing power that opens up huge new potential. Returning to the example of Go versus Chess, he notes how an average Go game has 200 moves versus 37 in chess. “When IBM’s Deep Blue chess-playing computer beat leading chess champions 20 years ago, it could process fewer move possibilities in this closed-loop game.” By contrast, Go involves up to 320 billion possible combinations or more. “Clearly no human doing rule-based programming can handle this. It was AlphaGo’s neural networks that allowed it to creatively sort through millions of data points to develop new strategies and recognize new patterns.”

## Vision: the intelligent Mycronic 4.0 factory

Intent on accelerating the development of deep learning and AI for the benefit of its customers, Mycronic expects to incorporate it into our product development roadmaps in 2020. “Our focus is on the Mycronic 4.0 intelligent factory, which relies on factory-wide information flows – horizontal, vertical and into the cloud,” he says. “Our ambition is the zero-defect line, and we are already gathering data in collaboration with PCB manufacturers at multiple sites.”



### Challenge: achieving repeatable accuracy

According to Romain, in addition to gathering large data sets and image libraries, a key hurdle is achieving repeatable and accurate recognition of a component's geometry. This will mean improving automated optical inspection systems (AOI) to ensure the stability and accuracy of the definition of new components, even in dynamic production environments where designs, assembly fluids and packaging change rapidly. For Mycronic, this has required building up a large library of tens of thousands of 3D images, including data on complex geometries, that can be quickly recognized using algorithmic assistance. "This is a good start" he says. "We will need ten times or even a hundred times more data so that our deep neural network can generalize to all types of components and all types of boards. This amount of data is quite usual for deep learning applications".

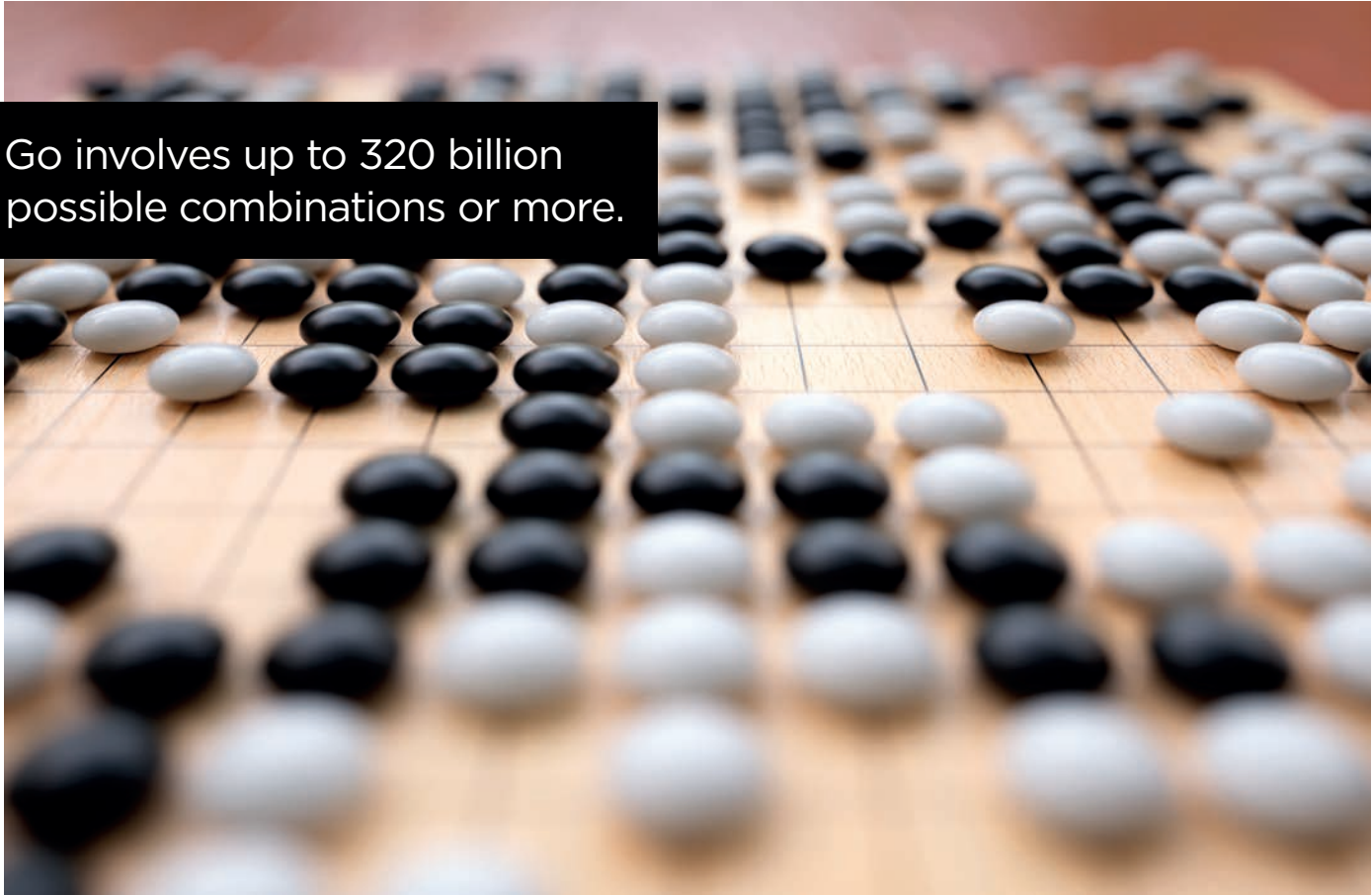
He explains that machine learning - which is necessary for a range of auto-programming, closed-loop and predictive systems for Mycronic equipment today - involves parsing structured data to train machine learning algorithms according to defined criteria. Going a step further, deep learning, a subfield of machine learning and AI, structures the algorithms in layers to create an artificial neural network that can create and simulate new situations in order to improve its decision-making without relying on rule-based programming.

