

# Results Today

The global customer magazine

N°12

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### PRESIDENT'S EDITORIAL

## Your success enabler: today, tomorrow and beyond



Dear readers,

Welcome to the first edition of our redesigned *Results Today*. As you will experience as you explore these pages, the new *Results Today* reflects the dynamism of manufacturing today and the dynamism of GF Machining Solutions.

Today, as never before, GF Machining Solutions is your go-to partner for complete solutions—machine tools, Automation, robots, software and full life cycle services to solve your most pressing challenges. Clearly, this approach meets your demands: I am proud to say, for example, that our System 3R Automation business volume has multiplied by four or five times in recent years!

And here is another advantage of having a single partner at your side, providing complete, expert and proven solutions: If you run into a problem, you can give us a call and we take total responsibility. That's why customers worldwide, and across a wide range of fast-growing industrial segments, increasingly turn to GF Machining Solutions for Milling, Spindles, electrical discharge machines (EDM), Laser texturing and micromachining, Automation, software and Customer Services.

Whether you are targeting greater quality, higher productivity, cost reductions, capacity expansion or new levels of accuracy, we have a solution that will both meet your needs and exceed your expectations—today, tomorrow, and beyond.

**Pascal Boillat**  
President, GF Machining Solutions

# In brief



## Symmedia acquisition will advance GF Machining Solutions' digital offering

GF Machining Solutions' 2017 acquisition of Bielefeld, Germany-based machine connectivity specialist Symmedia will accelerate the GF Division's digital transformation and speed up and widen its offering of complete factory connectivity solutions.

Secure machine interconnection is the basis for the development of Industry 4.0. With more than 15,000 machines in various industries worldwide equipped with its software, Symmedia—established 20 years ago—is a key factory digitalization player.

"Envision Your Future" was the theme of GF Machining Solutions' future-oriented presence at EMO Hannover 2017.

## Connecting systems for intelligent production at EMO 2017

Nearly 3,700 visitors representing the global manufacturing industry were inspired by GF Machining Solutions' complete range of connecting systems for intelligent production at EMO Hannover 2017, last September in Hannover, Germany.

With the theme, "Envision Your Future," GF Machining Solutions' 945-square-meter stand focused on current industry trends, including Industry 4.0, energy efficiency and Additive Manufacturing. The stand's series of interactive flows showcased a variety of complete solutions.

## 945-square-meter stand focused on current industry trends



At EMO 2017, visitors also experienced rConnect's Customer Cockpit, the Live Remote Assistance module providing direct access to GF Machining Solutions experts, and the new Messenger app that will give customers instant access—right on their smartphones—to all machine park data.



The Mikron MILL P 500 U debuted at EMO 2017 with System 3R Automation, including a six-axis FANUC robot.



# Save the date

### Shanghai: Die and Mould China (DMC)

GF Machining Solutions' complete solutions for information and communications technology (ICT), electronic components and automotive take center stage June 5-9 at DMC 2018, to be held at the National Exhibition and Convention Center (Hongqiao) in Shanghai, China.

In its 500-square-meter booth at 3H-E108, GF Machining Solutions will showcase six solutions: the Mikron MILL S 500 Graphite with the AgieCharmilles FORM P 350, connected by the WorkPartner 1+ Automation solution; the AgieCharmilles CUT P 350 and FORM S 350; the Mikron MILL P 500 U's debut in China and the MILL P 800 U.

### Chicago: International Manufacturing Technology Show (IMTS)

IMTS 2018 is the place to experience GF Machining Solutions' manufacturing solutions for medtech, aerospace, automotive and packaging, at IMTS 2018 booth 338754, September 10-15, McCormick Place, Chicago (US).

The 743-square-meter booth at IMTS 2018 will feature key machining technologies such as EDM, Milling and advanced manufacturing, including the LASER S series.

### Stuttgart: AMB 2018

GF Machining Solutions' complete technology portfolio will be shown at AMB 2018, the international exhibition for metal working, September 18-22, at the Stuttgart Trade Fair Centre.

Hall 7, stand 7C31 is the location of GF Machining Solutions' 500-square-meter booth at AMB 2018.

### Tokyo: Japan International Machine Tool Fair (JIMTOF)

Advanced manufacturing and Industry 4.0 come together as the focus of GF Machining Solutions' presence at JIMTOF 2018, November 1-6 at the Tokyo International Exhibition Center (Tokyo Big Sight).

In its 189-square-meter booth, GF Machining Solutions will show four machines: the HSM 200 U LP, the CUT 2000 X with ASM installed, the LASER S 600 (celebrating its debut in Asia after the global launch) and the Microlution ML-5.

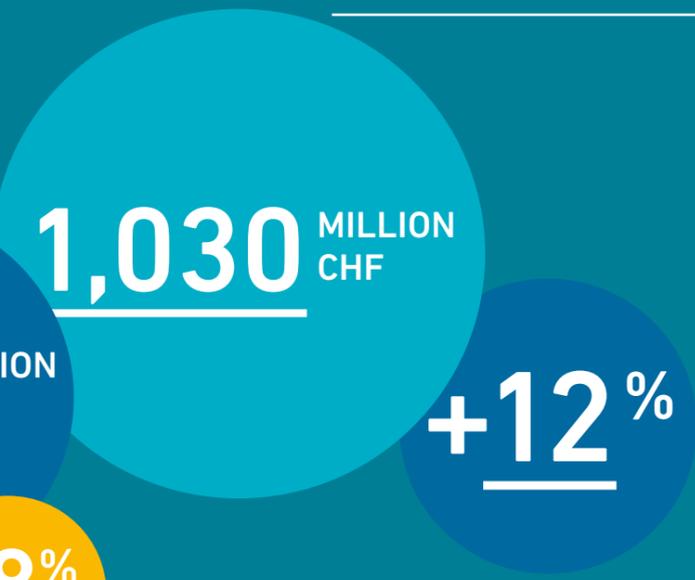
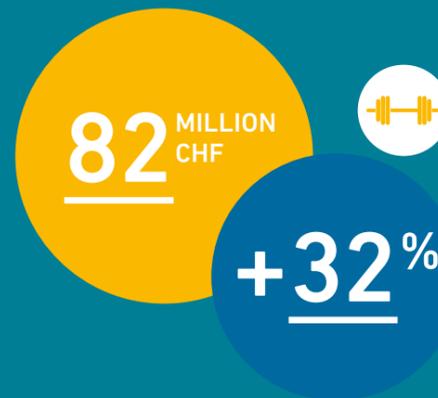


# Annual results

### New location for South China sales company

GF Machining Solutions' South China sales organization in late June 2018 will move to its new, modern location in Dongguan's CIMC near Songshan Lake.

The three-story, 1,265-square-meter facility is aligned with GF Machining Solutions' role as an innovation leader and situates the South China sales organization closer to customers for even quicker responses. The new site is at the center of Dongguan City, along the Guangzhou-Shenzhen-Hong Kong Economic Corridor and next to Chang'an Town.



**GF Machining Solutions key figures 2017**  
GF Machining Solutions had a successful run in 2017, increasing its order intake by more than 12 percent to CHF 1,030 million and generating sales of CHF 992 million, an increase of 8 percent. The main growth drivers were the aerospace and ICT (information and communications technology) sectors, particularly in China, but also across Europe. Moreover, a rising demand for Automation and recently launched new products supported higher sales and margins in the second half. The Division significantly increased its operating result by 32 percent to CHF 82 million.

