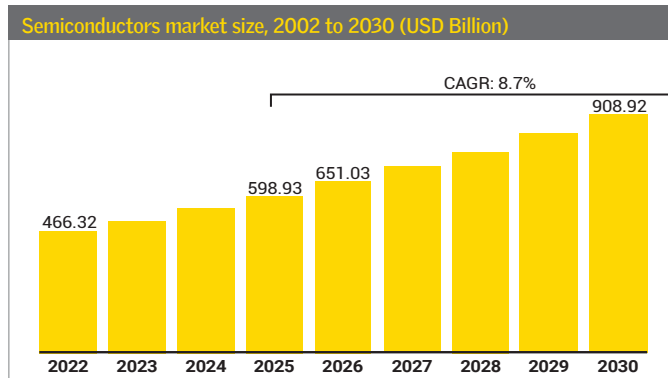
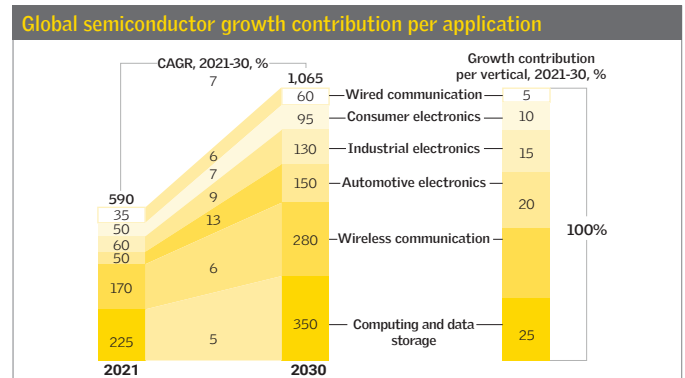


Japan's evolving role in semiconductors and electronics

As demands from the semiconductor and electronics industries become increasingly complex, Japan's equipment and material manufacturers are on hand to provide market-leading solutions.



Source: Vantage Market Research



Source: McKinsey & Company

With the emergence of new technologies such as AI, VR, Big Data, the Internet of Things, electric and autonomous vehicles, and 5G/6G internet, demand for semiconductors continues to grow at a rapid pace. Indeed, it is thanks to the rapid advancement of semiconductors, the building blocks of our digital world, that such technologies have been able to flourish. And as chips have become increasingly faster and smaller, the materials and techniques used to develop them must constantly evolve.

"This rapid advancement in semiconductor technology is driving various applications, including the rising popularity of generative AI, and the development of virtual reality and autonomous driving systems. Such innovations would not be possible without continuous improvements in the semiconductor industry, making it the driving force behind numerous technological breakthroughs," highlights Toshiki Kawai, Representative Director, President and CEO of Tokyo Electron (TEL).

While Japan is no longer the dominant player in global semiconductor production, Japanese companies still lead the world when it comes to the materials and manufacturing equipment used to make chips. As such, they are well placed to support the demand for ever-smaller and higher-performing semiconductors. One of Japan's leading players, TEL, which produces equipment for the production of cutting-edge semiconductor devices and flat panel displays, is doing just that, investing heavily in R&D to ensure its processing equipment is top of its field.

"The semiconductor market reached USD 574 billion in the 2022 fiscal year, and it is projected to skyrocket to over USD 1 trillion by 2030 (Source: 2022 (WSTS)/ 2030 (IBS, August 2023)), nearly doubling its size," says Mr. Kawai. "Global data traffic is expected to have an average compound annual growth rate (CAGR) of 26% (Source: Omdia (1990-2030)), growing tenfold in a decade. The future will also see an increase in bit-based computing, alongside quantum computing, and neural network-based computer processing is anticipated."

"While some argue that we have entered the Big Data era, we believe we are only on the cusp," he

adds. "Consequently, there will be a rising demand for advanced semiconductor technologies. Currently, Tokyo Electron holds about 22,000 patents for semiconductor production equipment, making us the industry leader. To strengthen our position further, we continue to invest significantly in R&D, having already invested JPY 600 billion between FY2018 and FY2022, with plans to invest over JPY 1 trillion between FY2023 and FY2027. These investments have resulted in groundbreaking achievements, such as etching process equipment capable of reaching a depth of 10 microns two and a half times faster than previous capabilities while consuming over 40% less power."

A leading manufacturer of materials, components and solutions for printed circuit boards (PCBs), FICT is also investing heavily in R&D to develop groundbreaking technologies. Having pioneered technologies such as Organic Flip-Chip BGA Substrate (FC-BGA), a global standard in semiconductor substrate packaging, and F-ALCS (F-All Layer Connection Structure), which maximizes the wiring capacity of printed wiring boards (over 60 layers) through paste filling and metal bonding, the company's R&D efforts today are focusing on the transition towards glass-made substrates.

"We believe that given the prevalent trend of wiring pattern (line/space) miniaturization, transitioning toward glass substrates becomes increasingly crucial," says FICT's former president Seiji Miyoshi. "Through our F-ALCS technology initiative, we aimed to pivot toward laminated glass technology. Unlike the conventional approach reliant on organic materials, our transition to glass empowers us to layer these components. A viable application lies in potential collaborations with LCD panel manufacturers. This collaboration could involve integrating a glass substrate into the semiconductor packaging with our G-ALCS (Glass All Layer Z-Connection Structure) technology, opening new avenues for advancement."