### The emergence of Digital Twins

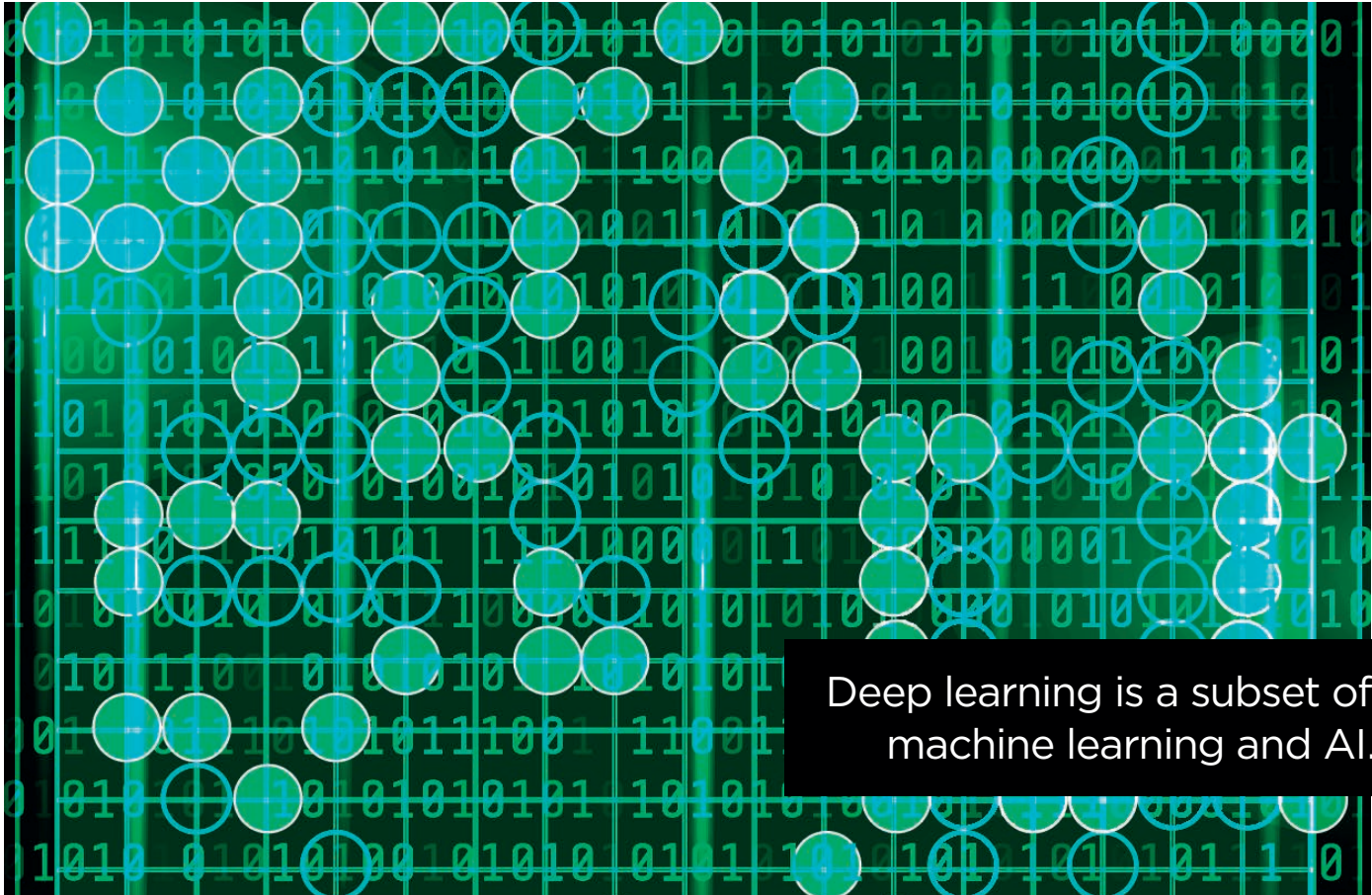
Today, deep learning scientists are building virtual replicas of physical factories and combining this with AI and analytics to simulate operations in real time. Often referred to as Digital Twins, this new approach allows for the analysis of data and systems (in the virtual model) to head off problems before they occur in the physical factory. According to Roux, this will enable predictive maintenance, zero-defect manufacturing and creative solutions to product designs in simulated environments. He estimates that the widespread use of Digital Twins in the SMT industry may be ten years down the road. It will also depend on another key breakthrough: synchronized data correlation of all systems in the different machines - something that is not possible today.

### Taking steps in the right direction

Mycronic has already developed SIGMA Link, an advanced software suite that gives better control and actionable insights into product quality and process automation. It offers data correlation between SPI and AOIs from the same line, and from several lines, without the need for a Manufacturing Execution System. The system continues to improve with the help of larger sets of quality training data. "The addition of deep learning functionality will take the benefits of this system to a whole new level in the years ahead."



Go involves up to 320 billion possible combinations or more.



Deep learning is a subset of machine learning and AI.





The future is the speed of stencils with the quality of jet printing.”

# How to achieve zero stencil defects

TEXT: GRANT BALDRIDGE PHOTO: MAGNUS ELGQVIST

Through Mycronic’s fully integrated 3D solder paste inspection and jet printing solution, you can automatically eliminate your stencil defects.

### No worries, no compromises

Every manufacturer with stencil printers faces a number of difficult trade-offs: between continuity and quality, small and large components, and thin and thick stencils. All too often, this results in a wide SPI threshold for solder paste volume in order to avoid false calls and keep production flowing.

### Bigger production volumes, bigger opportunities

This level of control represents a huge opportunity for high-volume manufacturers, where an FPY improvement of even a fraction of a percent can have a major impact on profitability, quality and delivery times. “The ability to simplify stencil designs and automatically correct any difficult deposits at high speeds is really an industry first,” says Tomas Stetter, Sr. VP Assembly Solutions.

These challenges are especially acute for manufacturers of automotive and power electronics, whose PCBs might contain 80 percent chip components, together with an array of large, high-voltage components, or vice versa. The MY700 3D SPI add-on solution eliminates the need to compromise stencil thickness by automatically applying the deposits wherever they’re needed most.