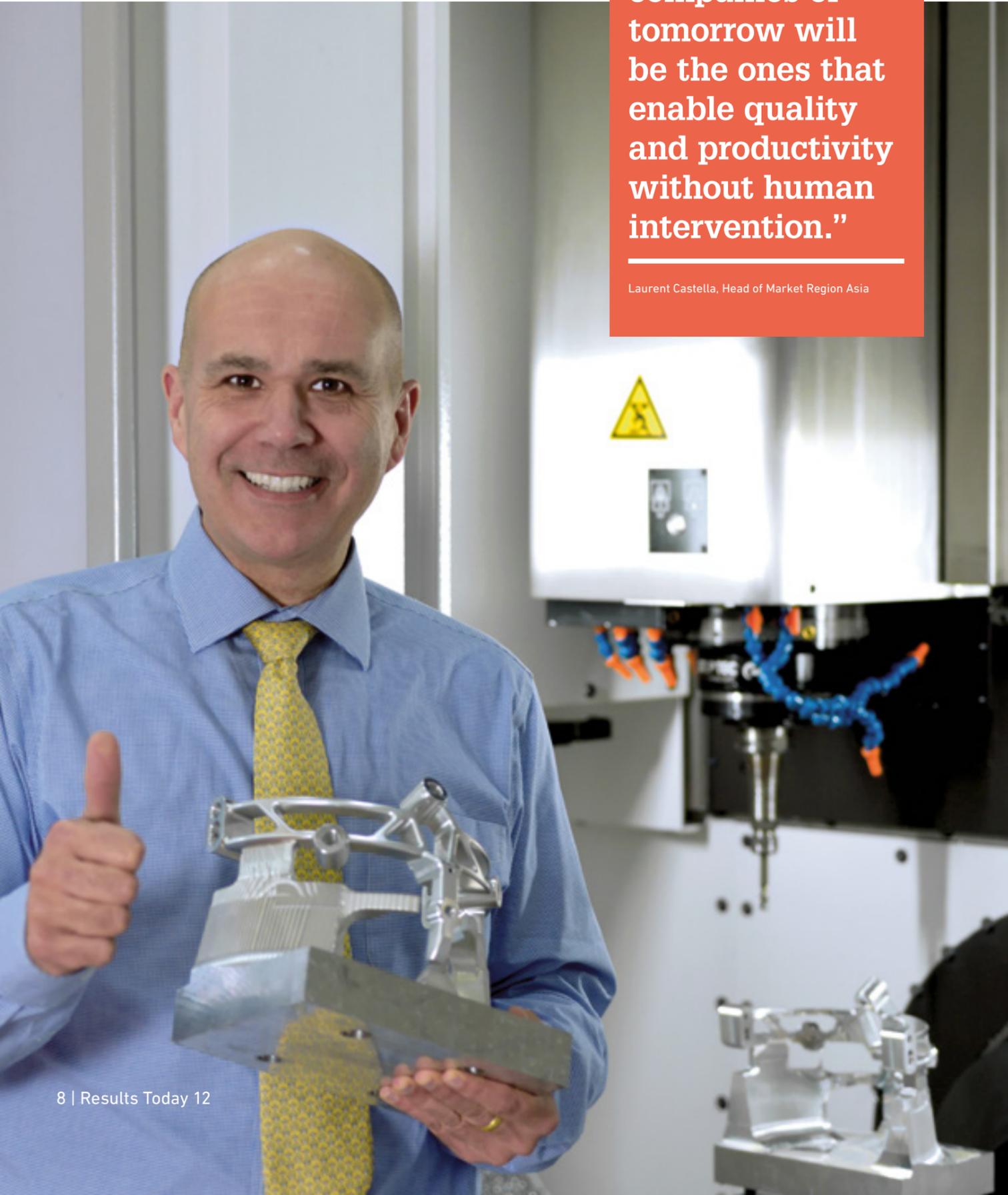


GF Machining Solutions South China's new **1,265-square-meter** location in Dongguan's **CIMC** situates the sales organization close to a wide range of well-known high-tech companies.

+ To learn more, visit [www.gfms.com](http://www.gfms.com)

“The winning machine tool companies of tomorrow will be the ones that enable quality and productivity without human intervention.”

Laurent Castella, Head of Market Region Asia



## Enabling digital transformation in Asia—and beyond

Industry 4.0 may first become a reality in Asia, thanks to the region’s willingness to take business risks, a young and dynamic workforce, China’s sprint to 5G network adoption, and its governments’ aim to dominate digital manufacturing. GF Machining Solutions is already enabling the digital transformation.

**W**ith the GF Division’s nearly 60-year legacy of connecting Market Region Asia customers to success, it’s encouraging that the region’s manufacturers already turn to it for increasingly complete and intelligent manufacturing solutions, says Laurent Castella, Head of Market Region Asia.

GF Machining Solutions’ strategic presence in Asia allows a critical closeness to customers across growing market segments—including information and communications technology (ICT) and automotive—that informs Castella’s view of manufacturing’s transformation.

“Young people today do not want to be machine operators—and the future of manufacturing will be factories without operators, anyway,” he says, explaining that the life experience of the future workforce—Generation Z—has been shaped by digital technology. “This generation will be programming manufacturing cells and systems and monitoring productivity through convenient dashboards.”

Moreover, manufacturing technology is evolving to the degree that soon one need not have deep mechanical engineering or programming expertise to achieve satisfactory results.

“The winning machine tool companies of tomorrow will be the ones that enable quality and productivity without human intervention,” he says.

GF Machining Solutions already is making significant inroads toward its vision of intelligent manufacturing solutions targeting fully predictive processes that could be readily tuned to the best performance to meet manufacturers’ specific needs.

### The road to Industry 4.0

The first step is enabling all machines and systems to “speak” a common language. For this, the GF Division uses the OPC-UA communication protocol developed in Europe and now widely accepted in the global machine tool industry.

“Our machines today are equipped with rConnect hardware and software allowing us to use this standard and build user-friendly software and apps on top of it,” Castella says. GF Machining Solutions is adding sensors related to the machining process and key components’ behavior to enable a self-optimizing machining process and predictive maintenance.

Castella believes his region, where GF Machining Solutions installed the highest number of automated cells in 2017, will be early to reach a true Industry 4.0 level, but other regions will benefit, too.

“The digital transformation will allow the same manufacturing costs in Europe and the US as here in Asia,” he says, “because these costs will be relative to innovation and equipment costs rather than labor costs. Innovation will then remain the only business differentiator.”



# JANDA Electric: Keeping pace with the world and winning with customers

Enhancing customer value with superb quality, high efficiency and low costs are central to JANDA Electric Co., Ltd.'s business philosophy. To help achieve those aims, JANDA has been expanding its fleet of Mikron Mill and AgieCharmilles wire-cutting and die-sinking EDM solutions since 2007.

Situated in Zhejiang, China's busy Wenzhou Economic and Technical Development Zone, JANDA is a go-to partner for automotive molds and electrical components such as vehicle connectors and chargers. Over the past 20 years, the business has established long-term cooperative relationships with 30 globally known automotive powerhouses, including IPD in Australia, Germany-based Mercedes-Benz, Edscha and Wilo, US-based Littelfuse, Ireland-headquartered Eaton, and Lucy in the UK.

It is a point of pride for JANDA Managing Director Zheng YouYi and his 350 employees that the company's products are widely used in electrical engineering, mechanical and electrical equipment, automobiles and other applications. All of the company's GF Machining Solutions machines work around the clock, keeping JANDA on pace with fast-developing mold-and-die industry trends.

### Complete solutions

"The trend in mold and die is fast mold making technologies," Zheng says, explaining that the company is intent on becoming the spare parts supplier for automotive companies both at home and abroad.

Its GF Machining Solutions fleet represents complete solutions for high precision, efficiency, speed and product stability.

Case in point: When JANDA had a chance to make a part required by Mercedes-Benz, test cuts were perfectly executed with Mikron Mill and AgieCharmilles EDM solutions—feats that could not be accomplished with competitors' machines.