Amid the increasing demand for chips, there has been a revitalization of semiconductor production in both Japan and the United States. In Japan, TSMC is establishing a new semiconductor manufacturing facility in Kumamoto in

collaboration with Sony, while in the U.S., Intel is building two new fabs as the U.S. government has approved a package that will pump billions into stimulating the industry. Such developments bode well for Japanese firms, including Iwata and Co., Kanto Chemical, VALQUA and KEL.

With the revival of the industry in Japan, Dr. Takuya Iwata, President of Iwata & Co. – which provides high-purity chemicals and materials essential for semiconductor manufacturing processes – warns that enhancing the supply chain will be crucial. "The paramount concern regarding the semiconductor industry's further growth in Japan lies not only in investment but also in bolstering supply chain resilience. It is crucial for the Japanese government to extend support to local semiconductor manufacturers and the companies that play a pivotal role in sustaining the entire industry. By mirroring the domestic supply chain structure implemented by the automotive industry, we can fortify the semiconductor sector's stability and growth."

For its part, Iwata established a subsidiary in 2020, which is playing a crucial role in the rapidly expanding semiconductor industry in the Kyushu region. "These small-scale factories epitomize the essence of Japanese craftsmanship, and SMEs like ours possess and maintain advanced Japanese technology," adds Dr. Iwata. "Our subsidiary represents one of our core strengths, excelling in custom ordering production equipment and maintaining an efficient annual maintenance system. Their contributions are indispensable to the success of new semiconductor manufacturing brands and processes."

VALQUA Group is a pioneering company in the fields of seal engineering and resin-based materials for a wide range of industries, including semiconductors. Chairman and CEO, Toshikazu Takisawa, is optimistic about the company's potential for growth as a result of the expansion of the chip industry in Japan and the U.S. "We align with the U.S. and work with Western countries to re-establish the supply chain together. TSMC and Rapidus are investing and building factories in Japan once again. And apparently, we are regaining the attention of these companies. We

are their global supplier, so we will be able to cater to them domestically too, in Japan. Also, we are now about to build new factories in Japan, and we are relocating our manufacturing location from China to other countries in the Asian region. I am taking the U.S.-China decoupling rather positively because it may serve as a trigger to bring back *monozukuri* manufacturing probabilities to Japan. Moreover, it could be the start of another technical innovation expansion in Japan."

Like Iwata, Kanto Chemical supplies high-purity chemicals to the semiconductor industry and already exports its products to the U.S., while the company has been exporting to countries such as Taiwan, Singapore, Malaysia, and China since the 1990s. "We are dedicated to strengthening our presence in these countries and regions by enhancing our factories and providing comprehensive support to our local customers in the semiconductor industry," says Manabu Nozawa, President and CEO of Kanto Chemical. "Currently, our priority market is the United States, which is experiencing a resurgence in the semiconductor sector. Given the discussions on economic security, we are actively pursuing opportunities to penetrate the U.S. market. Our efforts are centered in Japan, and we are collaborating with Kanto-PPC in Taiwan and Kanto Corporation in the U.S., along with our partner companies, to launch a robust sales promotion campaign within the U.S. market."

Turning attention back to Japan, Sean M. Stack, President and CEO of Proterial – which supplies high-quality, cutting-edge materials to several industries, including automotives and semiconductors – says that Japan offers an advantageous ecosystem for semiconductor development in two key areas.

"First is the equipment used to manufacture semiconductors, which is a big opportunity. We support both equipment manufacturers and chip makers by providing specialty steel, electric wires and cables, lead frame materials, and silicon carbide for the chip-making process. Our relationship with customers in this domain is strong, and we constantly evaluate investment opportunities every quarter to meet the increasing demand, reduce lead times, and secure the supply chain," he explains.

"The second advantage of operating in Japan is the close proximity and collaboration with Japanese equipment manufacturers and chip makers. This proximity enables efficient coordination and shorter lead times for securing equipment necessary for our materials production. Customers are coming to us probably earlier than expected because of the demand and the opportunities they see."

A company that provides state-of-the-art connectors essential for industrial, automotive, electronics and communication equipment, including 5G and 6G technologies, KEL sees ample potential for business growth with the prospective reboot of Japan's semiconductor industry domestically. "The more semiconductors are consumed and produced, the more connectors are used. For instance, when there is an increase in the usage of PCBs on which semiconductors are mounted, connectors that connect these PCBs see higher

demand," explains president Akira Kasuga. "If semiconductor development and engineering return to Japan, it would facilitate application development and provide more opportunities for us to focus on specifications. Previously, it was challenging for KEL to participate in such activities overseas. The return of production and development to Japan, especially for automotive applications, would benefit us since we have numerous automotive manufacturer clients."

With the trend towards miniaturization, semiconductors have become increasingly smaller, and removing the nano-sized particles that can impact their performance and quality is a crucial part of the manufacturing, transport and packaging processes. In the area of semiconductor cleaning equipment, Japanese companies like AICELLO and Miyatsu have and will continue to lead the charge.

"In semiconductor production, every step requires a particular chemical packed and transported with our containers. The size of semiconductor products is becoming smaller, thus, there is a higher chance for contamination or impurities during the process to cause defects to the end product," says Satoshi Morita, President and CEO of AICELLO Corporation. "To that end, because chemical manufacturers are required to keep their products as clean as possible, they also demand the cleanest packaging with high purity. We are the only company that can realize the needed quality for plastic-based bottles for the storage of semiconductor-related chemical products."