“Wherever stencils are involved, our solution can increase total yield, first pass yield and overall line utilization both immediately, and over time. When it comes to taking the next step towards Industry 4.0, there’s really no simpler, more trouble-free way to improve the quality of the solder paste application process in these extremely demanding environments.”

As Viktor Olsson, Product Manager Jet Printing, explains, “with closed-loop horizontal communication between the screen printer, SPI and Jet Printer, you get the automatic precision you need for whichever stencil thickness you choose. If it’s a 75-micron stencil, it can jet more volume on top to compensate for the larger components. If it’s 200 microns, it jets all the small dots you need. And for any other issues, it automatically inspects and repairs individual deposits with the industry’s highest precision.”



### Discover the MY700 3D SPI add-on solution

The future of high-volume jetting applications is here. The MY700 3D SPI add-on solution is a fully integrated 3D solder paste inspection and jet printing module that eliminates stencil printing compromises at any production volume. Let the 3D SPI scan and identify missing or damaged solder paste print, and the MY700 automatically fills them in with perfect placement and volume control. All so you can keep the highest throughput speeds, simplify your stencil designs and put the future back where it belongs: in your control.

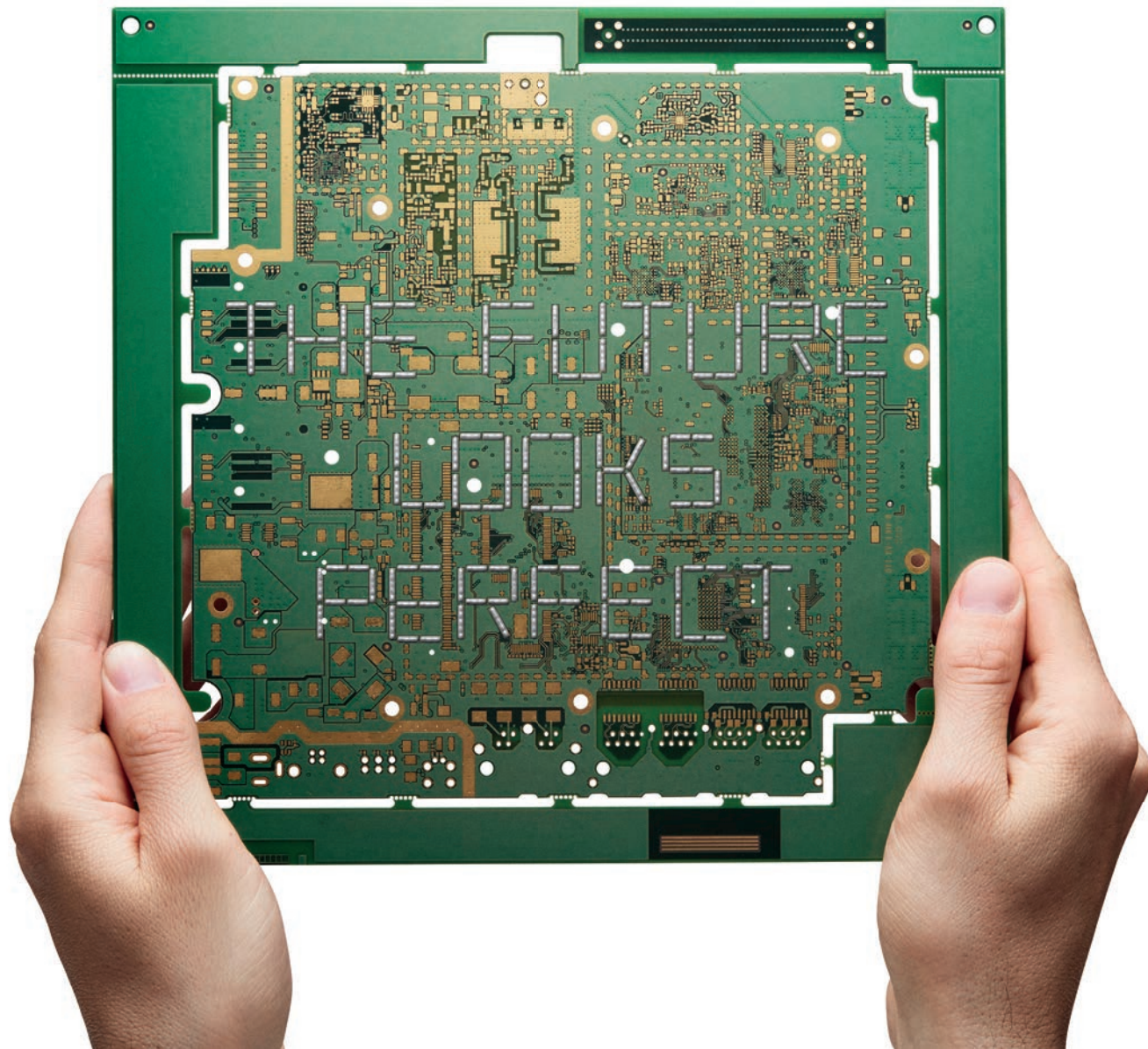


→ Mycronic’s 3D SPI and Jet Printing repair solution.