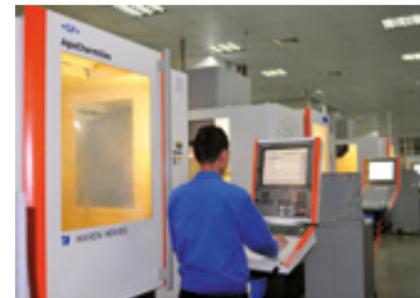
"The trial part was qualified completely according to the most rigorous requirements," Zheng explains, and, "JANDA smoothly secured the orders and became a long-term supplier to Mercedes-Benz."

### Passion for Precision

In fact, he says, JANDA shares GF Machining Solutions' "Passion for Precision."

"GF Machining Solutions keeps the leading position in technology [and] provides sound support for JANDA's steady development and continuous improvement," Zheng says. "The high precision of GF Machining Solutions machines ensures the high quality of JANDA's products."

Three GF Machining Solutions Mikron HEM 800 solutions are used at JANDA for machining electrodes. JANDA has been steadily investing in GF Machining Solutions' technologies since 2007 and plans to continue investing in the GF Division's high-speed Milling machines and high-end wire-cutting EDM solutions.



JANDA relies on GF Machining Solutions machines—especially for its key, high-precision processes—in the production of automotive parts and molds.



## "The high precision of GF Machining Solutions machines ensures the high quality of JANDA's products."

Zheng YouYi, Managing Director, JANDA Electric Co., Ltd.

Under the leadership of Managing Director Zheng YouYi, JANDA Electric Co., Ltd. has implemented innovative technologies and new processes such as in-house hot runner technology for precision molds, introduced an advanced management system, and become an industry leader with sustainable innovation capability.



JANDA Electric Co., Ltd., with its 42,000-square-meter campus located in the Wenzhou Economic and Technical Development Zone, has established long-term strategic cooperative relationships with more than 30 globally renowned companies.



### GF Machining Solutions machines

- 3x Mikron HEM 800
- 2x AgieCharmilles CUT 200C
- 1x AgieCharmilles CUT 200Bp
- 1x AgieCharmilles CUT E 350
- 1x AgieCharmilles CA 20
- 1x AgieCharmilles CA 30
- 2x AgieCharmilles FO 23 UP
- 1x AgieCharmilles FORM 53
- 1x AgieCharmilles FORM 2
- 1x AgieCharmilles FORM 3

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# Shanghai YaHong Moulding Co., Ltd.: Exquisite injection-molded parts, proudly ‘Made in China’

Shanghai YaHong Moulding Co., Ltd. aims to be China’s leading supplier of precise injection products. Complete mold machining solutions—from electrical discharge machining and Milling to Automation—from GF Machining Solutions help the company maintain its most prized competitive advantage: high precision.

↑ Founded in 1997, Shanghai YaHong Moulding Co., Ltd. has 22,000 square meters of floor space and currently is adding 3,300 square meters of workshop space.



**GF Machining Solutions machines**  
 2x Mikron HSM 500  
 1x Mikron MILL P 700  
 1x AgieCharmilles VCP 600  
 1x AgieCharmilles CUT E 350  
 1x AgieCharmilles CUT E 600  
 1x AgieCharmilles FORM 200 Bp X4  
 1x AgieCharmilles FORM 300  
 1x AgieCharmilles ROBOFIL 380  
 2x AgieCharmilles ROBIFORM 35P  
 System 3R WorkShopManager and robot

**F**ounded in 1997, the Shanghai, China-based business has grown into a 785-employee-strong specialist in the design and production of precise injection molds. As China’s manufacturing industry continues to roar with life, YaHong is proud to place the “Made in China” label on the injection molds it supplies to the world, including General Motors, Volkswagen and BMW.

**“GF Machining Solutions provides complete mold machining solutions, which coincides with our development strategy and the modern mold making trend.”**

quality,” he says. “On the other hand, high-end service and technology from GF Machining Solutions has established a trust.”

**A complete solution**  
 That trust is proven daily by YaHong’s automated production line, the first for private enterprise in Shanghai. Configured by GF Machining Solutions, it includes two Mikron HSM 500 machines for graphite machining, four AgieCharmilles FORM 200 Bp machines and an AgieCharmilles FORM 300, and a coordinate measuring machine—all processing molds with high precision. Adding System 3R’s WorkshopManager and a robot took YaHong’s machining stability to a new level and further improved the machines’ performance.

**Continuous innovation**  
 “YaHong has always adhered to the principle of devoting heart and soul to creating value for customers and focusing on targets and goals for constantly providing customers with excellent products and service that are far beyond their expectations,” says founder and chairman Xie YaMing. “The operating principle for YaHong is to keep improving mold precision to drive injection mold development.”

The company’s relationship with GF Machining Solutions began in 2005 and to this day, high precision is always the core of cooperation.

“On one hand, GF Machining Solutions’ Swiss origins represent high precision and

“GF Machining Solutions machines provide higher precision and machining stability compared with competitors,” he says, adding that his first AgieCharmilles EDM machines still boast high precision and stability after 10 years in operation. “GF Machining Solutions provides complete mold machining solutions, which coincides with our development strategy and the modern mold making trend.”

Xie YaMing, founder and chairman, Shanghai YaHong Moulding Co., Ltd.

↓ The processing precision and efficiency of GF Machining Solutions’ AgieCharmilles CUT E 600 were approved by Wang Feng, the mold department manager of YaHong.



↓ YaHong Moulding founder and chairman Xie YaMing, a Shanghai native, clearly saw the region’s potential for rapid economic growth and established his business there in 1997.



↑ A System 3R robot helps increase productivity at YaHong.

↓ GF Machining Solutions’ Milling and die-sinking and wire-cutting EDM are key processes in YaHong’s production of a car dashboard cover mold with ±0.01 mm accuracy.



# Ambrosi Cesare & Co.: Greater speed, higher precision with Mikron Mill solutions

After installing its Mikron MILL X 600 U machining centers, Ambrosi Cesare & Co. has been able to reach excellent results in terms of surface quality and cycle time, setting the stage for new business opportunities in the production of precision components in aerospace, automotive and medical.



**GF Machining Solutions machines**  
2x Mikron MILL X 600 U

↑ Ambrosi Cesare & Co. S.r.l, with its 1,200-square-meter workshop located in Trento, Italy, aims to continue its technological advancement to remain market leader.

↑ Component for testing prosthetics on dental implants.



↑ Thanks to its Mikron MILL X 600 U solutions, the team at Ambrosi Cesare & Co. (from left: Matteo, Alessandro, Guido and Thomas Ambrosi) achieves excellent results in terms of surface quality and cycle time, opening up new business opportunities.

Located just outside Trento, Italy, in the heart of the Dolomites along the Adige River valley, Ambrosi Cesare & Co. S.r.l has a history similar to many Italian industrial companies: tightly linked to the local area but with an international outlook, and a background of technical knowledge that allows it to offer versatile and highly customized solutions. For over 80 years, its precision-mechanics workshop has produced sub-contracted mechanical parts, machinery and customized equipment and provides a tool restoration service thanks to a linear and circular sharpening department.

The 1,200-square-meter workshop accommodates a vast fleet of machines including two Mikron MILL X 600 U machines from GF Machining Solutions. These high-speed, five-axis machining centers provide excellent results in terms of speed, precision and superficial finishing quality. These are essential to the production of high precision components for the aerospace, automotive and medical industries for which the MILL X 600 U is specifically designed.

“Acquiring the Mikron MILL X 600 U centers was a valuable choice for us,” explains Alessandro Ambrosi, Sales Manager at Ambrosi. “These solutions enable high-speed batch production with dynamic order handling, reduced cycle time and constant 24-hour compliance with the set tolerances, even for unmanned production.”

“Furthermore, thanks to substantial results in terms of surface finishing achieved with the GF Machining Solutions machining centers, we can now meet customer requirements that previously we would not have been able to meet,” adds Guido Ambrosi, Ambrosi’s CEO.

Ambrosi especially appreciates GF Machining Solutions Customer Services’ support for the company’s production with fast response time and remarkable technical know-how.