Miyatsu, meanwhile, has developed pioneering technology that is a vital part of the semiconductor process. The company's MG6500R, for example, is a batch-ashing device that removes impurities or organic matter from the wafer. Chiharu Miyata, Chairman and CEO of Miyatsu, explains: "At the heart of our MG Series lies the plasma emitter, a vital component that has been a cornerstone of our machinery for over two decades. Ashing, also known as plasma etching, serves as an entry process and may seem daunting to some, but in reality, it is not as difficult as perceived. Once the plasma emitter achieves stability, it efficiently cleans the wafer surfaces, making it a crucial element in maintaining clean and smooth surfaces. This equipment has been highly acclaimed by our customers due to its safety and user-friendly nature."

Moving beyond semiconductors to the wider electronics field, JNC develops high-performing materials for LCD and OLED technologies, as well as silane coupling agents for semiconductor encapsulation materials. JNC's performance products for liquid crystals and organic EL can contribute to energy conservation, while the company's blue light-emitting materials support the creation of OLED displays with high color reproducibility that are less stressful on the eyes.

"In the silicone field, we are developing reactive silicon agents and silicon coupling agents that can be applied to contact lenses and heat dissipation materials. Many coupling agents are also used as semiconductor encapsulants," says JNC president Keizo Yamada, who also reveals that the company hopes to play a role in a recently announced joint venture between Japan Display

Inc and China's HKC on OLED technology. "Some companies have expressed interest in our silicon products in Europe and other regions outside of the U.S. and Asia, and we would like to launch and spread our silicon products in those regions in the near future," he adds.

The growing electronics industry has become a priority area for Sanwa Pump, whose stainless steel magnetic pumps are used in the petrochemicals industry, electronics and semiconductor IC manufacturing, as well in pharmaceuticals and food processing. "The electronics industry has become a focus area for us, along with the food industry. While petrochemicals remain important, we are actively pursuing further diversification of our applications," explains president Kiyotaka Horiuchi, who hopes to establish more successful business partnerships like that which led to the development of a new type of pump suited for semiconductor applications.

"Looking to the future, we recognize the global trend towards carbon neutrality. We aim to contribute to this goal by aligning our business with the carbon-neutral field. We anticipate the need for new technology, products, equipment, and development in this area. I believe that our stainless steel magnetic pumps are well-suited for applications that require liquid agents in achieving carbon neutrality. We are committed to playing a role in this important endeavor."

Supporting the shift to carbon neutrality is also an important endeavor for Nitto Kohki, which manufactures couplings for electric vehicles (EVs), hydrogen fuel stations and lithium-ion batteries (LiBs). "The material used for lithium-ion batteries is a liquid electrolyte solution that requires couplings for its transportation," says president and CEO, Akinobu Ogata. "And the increased need for LiBs is leading to an increase in Nitto Kohki's business as our products are a crucial part of the battery-making process. Additionally, with the advancements made in hydrogen, we are seeing an increase in our business opportunities in that sector too. We have great potential in both directions."

Due to the heaviness of LiBs, aluminum, which has emerged as an alternative to ferrous steel in the automotive industry, plays a crucial role in offsetting the weight of these batteries in EVs. SEC Carbon, which offers a range of innovative graphite and carbon products used in several industries, produces SK-B graphitized cathode blocks crucial for aluminum production. "Utilizing aluminum helps to reduce overall CO₂ emissions, so we are indirectly contributing to a carbon-neutral society, as our cathode blocks facilitate aluminum production," says Nakajima Koh, President of SEC Carbon.

"With the increasing prevalence of EVs, we anticipate further opportunities to fortify this aspect of our business. To align with global trends, we have set our sights on targeting the domestic market in Japan, as well as China and the U.S. for expansion in this sector."

"Our goal is to maintain our position as the world's leading provider of cathode blocks," adds Mr. Koh. "We are dedicated to pushing the boundaries of innovation and introducing special products that pave the way toward a carbon-neutral society."

Tokyo Electron makes R&D investment pledge to ensure company's prosperity and continuous growth



"At Tokyo Electron, we embrace the concept of Creating Shared Value, leveraging our corporate expertise to address various social issues as well as contributing to society."

Toshiki Kawai,
Representative Director,
President & CEO,
Tokyo Electron Ltd.

Since the invention of transistors in 1947, the semiconductor industry has seen the emergence of PCs in the 90s, mobile communications in the 2000s and, most recently, significant growth in AI-centric and virtual reality applications. In other words, it is the driving force behind numerous technological breakthroughs, a state of affairs reflected by the fact that the semiconductor market reached USD 574 billion in fiscal year 2022, and is predicted to almost double by 2030 (Source: 2022 (WSTS)/ 2030 (IBS, August 2023)).

Meanwhile, the so-called MAGIC market (a term originally coined by Tokyo Electron) encompassing the Metaverse, Autonomous mobility, Green energy, IoT/information, and Communications (MAGIC), is also expected to grow steadily in the next decade, with demand for semiconductor production equipment increasing around the globe.

The semiconductor industry, therefore, is expected to have a bright long-term future, but the companies involved in the sec-

The company's long-established commitment to technological innovation, creativity and dreaming big means the future is as bright as ever.



tor need to sit tight and prepare for the future. For its part, Tokyo Electron (TEL), which will soon celebrate its 60th anniversary, has set a new vision.

President and CEO Toshiki Kawai emphasizes that TEL's vision is to be: "A company filled with dreams and vitality that contributes to technological innovation in semiconductors." Indeed, we currently hold about 22,000 patents for semiconductor production equipment, making us the industry leader."

"At TEL," he continues, "we leverage our expertise in semiconductor production equipment to contribute to the world's digitalization efforts and support environmental sustainability, promoting the realization of a more carbon-neutral society. By doing so, we enhance both our corporate value and society's sustainable growth."