# Dreaming of a zero-defect future? We help you get there.

In tomorrow's intelligent factory, product quality is fully within your control. With Vi TECHNOLOGY's fleet of state-of-the-art inspection solutions, the actionable information you need to boost yield, quality and repeatability is never more than a few clicks away. Thanks to a combination of high-precision metrology and powerful process management tools, you can predict and prevent more defects, and get paid for more boards at the end of every day.



## New holder unit for jet printing

**A NEW HOLDER UNIT** for jet printing is now available with two new features:

- A raised motor, adding more clearance between the cassette and the board, enabling more applications when jet printing on already populated boards.
- A new level sensor for detecting when the jet printing media runs low. The level sensor is only compatible with the new holder unit. //

## New functionality in JPSys 3.9

**THE LATEST JPSYS 3.9 JET PRINTING SOFTWARE** includes several improvements that increase usability and productivity for the MY700 Jet Printer. The main highlights of this release are:

**AI2 Active Inspection Interface, repair loop.** External information from solder paste inspection (SPI) machines can be used to repair absent or insufficient solder paste on a PCB. Compatible with Vi TECHNOLOGY's PI series.

**E-mapping, external bad board info.** External information from file or MES server about which PCBs to skip can now be used during production to avoid searching bad board marks.

**E-marking, external fiducial info.** External information from file or MES server about individual location of PCBs in carriers can now be used during production.

**Easy programming of Vi TECHNOLOGY's PI 3D SPI system with JSON files.** Transfer tool and the JSON format are updated to support easier programming of Vi TECHNOLOGY solder inspection machines through SIGMA Import software module. Exporting old programs may require SPI acceptance levels to be modified manually.