**“Thanks to the substantial results in terms of surface finishing achieved with the GF Machining Solutions centers, we can now meet customer requirements that previously we would not have been able to meet.”**

Guido Ambrosi, CEO of Ambrosi Cesare & Co., S.r.l

**“Acquiring the Mikron MILL X 600 U centers was a valuable choice for us.”**

Alessandro Ambrosi, Sales Manager, Ambrosi Cesare & Co., S.r.l

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← The complete chassis of a Hasselblad Lunar camera.

# Micropulse, Inc.: Medical shop operates with high precision, Automation

Micropulse Inc. has come a long way since its start with one wire electrical discharge machine (EDM) that arrived in the back of founder, owner and CEO Brian Emerick's pickup truck. The Columbia City, Indiana (US) shop, focusing 100 percent on medical work, is a leading manufacturer for the orthopedic industry.

**T**oday, with a modern, 160,000-square-foot facility, Micropulse offers manufacturing services for orthopedic surgical instruments, implants, and case and tray, as well as sterile packaging and product logistic services.

### Highest precision required

Medical industry requirements and regulations dictate tighter part tolerances, demands that Micropulse can only meet with extremely high-precision machine tools. It also requires automation and earned trust and integrity, enabling the shop to provide the highest quality parts, quick delivery and competitive pricing.

Nearly all of Micropulse's operations and quality systems are audited, and the shop is ISO 13485 certified. Each of its products must be traceable all the way back to the raw material provider; every manufacturing process is tracked in terms of who did what and what tools and software were used.

For instrument manufacturing, the shop uses general cells comprised of different machines and operations. Each of these cells "owns" certain part/instrument families and produces all related components. One such cell, for example, produces all hip and shoulder broaches. For implants, cells are often organized by process, such as milling, turning or EDM.

### A true technology partner

Micropulse's high-precision EDM, Milling, and Automation solutions are all from GF Machining Solutions.

"Manufacturing technology from GF Machining Solutions has allowed us to not only be competitive on price, but also on delivery and efficiency," adds Emerick. "In some instances, we've cut part processing costs by 30 percent. And with such accomplishments, we are confident that we can continue to diligently compete with offshore competition because of how we can optimize our output. GF Machining Solutions is a big part of that capability because it is a true technology partner and a supplier that wants to keep us successful—not just sell us a machine tool."



Some of the surgical implants Micropulse produces on its GF Machining Solutions machines are so small and intricate that inspecting them requires special magnification systems.

Most Micropulse jobs are small batches that entail a lot of changeovers, so for fast setups, the shop makes some of its own fixtures for its EDM machines from GF Machining Solutions.

**"GF Machining Solutions is...a true technology partner and a supplier that wants to keep us successful."**

Brian Emerick, Micropulse founder, owner and CEO

### GF Machining Solutions machines

- 1x AgieCharmilles FORM 200
- 1x AgieCharmilles Roboform 31
- 1x AgieCharmilles Roboform 35P
- 1x AgieCharmilles Roboform 40
- 2x AgieCharmilles Roboform 350
- 4x AgieCharmilles Robofil 240 CC
- 1x AgieCharmilles Robofil 440 CC
- 2x AgieCharmilles CUT 200 Sp
- 1x AgieCharmilles CUT 300 Sp
- 1x AgieCharmilles Robofil F1240 CC
- 1x AgieCharmilles Robofil 240 SLP
- 1x AgieCharmilles Robofil 240
- 8x Mikron HSM 400U LP
- 2x Mikron HSM 300
- 1x Mikron UCP 600 Vario
- 2x System 3R WorkMaster robot
- 3x System 3R WorkPartner 1+ robot



Micropulse's AgieCharmilles CUT 200 Sp wire EDM allows the shop to generate parts to micron tolerances, especially those with variable heights.

**"Manufacturing technology from GF Machining Solutions has allowed us to not only be competitive on price, but also on delivery and efficiency."**

Brian Emerick, Micropulse founder, owner and CEO

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# Digital capabilities are transforming manufacturing

**GF Machining Solutions Head of Digital Transformation**  
Andreas Rauch discusses how digital capabilities are transforming manufacturing while improving efficiency, enhancing customer value, managing risk and giving rise to new opportunities.

**“rConnect is our future Internet of Things platform; we will add value to it with...apps—right from our own app store.”**



**R**auch's nearly 30-year mechanical engineering career spans many connected manufacturing fields, including two years as leader of General Electric's Advanced Manufacturing Works Europe.

#### **How has manufacturing changed during your career?**

Back then, even with CAD/CAM systems in place, there were a lot of walls between engineering and manufacturing. Part of digital transformation focuses on a connected and transparent process based on valid, up-to-date information.

#### **What does “digital transformation” really mean?**

Think of the transformation in the way most of us communicate with our mobile phones: From morning to evening, we are connected to our mobile phones, communicating, tracking and improving our health, taking photos and videos. Data, not technology, is the real power behind this phenomenon. It will be the same for GF Machining Solutions.

#### **What does all of this mean for manufacturing?**

For example, when you have a change in product design or in manufacturing technology, you immediately get better

results and can achieve continuous process improvement over the entire product value chain. Access to data takes place in real time, and processes are updated, without any breaks. Design modifications are immediately, automatically integrated and become visible, so you can see their effect in the subsequent process chain—all thanks to contemporary data capabilities.

#### **How does GF Machining Solutions' integration of Symmedia play into the Division's vision of the intelligent, high performing and fully predictive smart factory of the future?**

Our rConnect platform uses customized Symmedia software to provide secure communication between our customers' machines and us. With Symmedia tools, our customers achieve clear return on their machine investment and greater machine uptime, productivity and reliability. rConnect is our future Internet of Things platform; we will add value to it with problem-solving and prevention (Seamless Connect) apps, cycle time predictions and process and technology services—right from our own app store.

#### **What does the ongoing digital transformation hold for our customers in the short term?**

A huge transformation is underway as

the industry moves to a Manufacturing as a Service (Maas) model: The customer will have access to planning, integration and process optimization; everything now running on our machines will be part of that. That's why we will focus our R&D on machine learning and artificial intelligence as well. Customers will have seamless lifetime connections to our know-how from design to production and beyond.

**“Customers will have seamless lifetime connections to our know-how from design to production and beyond.”**

Andreas Rauch  
Head of Digital Transformation, GF Machining Solutions

# Counterpoint is on top of aerospace industry trends

The complex, global, high-stakes aerospace industry is an endless source of fascination for Counterpoint Market Intelligence Limited Director and co-founder Richard Apps, a Cambridge University-educated engineer with a 38-year career in the business.

Travelers' lives literally depend on the ability of aircraft to safely convey them from point A to point B. That's a big responsibility and one compounded by a constellation of additional pressures, from costs and the need to invest in innovation and technology to the demand for greater engine efficiency and reduced carbon dioxide (CO<sub>2</sub>) emissions.

Those concerns have a ripple effect on the whole aerospace manufacturing supply chain, says Apps. Counterpoint Market Intelligence Limited, based in Oxfordshire, UK, advises aircraft and engine manufacturers and their suppliers, as well as investors—including banks and private equity firms—with facts and figures to inform their business decisions.

### Broad, deep expertise

"I look at the whole market and do aircraft forecasting and growth forecasts: How many aircraft are needed, what kind? Aerostructures and engine components are particular interests of mine," Apps explains.

Counterpoint's aerospace and defense expertise covers virtually the full aircraft, from aerostructures and engine components to aerospace equipment,

yielding original, independent and rigorous research. Counterpoint's team represents a broad—and deep—range of knowledge, including strategic planning, business development, new market models, next-generation aerospace composites, design and development of new interiors, market research, and mergers and acquisitions.

### Ripple effect

"The biggest change in the industry over the past 50 years has been the consolidation that has taken place. Consolidation at the top of the industry has rippled through to consolidation down the supply chain," says Apps. "We've also seen a change in the way work is contracted, with suppliers being asked to take on greater risk sharing. It's always a balance between risk and opportunity."