Key here is the company's sustained investment in R&D. Mr. Kawai takes up the thread: "We are investing significantly in R&D, having already invested JPY 600 billion between FY2018 and FY2022, and with plans to

invest over JPY 1 trillion between FY2023 and FY2027."

So far, the investments have been a startling success. See, for example, groundbreaking innovations such as etching process equipment capable of reaching a depth of 10 microns at more than twice the speed of previous capabilities while also consuming 40% less power.

In addition to increased R&D funding, the firm has both expanded the production capacity of existing plants and built new plants, and plans to invest 124 billion yen in capital expenditures this fiscal year.

Mr. Kawai highlights the importance of R&D investment. "When I joined TEL in 1986," he says, "the Japanese semiconductor industry held a global market share of 50%, but when the economic bubble burst, many Japanese firms halted their capital investments. In contrast, our overseas customers, such as Taiwanese and Korean semiconductor manufacturers, persisted in their investments. We must keep these insights at the forefront of our minds to ensure prosperity and further growth."

TEL will continue to cater to different customer needs and new entries into the field. Mr. Kawai again: "Our company boasts a diverse product lineup, leveraging various cutting-edge technologies. From deposition, coating/development and etching to cleaning, we have a wide array of offerings. Our products are underpinned by extensive chemical knowledge, and drawing from this rich expertise, we are able to present our clients with a range of proposals and solutions."

Looking to the future, the company is aiming to achieve more than JPY 3 trillion in net sales, an operating margin of over 35% and at least a 30% return on investment (ROE) by fiscal year 2027.

Exciting times are ahead, meanwhile, for the country and Japanese firms as a whole. With comparatively lower profit ratios than larger US and European companies, there is a wealth of opportunities for growth and enhancement, opportunities that are there for the taking if companies such as TEL can continue to demonstrate tangible progress and growth.

Bloom into the future



The world that emerges in a few short years may transcend the boundaries of our imagination. We provide sustained support for an unpredictable future in our capacity as a semiconductor production equipment manufacturer. Why? Because we are confident that awe-inspiring technological innovation nurtures humanity's dreams in the present so they may bloom into the future.

Iwata: “Chemical industry has a role to play in shaping sustainable future”

Expertise in developing new functional materials, production technologies, and quality processes positions Japan’s chemical industry at the forefront of confronting modern challenges.

As with every other global economy, Japanese industry was profoundly affected by the COVID-19 pandemic and the recent decoupling of U.S.-China relations. Nevertheless, Japanese manufacturers have remained steadfastly committed to the principles of quality control and stable supply. In this rapidly evolving political and economic landscape, Japan’s chemical industry has been significantly impacted by environmental concerns and international trend towards carbon neutrality.

Nevertheless, Japanese chemical companies have long demonstrated a strong commitment to addressing environmental issues, says Dr. Takuya Iwata, the President of Iwata & Co.

“All chemical companies have a pivotal role to play in shaping a sustainable future. Many of these companies, including ours, adeptly navigate these challenges using conventional facilities whilst we are actively engaging in diesel transformation and mobility innovation. Our expertise in Japan for developing new functional materials, production technologies, and adherence to stringent quality processes positions us at the forefront of the global chemical industry when it comes to confronting these modern challenges.”

“I must say though,” he continues, “the responsibility towards environmental sustainability extends far beyond the chemical industry alone. It is incumbent upon businesses worldwide to adopt and implement more robust measures and ambitious goals, in a collective effort to safeguard our planet and conserve our environment for the generations to come.”

Confronting its environmental impact is just one challenge facing the semiconductor industry, however. The sector has also been impacted over the last couple of years as a result of increased inventories and drops in demand due to tightening monetary policies, causing the industry to take a significant downturn over the last few months in particular. Nevertheless, all major companies in the sector are expected to rebound over the second half of 2023. Reasons for

“As a renowned trader of chemicals, Iwata & Co. is looking to further contribute to the growth of the semiconductor industry.”

Dr. Takuya Iwata,
President,
Iwata & Co., Ltd.



Customized wet cleaner



New-type sealant for buildings



High-quality sealant

optimism include consumption-driven recovery in China, spikes in demand for microchips in electric vehicles and AI applications, as well as a pause in interest hikes.

“At Iwata & Co., we take pride in our ability to navigate through exceptionally challenging times, and a key factor in our success has been the establishment of resilience in our supply chain,” says the company president. “Thanks to this, we possess the capacity to cater to a wide array of chemicals, including high-purity chemicals and materials

essential for semiconductor manufacturing processes. Nevertheless, as similar semiconductor facilities are established within Japan, we recognize the need to adapt our supply approach accordingly.”

The paramount concern regarding the semiconductor industry’s further growth in Japan lies not only in investment but also in further bolstering supply chain resilience, stresses Dr. Iwata. “It is crucial for the Japanese government to extend support to local semiconductor manufacturers and the

companies that play a pivotal role in sustaining the entire industry,” he says. “By mirroring the domestic supply chain structure implemented by the automotive industry, we can fortify the semiconductor sector’s stability and growth.”

When it comes to semiconductor manufacturing, the industry is now also experiencing a shift in the materials used. Silicon carbide and gallium nitride have been receiving increased attention because of their excellent physical characteristics such as high heat resistance, which in turn helps to enable more efficient electronic equipment.