JPSys 3.9 is a free software upgrade for all MY700 customers. //

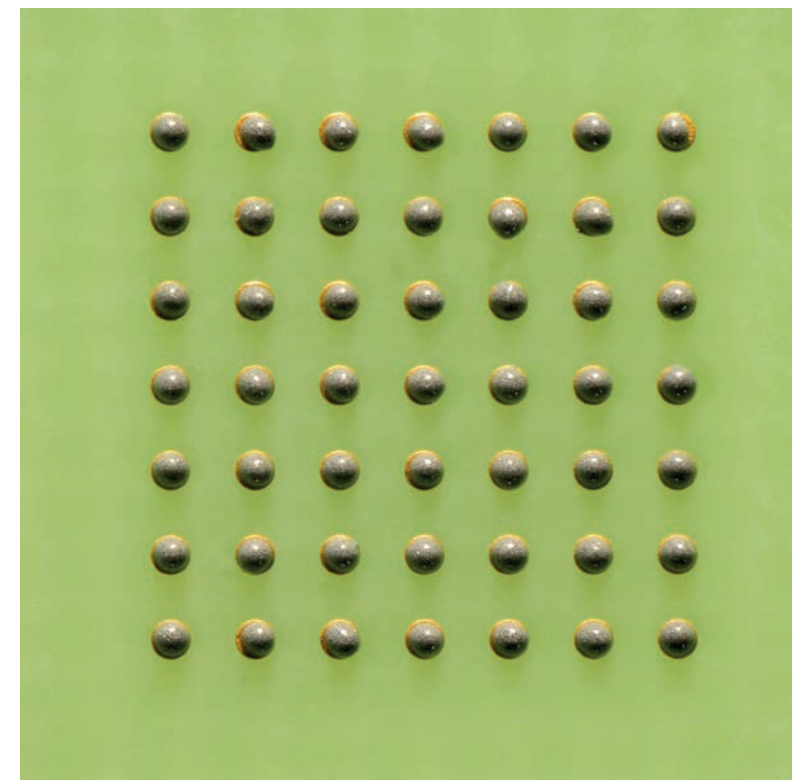


PHOTO: MAGNUS ELGOVIST

## New small dot ejector for fine pitch applications

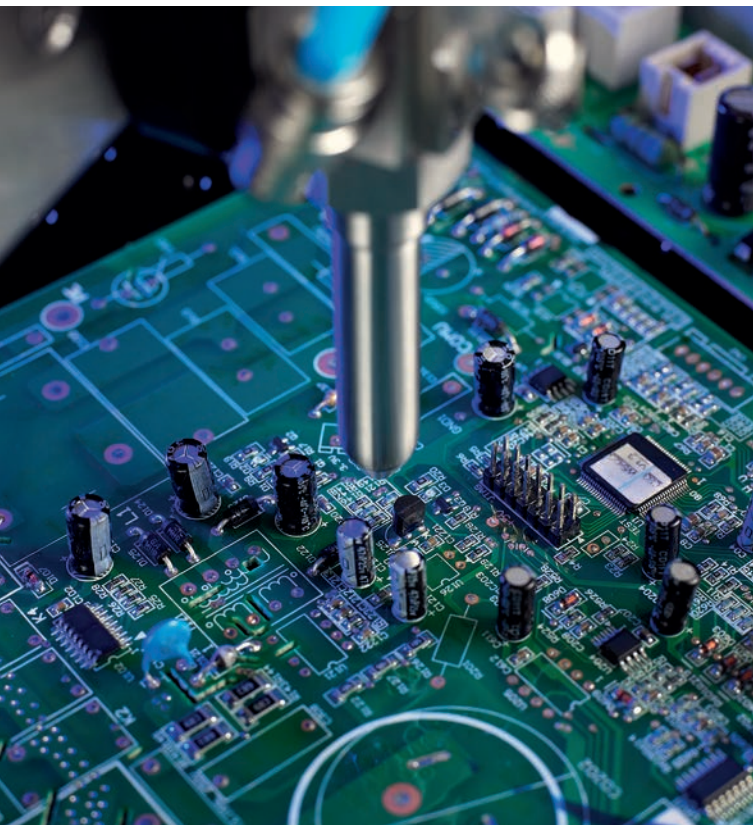
**THE NEW FINE PITCH EJECTOR AR** is the latest addition to Mycronic's ejector portfolio for solder paste. The ejector is designed for type 6 paste and targets dot sizes between 210µm and 270µm with volumes between 1.8nl and 2.9nl.

The ejector is released in two versions:

- AR01 for Senju Type 6 LFAC60
- AR02 for Tamura Type 6 JDS204G-MJ21-HF

One of the standard requirements of type 6 paste is the use of a nitrogen reflow oven, and the maximum allowed level of oxygen is 1,000ppm. //





## Revamped MYC50 - fastest growing MYSmart coating product

**IN KEEPING PACE** with industry demands, the MYC50 has rapidly evolved to meet and exceed requirements through both hardware and software innovation:

**New software layout:** single screen format, with intuitive interface and visual reference to customer parts.

**New precise spray valve:** slim nozzle design for superb edge definition and highest throughput.

**Nozzle calibration unit:** enables precise calibration for valves installed on a system regardless of needles and/or nozzle configuration resulting in more precise coating.