Emerging technologies like electric propulsion also represent opportunities.

"Technology moves relatively slowly in our industry, but we may see electric auxiliary power units (APUs) within the next 10 years for small, regional, propelled aircraft," Apps says.

### Track record is vital

Whether the technology is conventional or new, aircraft manufacturers are constantly faced with the task of

choosing supply partners, he says. "This is a very conservative industry. You choose a supplier with a track record in the industry," he adds.

Partners with a foothold in Industry 4.0—the smart factories of the future—can make a significant contribution to the aerospace industry, Apps states.

"Industry 4.0 brings in all of the benefits the industry needs: traceability, being able to forecast in terms of spare components, and safety," he says. "A huge amount of data can be extracted from aircraft today and understanding and using that data is very important. Industry 4.0 ties into this need and is already changing things in the industry."



Beyond the safety, aerospace OEMs and their supply partners face a wide range for pressure: keeping costs in check, the need to invest in innovation and technology, greater engine efficiency and reduced CO<sub>2</sub> emissions.



“Industry 4.0 brings in all of the benefits the industry needs: traceability, being able to forecast in terms of spare components, and safety.”

“You choose a supplier with a track record in the industry.”

Richard Apps, co-founder and director, Counterpoint Market Intelligence Limited



Richard Apps, Counterpoint Market Intelligence Limited Director and co-founder.



# Switzerland's Rinspeed shapes mobility's future

Frank M. Rinderknecht was a mobility influencer long before he founded Swiss automotive industry creative think tank and mobility lab Rinspeed. With passion and curiosity, the Zumikon, Switzerland-based Rinspeed team is shaping the future of mobility.

**R**inderknecht's experience as a mobility influencer had already taken hold by the time he saw the 1969 US film, *Easy Rider*, and decided to outfit his bicycle with the "ape hanger" motorcycle handlebars popularized by the film.

"I remember being tremendously impressed with those handlebars and wanted some for my bicycle—and I was the first kid in our neighborhood who had them," Rinderknecht recalls. "I've always been passionate about my individual mobility and throughout my whole life I have not wanted to conform to rules."

Truer words were never spoken. For example, Rinspeed's Oasis concept city car foretells a future in which drivers become passengers, transported as comfortably as if they were sitting in their own living rooms, complete with swivel chairs, a panoramic view of the landscape and even a mobile urban garden. Ultra-high-definition wide screen displays with gesture control and personal voice assistant add to the experience, along with augmented head-up display (HUD) tailored to users' individual preferences for social media, weather, parking and daily agenda. The vehicle's aluminum seat supports with lightweight, bionic design were fabricated by another Swiss powerhouse, GF Casting Solutions.

### Do what you love

"It's all about passion and curiosity," Rinderknecht says. "My philosophy in life is, 'Do in life what you love to do.' Success will follow."

Rinspeed, today a respected "sparring partner" of the automotive industry, has been well served by that mindset.

"My customers are mostly Tier 1 and Tier 2 automotive businesses and development agencies that want to understand what the future of mobility is about and what it means for their activities," he says. "We act as a sparring partner to work out scenarios for the future."

### Open horizon

What will that future look like? Mobility as a field, Rinderknecht believes, is wide open: It could continue as it has for 120 years, or it could change so drastically that not one stone remains unturned.

"I see great potential for autonomous driving. If you don't expect machines to be perfect but as good as human beings, it will be a good thing, and it will improve over time," he says. "The biggest challenge will not be technology. It will be people. It's hard to get people to change."

Still, Rinderknecht is an optimist. He and the work done by Rinspeed make a

convincing argument that nearly anything is achievable by thinking outside of the box and factoring in feasibility and risks.

"The word 'impossible' shouldn't really exist," he says.

## "It's all about passion and curiosity."

Frank M. Rinderknecht, founder and CEO, Rinspeed



Rinspeed founder and CEO Frank M. Rinderknecht has always been passionate about his individual mobility; today he is a mobility influencer and "sparring partner" to Tier 1 and Tier 2 automotive businesses and development agencies interested in understanding the future of mobility.



Rinspeed reimagines mobility with its Oasis concept vehicle, the ingenious self-driving electric vehicle for the city and surrounding areas.



GF Casting Solutions supplied a bionic aluminum seat support for Rinspeed's Oasis concept car, an agile electric speedster for town and country.



Rinspeed's Snap concept car brings to life an elaborate and unparalleled mobility ecosystem with a fully connected user experience for passenger cabin occupants.



Rinspeed founder Frank M. Rinderknecht refutes the deeply ingrained notion of the urban jungle that requires SUVs the size of battle tanks for the daily struggle for survival. His alternative concept: a maneuverable speedster with a small garden plot integrated behind the windshield.

# Dive into your future-shaping solutions with the AgieCharmilles FORM family

Whatever your current or future die-sinking electrical discharge machining (DSEDM) challenge, GF Machining Solutions' AgieCharmilles FORM family machines will advance your success.



DIE-SINKING

Whether you need a single machine for straightforward use or full Automation, you will meet every challenge with greater flexibility and machining accuracy to eliminate costly manual operations with the easily integrable and eco-friendly FORM X, FORM S, FORM P and FORM E.

Maximize your FORM machine's use with the eConnectivity features and MTConnect capability to stay informed of the machine's status. Use Automation to boost productivity: Unattended production is a must today, so the FORM machines can be connected to external robots and offer integrated pallet and electrode changing solutions.

**FORM X: extreme accuracy**  
Uncompromising accuracy, highest precision and unparalleled productivity come together with the FORM X machines. Their TECFORM EXPERT system ensures highest accuracy and reproducibility on big and small parts, and their fixed table and stiff machine base deliver perfect positioning accuracy along the full axis travel. Precision-enhancing thermostabilization and available

Automation put you on the fast track to mass production of highly precise micro parts. Profit, too, from smart features such as Part Express and Job List management, as well as the FORM X's accommodation of two front-oriented machines on each side of a robot.

**FORM S: perfect micro profiles**  
The FORM S opens new miniaturization horizons, optimizes productivity, ensures lasting accuracy, and is Automation ready right out of the box. Miniaturization is made easy by the maximum respect for details enabled by the FORM S's latest-generation Intelligent Speed Power Generator (ISPG) and specific micro technologies. And, due to a process enabling the tiniest current, electrode wear becomes insignificant, so you'll use fewer electrodes to machine cavities.

For example, the FORM S 350 boasts 3D accuracy of  $\pm 2 \mu\text{m}$ , produces perfect cavity profiles, and ensures zero scrap when using copper electrodes to produce steel camera modules—and with a surface finish of Ra 0.1 to 0.25  $\mu\text{m}$ .

**FORM P: efficient running time**  
Get perfect results and high productivity at your fingertips with this solution of choice for automated parts production. Experience an intuitive, easy-to-use process with the AC FORM human-machine interface, and benefit from high running time without manual intervention, thanks to the series' multiple Automation choices and smart features. Speed and productivity are advanced by the series' EDM process management while surface finish and homogeneity are optimized by the ISPG and TECFORM.

**FORM E: best investment value**  
With superb accessibility, automatic dielectric management, extended Automation capabilities, ever-evolving technological improvements and GF Machining Solutions' available rConnect world of digital services, this multifaceted performer delivers best value for your mold and part production. Automatic dielectric management advances productivity while reducing human intervention: Work tank filling and emptying is automatic, and dielectric height can be adjusted while running a program.