“We eagerly embrace this potential revolution in the semiconductor industry, particularly for new applications,” says Dr. Iwata. “As novel materials are adopted, or existing applications are enhanced, novel processes become essential, thereby creating lucrative business prospects. Japanese companies, in particular, enjoy an advantage in providing high-quality materials and equipment. We are committed to supplying the necessary chemicals and equipment to facilitate the utilization of these cutting-edge materials.”

Iwata Group is now exploring such opportunities in its production facilities, with a new subsidiary established in 2020 playing a crucial role in a rapidly expanding semiconductor industry in the Kyushu region.

“These small-scale factories epitomize the essence of Japanese craftsmanship, and SMEs like ours possess and maintain advanced Japanese technology,” points out Dr. Iwata. “Our subsidiary represents one of our core strengths, excelling in custom ordering production equipment and maintaining an efficient annual maintenance system. Their contributions are indispensable to the success of new semiconductor manufacturing brands and processes, with their performance expected to soar by an impressive 250% this year.”



AICELLO: Cutting-edge solutions in clean packaging

As semiconductor performance improves and miniaturization progresses, the ultimate clean packaging that can control defects and metal ions is required, with the need for AICELLO's clean container and film solution rapidly increasing. You can check out the products that incorporate AICELLO's latest technology at the company's booth at this year's SEMICON® EUROPA (link below).



"Reducing the defects created by the semiconductor process is indispensable. Our goal is to attain zero defects from the transport and packaging processes."

Satoshi Morita,
President & CEO,
AICELLO Corporation

The first silicon transistor was built in the USA in 1947, an event that is widely heralded as a development that changed everything.

Today, with technology node sizes moving from millimeters to nanos (and beyond), it is fair to say that the art of miniaturization has revolutionized the semiconductor industry, leading to the development of high-performance microprocessors capable of powering a whole range of devices that we have come to consider as indispensable to our daily lives.

Some food for thought at this point: at the current rate of consumption, it is estimated that by



CLEANBARRIER bottle helps maintain the cleanliness of cutting-edge materials

2050 global society will use approximately 200 times more power than it does today. In IT-related areas, that figure is expected to rise to more like 4,000 times current levels.

All of which poses a conundrum for not just the IT sector but the semiconductor industry as a whole. Miniaturization or microfabrication, based on a principle developed in 1965 by Gordon Moore, co-founder of Intel, offers a potential solution.

"By reducing the circuit line width by half," says AICELLO Corporation President Satoshi Morita, "we can lessen power consumption by a quarter."

In order to achieve miniaturization, however, reducing the defects brought on by semiconductor production and packaging processes is crucial.

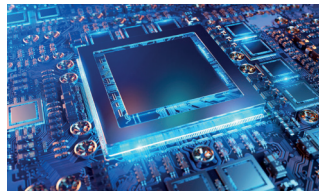


Mr. Morita again: "With the size of semiconductor products growing ever smaller, there is a higher chance that contamination or impurities during the process will cause defects to the end product. In terms of contamination from packaging, there are three potential causes of defects. First is the physical particles; second is the outgas and metal ions that come from resins and resin catalysts; and lastly there is the production environment."

In other words, the packaging, storage and transportation of semiconductor related chemical products needs to be as clean as possible – which is where AICELLO's CB Bottle comes in.

First developed over 20 years ago, when, according to Mr. Morita, "there was not as much demand as there is today", CLEAN-

BARRIER (CB) bottles are blow-molded, multi-layered, high density polyethylene bottles designed to carry ultra-pure semiconductor grade chemicals. Lighter, stronger and more hard-wearing than traditional glass bottles, their purity and elution prevention performance have won rave reviews in the semiconductor industry.



AICELLO, a firm that has cultivated a sense of urgency about the environmental impact of its business ever since its establishment almost a century ago in 1933, hopes that they will one day replace glass bottles altogether.

Originally active in the cellophane industry, the firm shifted its core business to polyethylene films and bottles in the 1970s, dramatically downsizing their portfolio of products in 2008, when with Mr. Morita installed as director of marketing, it began pursuing a company-wide policy known as 'CBS' (CLEAN, BOSELON, SOLUBLON).

A company with a long history of innovation, which has survived periods of economic downturn only to emerge as an internationally renowned pillar of industry, AICELLO highly values the concept of "Dantotsu", which refers to a product or business that is one of a kind, or impossible to replicate.

And, says Mr. Morita, "our clean packaging technology really is one of a kind", which creates huge value in "supporting the semiconductor industry through high purity process chemical packaging and manufacturing equipment parts packaging."

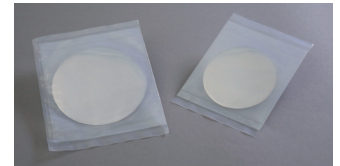
"As far as we know," he continues, "AICELLO is the first to

start bottle production within a cleanroom, something no one had considered doing before we began work in this field."

Nor does development stop at bottle production. Take, for example, the company's HYPERCLEAN Bag MA24, which is used for the packaging of hard disks and other easily contaminated devices.

According to Mr. Morita, it "exhibits a level of purity that is different from the polyethylene bags traditionally used by semiconductor manufacturing equipment manufacturers."

Its biggest feature, he continues, is the world's first standard management of outgas as a packaging material, outgas being a component that is potentially detrimental to semiconductor manufacturing equipment, which can cause defects to the end product.



MA24 contributes to semiconductor miniaturization

Integrating the latest technology among the company's clean bag grades, the MA24 has recently been adopted by one of the world's leading semiconductor manufacturing equipment firms, and has been recognized for its commercial value. It is, moreover, becoming an industry standard for the storage and transportation of semiconductor manufacturing equipment parts.