**Flow monitoring system:** increase yield through stricter process controls and maintaining precise output repeatability.

**Multiple valve configuration:** highest flexibility to meet the most demanding applications with 3- and 4-valve configurations on single system: film, needle, spray, gel, 2-part and others.

**Offline programming:** keep your line running while you program your next batch offline.

The MYC50 is the standard for conformal coating and 2-part material dispense. //

PHOTO: AXSON

## Introducing the new MYS Plasma systems

**THE NEW MYS PLASMA SYSTEMS** offer all the benefits of traditional vacuum plasma systems at atmospheric pressure:

**Higher throughput:** 50 times faster cleaning speeds for 200 mm wafers when compared with traditional vacuum plasma systems.

**Cleaner than vacuum plasma:** 200 times cleaner than traditional vacuum plasma when measuring post plasma particles on wafers.

**Higher yields:** real time feedback and active RF tuning maintain a consistent, uniform plasma beam resulting in uniform plasma treatment of all surfaces exposed to the beam.

**Safe and effective:** plasma free of sparks, streamers, particles, UV and heat, making it safe to touch and safe for sensitive electronics.

**Single part traceability:** know the exact plasma settings for each part processed over time.

All MYS systems can be equipped with loaders and unloaders to create a production island. //

## New functionality in TPSys/MYCenter 5.0

**THE LATEST PICK-AND-PLACE SOFTWARE** release includes several powerful improvements that help improve uptime and quality:

**Barcode scanner with display:** MYCenter 5 supports the Datalogic Memori barcode scanner with built-in touchscreen. The scanner's on-board display shows the same loading guidance as MYCenter's main screen, but in a more compact format.

**Owner-based kitting** is helpful when collecting and loading material dedicated for specific projects or customers. Each carrier can have a user-defined owner, and each kit can be limited to using material from one or several approved owners only.

**Assisted mounting** is a function that allows an operator to assist if centering problems occur during mounting. Instead of letting the machine reject the component, the operator can center the component manually and then resume mounting.

All MY100, MY200 and MY300 users can upgrade to version 5.0. //

## New hardware and software platform for K series 3D AOI

**THE K SERIES 3D AOI** is undergoing profound transformations. This new generation of K series 3D AOI will feature both a new external design and breakthrough software features improving programming time:

- New visual identity, more modern and more integrated with Mycronic MYPro Line range of equipment.
- Brand-new generation of AOI programming software that is 2 times faster and built on new algorithms based on deep learning technology to enable fully automated programming thanks to autonomous component recognition and model creation.
- Up to 50% faster cycle time thanks to high-speed red laser 3D scanning head and new smart scene analysis algorithm.
- Extension of test coverage with detection of foreign materials (down to 100µm in size), and inspection of odd-shaped exotic components, like custom connectors, thanks to a fully configurable 3D metrology tool.



PHOTO: MRSI

## MRSI-H/HVM series die bonders improve accuracy

**THE NEW ONE-STOP-SHOP** die bonders MRSI-H/HVM improve accuracy to 1.5 micrometers and provide superior flexibility for true multi-die, multi-process and multi-product manufacturing environments.

With the improved accuracy, our customers now have the option to design advanced products with higher density in miniature packages.

These systems deliver industry-leading productivity - whether you are in prototype mode or scaling to high-volume production - without sacrificing flexibility, precision or reliability. This is critical to help customers enable high productivity, just-in-time supply, and fast-paced innovations of critical photonic components for high-growth market segments such as hyper-scale data centers, 5G wireless, LiDAR, VR/AR, and other photonic sensors. //



More uptime.  
Better quality.  
Smarter data.  
**It's all in your control.**

If you could boost your factory's productivity tomorrow, what would be first on your wish list? Higher first pass yield? End-to-end line integration? Automated job planning with zero downtime? Our comprehensive SMT solutions and expertise can help you get there. From solder paste jet printing and pick-and-place to 3D inspection, material handling and coating systems, we've got you covered from the first batch to the final touch. All so you can produce more boards with less work - every day and put the future back in your control.