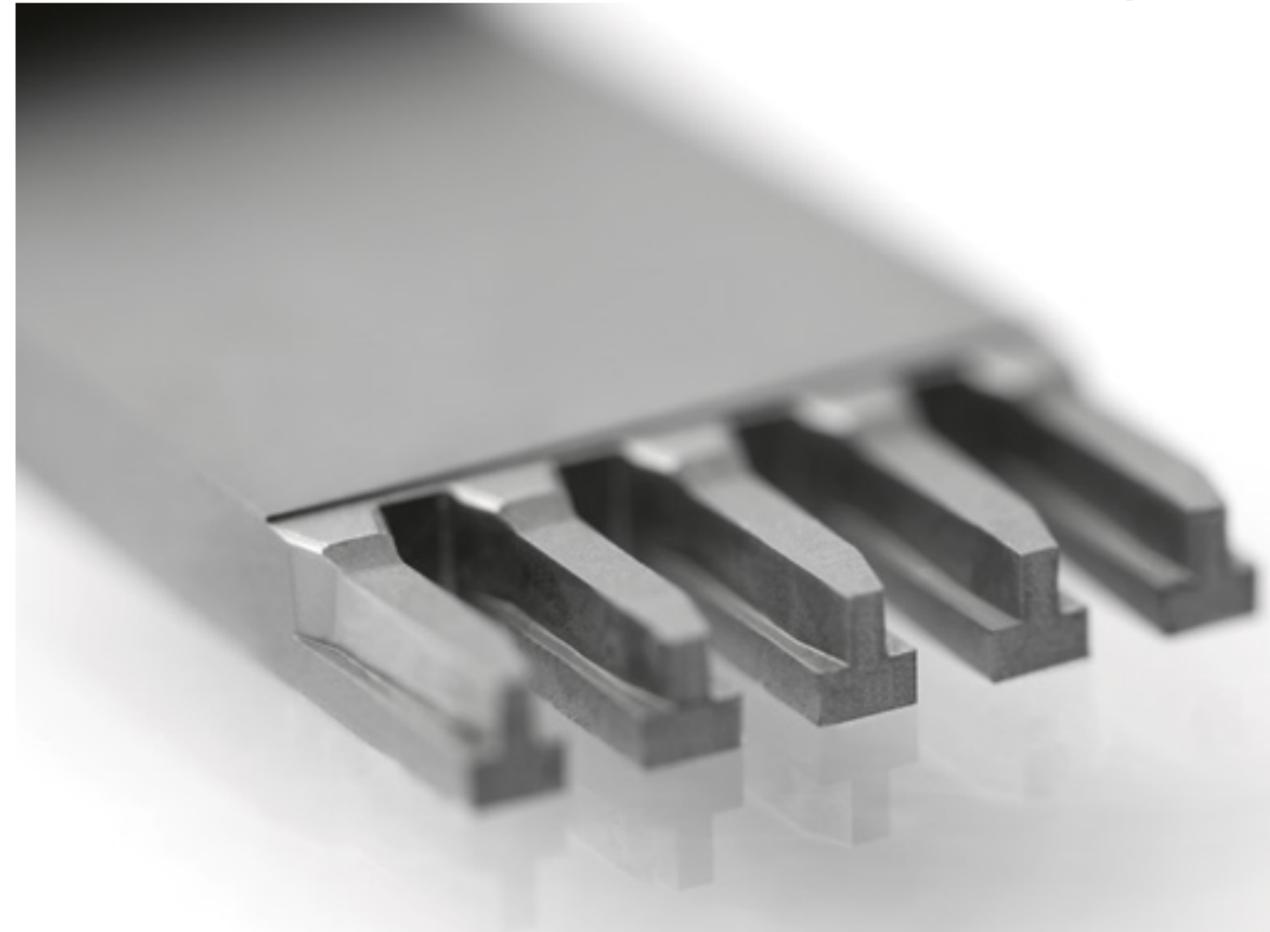
The FORM S 350 boasts 3D accuracy of  $\pm 2 \mu\text{m}$



With GF Machining Solutions' AgieCharmilles FORM family, you can benefit from unbeatable accuracy in micromachining and achieve greater details with fewer electrodes.



Accelerate your manufacturing process and combine profile accuracy and productivity with GF Machining Solutions' AgieCharmilles FORM family.





Automatic Slug Welding (ASW)—no surface alteration



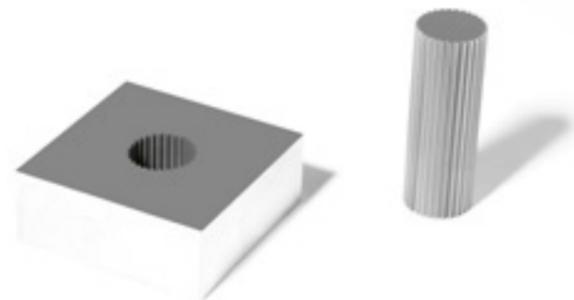
200 mm punch with a profile accuracy of  $\pm 2 \mu\text{m}$



**GF Machining Solutions' AgieCharmilles CUT P wire-cutting EDM solutions give you access to Limitless Possibilities with the increased speed, flexibility and quality enabled by the series' ever-evolving intelligence.**



Gear sintering punch and die with a consistent surface finish of  $\text{Ra } 0.2 \mu\text{m}$



# CUT P series: Speed, flexibility, quality open a world of Limitless Possibilities

Discover the Limitless Possibilities enabled by the speed, flexibility and quality of GF Machining Solutions' AgieCharmilles CUT P wire-cutting electrical discharge machining (WEDM) solutions.



## WIRE-CUTTING

Engineered to simplify even the most demanding applications, the CUT P series brings the Limitless Possibilities of new intelligence to the WEDM process. This new intelligence will advance your speed, flexibility and quality while helping you get to the heart of even the most critical applications in electronic components, packaging and medtech.

From producing the most lightweight surgical tools to machining oversize die-cast automotive molds, the CUT P series is designed to help you expand your business opportunities. Whether you are producing precision parts or molds and dies, this series' new, state-of-the-art Intelligent Power Generator (IPG) can increase your cutting performance by 20 percent. Completely adapted for System 3R Tooling and Automation solutions, the CUT P series also helps optimize your machine uptime. Your running costs are minimized by an array of innovative capabilities: Automatic Slug Welding (ASW), Automatic Slug Management (ASM), ECO machining and improved Econowatt function. Your results: reduced time to market and faster production at lower costs.

### Ideal for every application

From micromachining to macromachining, the CUT P delivers perfect machining in any situation to help you master complexity and expand your business. Count on accuracy down to  $2 \mu\text{m}$  and surface finishes down to  $\text{Ra } 0.08 \mu\text{m}$ , thanks to the series' combination of mechanical design, thermostabilization and machining repeatability. In parallel, the CUT P's EXPERT systems make it easy to achieve advanced taper accuracy below  $10^\circ$  with straightness, sharp contours and no lines. At the same time, the unique collision protection system prevents costly machine maintenance and ensures long-term accuracy and reliability, while the retractable 3D probing system ensures faster setup and complete Automation integration to drive your production of complex parts.

All of these benefits—including the more than 600 available technologies made possible by the new, cutting-edge IPG—allow you to cut your costs by up to 20 percent.

### Always available

Industry 4.0, a new innovation era, is changing the way manufacturers work and enabling new levels of productivity and machine availability essential to your profitability. That's why the AgieCharmilles CUT P series puts SMART and connected solutions at your fingertips.

These solutions include integrated RFID chips in wire spools to eliminate the risk of errors, facilitate quick wire replacements, avert breakdowns, minimize stock, and ensure complete process traceability. At the same time, System 3R WorkShopManager and CellManager software take process administration and surveying to the next level, and GF Machining Solutions' rConnect modular digital services keep you connected to your machines anytime—wherever you are.

Position your business for increased tooling life, fewer scrapped parts, advanced quality control, and minimal human intervention and start working 100 percent automatically, with the Limitless Possibilities delivered by the CUT P series.



Mold inserts with an accuracy of  $\pm 5 \mu\text{m}$  and a taper accuracy of  $<10^\circ$

# Advance your agility and autonomy with Milling and scalable Automation

Take your precision, surface finish and autonomy to a new level with GF Machining Solutions' Mikron MILL P 500 U and its scalable System 3R TRANSFORMER Automation solution with a six-axis FANUC robot.