For more information about AICELLO, those interested are encouraged to visit the company's booth at SEMICON®EUROPA, the single largest event for electronics manufacturing in Europe, with a range of speakers and networking sessions aimed at business and technology leaders, researchers, and industry analysts from across the microelectronics supply chain.

AICELLO
@HARKE

Visit us at booth **B1901**

For appointments: cleanproducts@harke.com, +49 208 3069 1500

SEMICON EUROPA

NOV 14 - 17, 2023 | MUNICH, GERMANY

Leading PCB firm prioritizes sustainability



"We aim to join our forces with business and technology partners to create a sustainable society."

Seiji Miyoshi,
President, FICT Ltd.
(August 2023 Interview)

Established in 1967 as the PCB business unit of Fujitsu, FICT is today an independent company that lives by the same founding philosophy to provide and develop state-of-the-art PCB solutions for global customers.

In 2001, the company invented the Organic Flip-Chip BGA Substrate (FC-BGA), a new technology that has now become a global standard in the semiconductor pack-

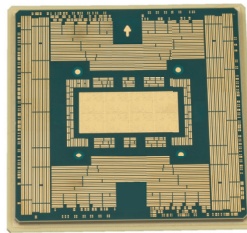
FICT is positioning itself to be a true key player in the global market in testing probe cards.

age substrate world. "Applying the same technology to our probe card products allowed us to develop high performance ST Board, positioning our company as a key player in the global market in testing probe cards (ST Board)," says Seiji Miyoshi, CEO of FICT.

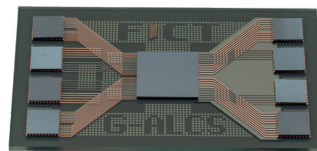
Another technology that the company has developed is the F-ALCS (F-All Layer Connection Structure), which maximizes the wiring capacity of printed wiring boards (over 60 layers) through paste filling and metal bonding. "The distinctiveness of this technology lies in its alignment with the escalating environmental concerns of our times. Given the contemporary emphasis on sustainability, we search for alternative

process solutions to reduce waste-water treatment and electricity consumption as much as possible," says Mr. Miyoshi. "As the realm of high-speed communication pushes the boundaries, signal transmissions now soar beyond 100 GHz. However, the conventional through-hole stub introduces a disruptive interference within this wavelength. In contrast, by using our conductive paste, our any-layer IVH (Interstitial Via Hole) with a one-time lamination approach stands as a stubless solution, facilitating uninterrupted high-speed transmission."

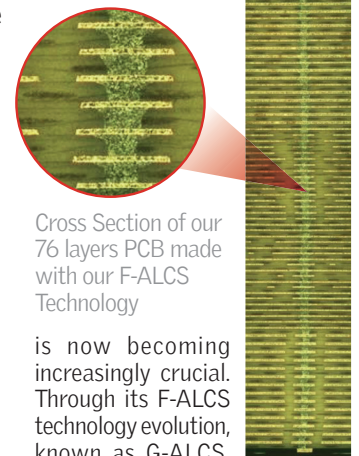
Given the prevalent trend of pursuing a finer wiring pitch, transiting toward glass substrates



Probe Card (ST Board)



Multilayer Glass Substrate Prototype (G-ALCS Technology)



Cross Section of our 76 layers PCB made with our F-ALCS Technology

is now becoming increasingly crucial. Through its F-ALCS technology evolution, known as G-ALCS, the company is now focusing on evolving toward laminated glass technology.

"Going forward, we aim to join our forces with business and technology partners and customers to create a sustainable society with our advanced technologies," outlines Mr. Miyoshi.



Insights from a visionary in manufacturing: unveiling trends and challenges

Exploring the multifaceted nature of Japan's manufacturing, Miyatsu possesses expertise from intricate semiconductor technologies to engineering advanced machinery.



"Embracing this mindset allows us to discover niches, leading to opportunities for corporate growth."

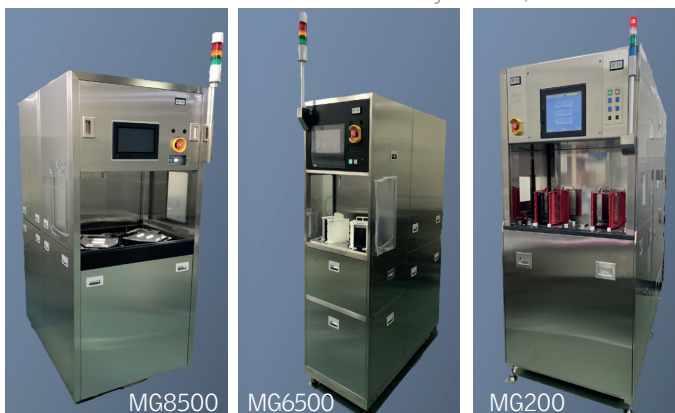
Chiharu Miyata,
Chairman & CEO,
Miyatsu Co., Ltd.

Japanese firm Miyatsu understands the relationship between hardware and software is key in system development. Primarily an equipment manufacturer in the semiconductor and infrastructure fields, Miyatsu recognizes that solely focusing on manufacturing can mean losing focus on understanding and fulfilling its customers' businesses and needs. Therefore, the company, founded in 1969, is actively engaged in the ICT business to react to the specific necessities of its customers. As company president Chiharu Miyata explains: "By supporting our clients with this approach, they trust us to provide the necessary equipment for their manufacturing processes."

One of Miyatsu's key products is its MG200 (Single wafer process type: Strip and Light Etching) device. This product provides a key part in semiconductor manufacturing: removing impurities or organic matter from the wafer. Noted for its

safety and user-friendly nature, the product is the latest in the MG Series which has formed the cornerstone of Miyatsu's business for over 20 years. Looking forward, the company understands that Japanese advancements in stacking technology are set to become highly valuable as semiconductors increase in their layers.

Mr. Miyata, who himself spent time living in the United States, is always open to collaborating with like-minded international partners, and highlights Asia, Europe and the U.S. as particularly important regions. Miyatsu has experience in the international market, developing software and providing client services from its base in Vietnam, and is looking to increase its international network as its business continues to grow.





"HHV CUPLA" fuel coupling for high pressure hydrogen



"Nitto Kohki has an advantage having a foot in both the EV and hydrogen vehicle markets. We have great potential in both directions."

Akinobu Ogata,
President & CEO,
Nitto Kohki Co., Ltd.

Nitto Kohki advanced know-how further contributing to hydrogen fuel and LiB industries

With its pioneering technology, Nitto Kohki is eyeing an increased presence in LiB manufacturing and couplings for hydrogen fuels as the shift to the next-generation of vehicles continues to take place.

With stricter environmental regulation coming into place in countries across the globe, the demand for electric and hydrogen vehicles will continue to increase. This trend is presenting major business opportunities for Nitto Kohki, a Japanese firm that manufactures couplings for vehicles, hydrogen fuel stations and lithium-ion batteries (LiBs), as well as labor and energy-saving technology, machinery and tools.



"delvo" electric screwdriver for automatic screw fastening

In Japan, the company has developed its couplings for hydrogen vehicles together with Toyota, and has also managed to capture market share with couplings for refueling stations by teaming up with a leading Japanese dispenser manufacturer.

"We will be expanding our product lineup and bolstering sales activities to carve out new applications besides fuel cell vehicles, such as transportation equipment and ships," adds Akinobu Ogata. "Nitto Kohki's hydrogen-related products

satisfy Japanese safety standards, which are the most stringent in the world. Fuel cells are expected to find more uses outside the passenger vehicle sector, for example in forklifts, ships, drones, and freight cars, and ensuring safety performance will be crucial."

With growing production of LiBs for electric vehicles (EVs), Nitto Kohki is well positioned to meet increasing demand for couplings used in the transportation of liquid electrolyte solution material used in LiBs, as well as in EV production lines.

"This increased need for batteries is leading to an increase in our own business as our products are a crucial part of the battery-making process," says the Nitto Kohki president. An increase in EV production, particularly in China, has led to sales expansion for couplings used on EV battery production lines, contributing to the record sales level.



Pneumatic tool series for automatic machines "BELTON"

"We see many avenues for increasing our sales activities for this

battery production. In this way, you could say Nitto Kohki has an advantage having a foot in both the EV and hydrogen vehicle markets. We have great potential in both directions."



"COMPACT ZEROSPILL CUPLA" for coolant piping quick connect coupling

Opportunities are also arising for the Japanese firm in the field of automation, and energy and labor-saving technologies, with a highlight product in the pipeline being a new pump that dramatically reduces the amount of electricity required for suction conveyor systems by limiting discharge pressure and flow. Offering energy savings, easy installation, quiet operation, and cleanliness, this new pump makes it possible to significantly reduce power usage. "A prototype has already been manufactured and is undergoing safety tests," Mr. Ogata reveals. "Our aim is to launch the product early next year and customers are waiting with high anticipation. Only so much information can be disclosed about products currently under development, but products contributing to

automation and labor saving remain priority development targets."

Testament to the company's commitment to innovation and product development is its new factory set to open in Fukushima. Designed by renowned architect Kengo Kuma (best known for designing the Tokyo Olympic Stadium), the new Fukushima plant will incorporate the latest cutting-edge technology, along with automation, AI, and other labor-saving technologies. "At this plant, we can raise the standard of the products we make to the next level," the president proudly declares.

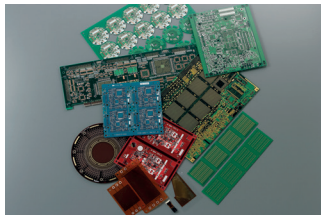
Meanwhile, outside Japan, Mr. Ogata reveals that Nitto Kohki's basic strategy is "to increase brand recognition and to collaborate with influential partners in target markets. As well as actively participating in hydrogen-related trade shows overseas, we are exploring partnerships with companies of good standing."



www.nitto-kohki.co.jp/e

FujiPrix Group looking to bring its know-how to international markets

As the world of electronics continues to advance every day, FujiPrix Group is offering its unique technologies to meet new challenges.



PWB (Fuji Print)

With the growing demand for durable printed circuit boards (PCBs) in sectors such as automotive, FujiPrix Group is focused on improving and enhancing existing technologies to serve global clients.

"Established technologies, such as those dealing with high frequencies, dominate the market, overshadowing newer, more advanced technologies," explains



Yuki Arai, President of FujiPrix Group. "To be truly successful in the Japanese PCB sector, especially as an SME, it requires a clear focus. The key lies not in chasing the latest technology, but in mastering and enhancing standard PCB technology."

Currently, the FujiPrix Group comprises five companies (four in Japan including Apollo

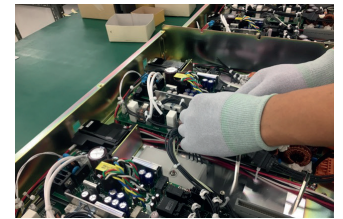
"We are committed to advocating the idea that SMEs can indeed expand and prosper with the right strategies and vision."