MILLING



AUTOMATION



SPINDLES

With its powerful and dynamic material removal capabilities and high stiffness, the MILL P 500 U enables continuous machining of complex forms and tough materials while shortening process time. Its advanced thermal stability ensures reliable precision over long machining periods. Furthermore, it delivers exceptional competitiveness by integrating smart Automation and ensures the process reliability essential to precision parts manufacturing segments such as aerospace and machinery parts as well as automotive mold making.

## ±2 µm precision in X/Y plane

With the MILL P 500 U, manufacturers of precision parts and molds experience top accuracy and uncompromising process reliability, thanks to the machine's thermostability and symmetrical design. Even when machining at a fast pace and over long production periods, accuracy and process reliability remain steadfast, so you achieve consistent dimensional precision and 24/7 process reliability.

## 365 days per year flexibility

Thanks to the MILL P 500 U's 1.7 g acceleration, 36 kW Step-Tec HPC190 Spindle with a large speed range up to 20,000 rpm, rotary tilting table capacity of up to 600 kg and workpiece diameters up to 707 mm, manufacturers experience constant dynamic machining as well as 100 percent flexibility in their part production.

The rotary tilting table is available in several variations: T-slot tables accommodating a payload of 200 kg, 400 kg or 600 kg, as well as pallet tables accommodating a payload of 200 kg, 400 kg or 600 kg. Incremental, direct angle measuring systems are mounted on the swiveling and circular axes to guarantee very high positioning and repeat accuracy.

Out of this machine's two tool Spindle choices, Step-Tec's 20,000 rpm HPC190 with HSK-A63 tool interface is manufacturers' first choice. This platform Spindle robustly and reliably delivers repeatable accuracy. Its carbon fiber mantle defeats deviations in accuracy related to hot spots and thermal tilt, and the carbon fiber acts as a heat barrier to ensure that the heat is taken out of the Spindle. Moreover, the outer sleeve's carbon fiber reduces Spindle weight by 6 percent, significantly increasing linear drive dynamics while reducing oscillation and jolts in the vertical axis.

For precision parts machining as well as for mold and die, the lighter but still powerful 36,000 rpm Step-Tec HVC150 Spindle with HSK-E50 tool interface supersedes its predecessor. An all-aluminum integral structural part on the rear end reduces the Spindle weight by 17 percent, making it a great choice in power-to-weight ratio. In addition, Step-Tec's well-proven OptiCool Principle (OCS) delivers excellent polar thermal stability which is ideal for precision machining but also offers best surface finish for mold and die components. Both Spindles feature integrated sensors for total process control such as vibration monitoring along with many other Spindle parameters.

More than double your productivity with the MILL P 500 U's accommodation of limitless integrable Automation solutions—such as direct robot loading of pallets to the table—through the back. The machine can also be connected to System 3R's scalable TRANSFORMER Automation solution with a six-axis FANUC robot.



## 250 percent higher productivity with integrated automation

Precision parts producers and mold makers can more than double productivity with the 12-square-meter MILL P 500 U's accommodation of limitless integrable Automation solutions through the back.

For example, you can add System 3R's scalable TRANSFORMER Automation solution with a six-axis FANUC robot to the MILL P 500 U to advance your productivity, flexibility and autonomy. Both stationary and rail versions of System 3R Automation solutions with FANUC industrial robots are available. Customizable to your needs, these solutions cover a wide range of applications and requirements, from 70–600 kg transfer weight and up to 3,400 mm radial reach to complex transfer movements and parts handling.

The direct benefit of the System 3R TRANSFORMER with a six-axis FANUC robot is cost-effective yet flexible Automation through state-of-the-art technology and smart technical solutions using standardized modules. Moreover, with System 3R's user-friendly WorkShopManager cell management software, complex Automation is made easy to use.

## MSP: full production within 10 minutes of a crash

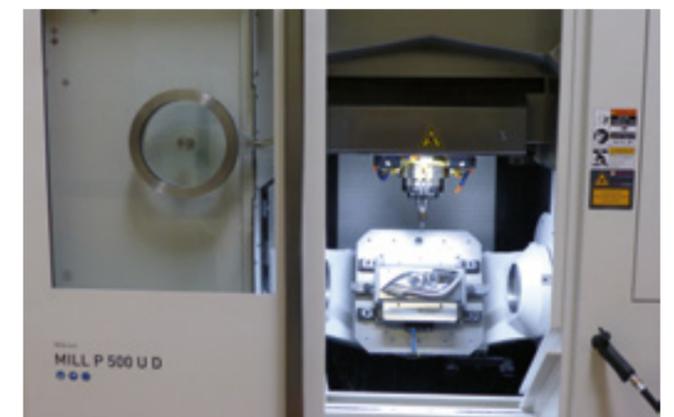
MILL P 500 U users pare their downtime from hours to mere minutes, thanks to GF Machining Solutions' Industry 4.0-supporting smart modules such as Machine Spindle Protection (MSP). MSP prevents Spindle breakdowns while protecting the machine geometry and maximizing machine uptime to reduce costs associated with unexpected Spindle collisions. MSP makes it possible to absorb axial and lateral collisions and then restore perfect accuracy: The Spindle returns to normal operations without any specific maintenance or recalibration, ensuring almost no downtime or collision-related costs.



Step-Tec's 20,000 rpm HPC190 Spindle with HSK-A63 tool interface is manufacturers' first choice of Spindles for the Mikron MILL P 500 U.



New levels of precision, surface finish and autonomy are at your fingertips with the MILL P 500 U, thanks to its powerful and dynamic material removal capabilities and high stiffness.



# Versatility, flexibility and precision are all built into Liechti's TURBOMILL i

The i technology embedded in GF Machining Solutions' Liechti machining centers allows precision airfoils to be flexibly machined—a true benefit in turbine blade and impeller manufacturing.



## MILLING

The versatility and flexibility of the TURBOMILL i is reflected in its areas of application: Turbine blades and impellers can be milled on the same machine.

Moreover, the TURBOMILL i machining center can also be used to repair high-precision blades and it is also suitable for Milling applications in production and precision engineering when used with a machine bench.

Thanks to this solution's turning and Milling option, the complete machining process can be economically managed

on just one machine. Additional options—such as the bar loading system and the automatic workpiece changer—automate the manufacturing process and reduce retooling times.

The TURBOMILL i is available in two different variants. The TM800 i is suitable for blade lengths up to 800 mm, while the TM1400 i is tailored to longer workpieces up to 1,400 mm. Both solutions are able to machine workpieces with a swing diameter of up to 400 mm.

As with every Liechti solution, these machining centers can be individually tailored to customers' needs. A variety of options is available, including a tool changer with 20, 32 or 60 positions and

a two-sided rotary drive or tailstock. The computer-aided manufacturing (CAM) software TURBOSOFT plus, developed in-house at Liechti, ideally complements the machining center, enabling precision airfoils to be machined using five-axis simultaneous Milling.

With Liechti as your partner, the challenges of keeping pace with today's historic ramp-up in aerospace production are resolved and you are on your way to reaping the benefits of Liechti's 4P approach to greater productivity and profits. This 4P model—Plan, Performance, Partnership, Profit Increase—helps you attain the lowest cost per part and achieve profitability increases of more than 30 percent.

The innovative yet compact design offers an optimal view of and simple accessibility to the workpiece.



Thanks to the bar loading system, blanks with a diameter of up to 150 mm are automatically inserted into the machining center. This optimizes retooling times.



Double-end drive for machining long, thin turbine blades.



Thanks to the turn-mill option, adjustable guide vane (AGV) blades can be machined in one manufacturing process.



Blades as well as impellers can be machined.



## 4P: SOLUTIONS FOR LOWEST COST PER PART



# Plan your profit

Solution engineering of your technical and economical production requirements

# Performance

Innovative technology for highest quality and quantity output

# Partnership

Support and performance updates over entire machining solution life cycle

# Profit Increase

MORE THAN

**30%**

LOWEST COST/PART

# Ultrafast Laser machined micro-holes for automotive, medical manufacturing

High-precision, high-speed ultrafast Laser machining platforms from GF Machining Solutions' Microlution brand help reduce automobile emissions and advance coronary health.



## MICROMACHINING

Precision micro-holes, smaller in diameter than a human hair, yield exciting new products and enable exponential leaps in performance for existing products. With more precise machining solutions, micro-holes can be shaped to deliver fluid more precisely and efficiently—capabilities that dramatically impact automotive products and medical devices. GF Machining Solutions' Microlution brand pioneered femtosecond Lasers for industrial use.

### Ultrafast solution

Previously used only for research, femtosecond Lasers today are rugged enough to perform in a factory environment. Ultrafast Lasers are prized for heat-free machining: Removing material with no thermal damage to the part makes it possible to create minute features with extreme precision and feature quality.

### Automotive parts

In automotive, new generations of gas direct injection fuel injectors can spray fuel into cylinders more efficiently, achieving target engine performance with less fuel and lower emissions. Injector nozzles must be drilled at extremely precise dimensions to control fuel droplet size and spray patterns and guide fuel to a location where it will combust with maximum efficiency.

These holes, shaped at diameters of less than 150 microns, must have near-perfect surface quality. To be cost-effective, each hole must be drilled in a few seconds or less with a repeatable process—far beyond traditional drilling technologies' capabilities.

Laser drilling's non-contact process produces no tool wear, dramatically reducing part variability and helping automakers worldwide create the most efficient injectors.

### Medical devices

Catheters for cardiac ablation to treat arrhythmia is another area where this machining technology enables safer, more effective medical devices. Increasingly common, ablation employs a catheter with an electronic tip that is guided to the heart to cauterize the source of the harmful signals.

Newer ablation catheter tips use irrigation to flush saline solution around or through the tip, cooling the area enough for successful ablation. Ultrafast Laser micromachining produces more precise irrigation catheter tips, delivering more coolant from less fluid, reducing the risks of boiling. To manipulate liquid dispersion, catheter tip holes are drilled to exact geometries, an economically unfeasible task with traditional machining technology.

### Pioneering solutions

Microlution has developed systems for multiple industries and now offers a variety of ultrafast Laser machining platforms:

- a stand-alone Laser machining station;
- a dual-station (hybrid) machine with a mechanical mill to rough out larger features and an ultrafast Laser to finish the surface and edges; and
- a dual-station (measurement) machine which performs detailed part measurement in parallel to the ultrafast Laser machining process.



Microlution's ultrafast Laser micro-hole drilling helps create the most efficient gas direct injection fuel injectors.



Removing material with no thermal damage to the part makes it possible to create minute features with extreme precision and feature quality.



Ultrafast Laser micromachining is used to make more precise irrigation catheter tips with holes drilled to exact geometries to manipulate liquid dispersion.



The ML-5 is industry's leading ultrafast Laser micromachining platform, combining exceptional part handling, motion control and real-time positional feedback. The ML-5 is the perfect solution for micro-hole and high-precision cutting applications.



# New digital services possibilities for your GF Machining Solutions machine

Get a direct connection to GF Machining Solutions' digital services world with rConnect, a modular software solution that pushes technological boundaries to deliver the future to you—today.



## CUSTOMER SERVICES

Beyond being the machine tool industry's most in-depth digital service platform, rConnect represents GF Machining Solutions' Industry 4.0 vision of intelligent and high-performing services. Connectivity—enabling machine-to-machine communication, wireless data delivery and data accessibility from remote service centers—is a critical characteristic of the factory of the future. rConnect, developed with GF Machining Solutions' own software specialist, Symmedia, is available for GF Machining Solutions technologies: Milling, EDM, Laser—and in the near future, Automation and Additive Manufacturing.

rConnect's Customer Cockpit user interface connects users with their production facilities via PC or mobile device from anywhere at any time. Its Live Remote Assistance (LRA) module provides direct audio, video and chat access to GF Machining Solutions' experts to resolve machine issues; these experts can use LRA to remotely conduct checks, significantly reducing machine downtime.

The new Messenger app gives customers instant access to all machine park data—

such as machine status and programs—on their smartphones. Users can also send a service request to get a fast and effective diagnosis. As data security is of utmost importance, rConnect offers secure certified connections based on the latest technology. Combined with LRA, Messenger is an indispensable app for daily business activities and connects customers closely with their workshops.

### Clear customer benefits

Northern Italian precision workshop Aldeghi, a mold, tool and prototype mechanical product manufacturer for the automotive, electronics and household markets, already benefits from rConnect. When Aldeghi was taking its first steps into digitalization, it turned to GF Machining Solutions—the company's partner for some 30 years. Today nine machines from GF Machining Solutions are running at the Italian production facility, including three EDM machines with rConnect LRA and Messenger.

Thanks to rConnect, Aldeghi now has the peace of mind of being able to check machine status remotely during unattended evening and weekend machining.

Aldeghi Managing Director Cesare Aldeghi says that prior to activating rConnect, requests for machine support entailed

contacting GF Machining Solutions Customer Services. An employee had to explain the situation and carry out checks according to the service expert's instructions. If a solution could not be quickly found, a site visit had to be arranged, costing the company time and money. Activation of LRA changed all that.

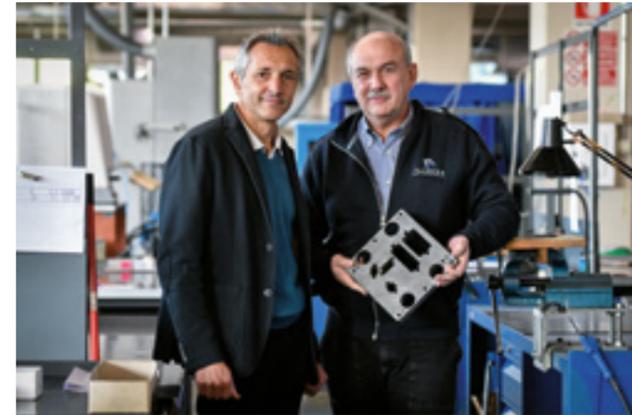
### Greater productive uptime

"Now, we can create a request for assistance directly from the LRA interface or the Customer Cockpit," he says. "This allows the GF Machining Solutions engineer to connect directly to the machine and carry out the checks without our assistance. In the meantime, we can continue with our work."

### Peace of mind—through Messenger

Moreover, the Messenger app has improved the company's processes.

"This is one of my favorite aspects of rConnect. When our machines are operating on an unmanned basis—for example, during the night or on weekends—we can use the Messenger to monitor the progress from a mobile device," he says. "We instantly see how work is proceeding, and that gives us greater peace of mind. We've been waiting for this option for some time and are very happy to be able to use it."



Aldeghi Managing Director Cesare Aldeghi (right) works closely with Enrico Borghi of GF Machining Solutions Customer Services.



Aldeghi EDM Department Manager Mauro Coco checks the machine status from his mobile device.



With rConnect's LRA module, customers get direct audio, video and chat access to GF Machining Solutions' experts.



Despite the advantages of automation, manual work—such as preparing a mold with bench mounting—still has its place for Aldeghi's employees.



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# Envision Your Future

GF Machining Solutions has continuously been driven by the passion to innovate and shape the future of global manufacturing. As pioneers in electrical discharge machining (EDM), high-speed Milling, five-axis machining and Tooling, we have set the highest standards for precision, efficiency and quality around the world. We inspire you by offering a broad range of complete machining solutions as well as a comprehensive portfolio of cross-technologies and intelligent ecosystems (Industry 4.0) designed to take your manufacturing process to the next level.