Yuki Arai,
President,
FujiPrix Group Co., Ltd.

Giken, Fuji Print Industrial, Faith, Pollux Techno, and one in China, FuJi Print Industrial (H.K.), covering every stage of the printed circuit board supply chain from upstream to downstream. The decisive strength of the group, says the President, lies in its comprehensive integration across the different stages of the PCB process.



Layout design (Apollo Giken)



EMS (Faith)

"It is rare in the industry for a company to be able to handle design, procurement and development in an integrated manner. This integrated approach differentiates us significantly," says Mr. Arai. "This aspect further underlines our distinct market position, whilst our organisational structure also allows us to exploit synergies between the different entities within the group. We are still refining the way we use the network, but we make it easy for clients associated with any of our five companies to connect, for example, if they require the services in which our subsidiary specializes."



www.fujiprix.com

Balancing legacy and innovation: Aikokiki's path to success

Navigating challenges in niche markets: a perspective from Aikokiki, one of Japan's leading manufacturers.



Headquarters office/factory

Founded in 1970, Aikokiki has shown its strategic nous that sets it apart in the dynamic semiconductor landscape.

"Our specialization is in flip Chip BGA semi-finished products, or package core substrates," says company president Tsukasa Kurata, a domain that constitutes a substantial 60-70% of its business. This unique focus offers an undeniable edge in a field where few



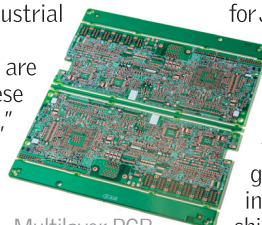
"Balancing legacy and innovation, we aim to become indispensable to our customers."

Tsukasa Kurata,
President,
AIKOKIKI MFG. CO., LTD.

even consider supplying semi-finished products.

An integral facet of Aikokiki's operations is its manufacturing facility in Nakatsugawa, producing PWBs primarily serving factory automation and industrial equipment sectors.

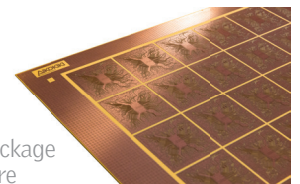
"Many of these boards are supplied to major Japanese electronics manufacturers," the president explains, underscoring their strategic influence in supporting these critical industries.



Multilayer PCB

With Japan's fluctuating role in the semiconductor industry, Mr. Kurata attributes the decline to resource fragmentation and insufficient governmental backing. However, he perceives a chance for Japan to rebound

through investments and collaborations, particularly with effective government and industry partnerships, providing an



Package core

opportunity for a renewed semiconductor hub.

"We acquired the Shibata factory, making preparations for the anticipated market resurgence," he says, with eyes on intriguing synergies, especially in the context of electric vehicles and smart grid projects.

As Aikokiki approaches its 55th anniversary, Mr. Kurata envisions enhanced employee welfare, technological innovation, and sustainable growth, with a roadmap that maintains equilibrium between legacy and advanced products while fostering close collaboration with its parent company.

"Someday, we want to become the only company that is indispensable to our customers in a certain field."



www.aikokiki.co.jp

Attaining the pinnacle of excellence

With its know-how in machinery manufacturing, Koki Tec brings excellence to the sectors that it supports.

In the heartland of Japan's manufacturing prowess, where precision engineering and craftsmanship have been cultivated for generations, the landscape of industry is undergoing a seismic shift. Mikine Ito, President of Koki Tec, a leading manufacturer of selective soldering equipment, explores the challenges and opportunities facing the sector.

Like many others, Koki Tec recognizes the need to adapt to an evolving demographic landscape. As Japan's working-age population shrinks, a labor shortage looms on the horizon. According to the Ministry of Economy, Trade, and Industry, by 2030, Japan could face a labor shortfall of approximately 6.5 million workers. To combat this challenge, the company is leveraging digital innovation to enhance productivity and sustain its competitive edge.

"We can realize more robust productivity improvements by digitizing the 'shop floor,' which has long been regarded as one of Japan's strengths," says Mr. Ito, adding that they are also "making capital investments in both hardware and software."

"To survive, machines must be easy to understand and use. It is no exaggeration to say that this is determined by software."

And, contrary to the belief that the younger generation has lost its enthusiasm for manufacturing, Koki Tec believes in nurturing the traditional Japanese *monozukuri* spirit, a commitment to relentless craftsmanship.

"I consider it my duty to guide, steer, and instill this temperament and spirit in the young generation," the president affirms, and this approach extends beyond the local workforce.

Through strategic partnerships with group companies like Fukoku Tokai and Dynatron, the company ensures a diverse pool of skilled personnel to drive their operations, with the world as its stage. Koki Tec is venturing into international markets to counteract domestic labor shortages. The sales composition is currently 70% domestic and 30% overseas, but this is a ratio it plans to shift in favor of a more global presence as the president explains.



"As a machinery manufacturer, it is crucial that we establish a direct rapport with our clientele to adeptly comprehend their requisites."

Mikine Ito,
President, Koki Tec Corp.



"We are looking into the possibility of entering the North American and European markets, where it is currently thin on the ground," explains Mr. Ito, who goes as far as to say that the aim is to increase total sales by 1.7 times by 2025, primarily driven by this international expansion.

And Koki Tec is not only responding to demographic shifts but also aligning with key global sustainability goals, which includes devel-

oping a next-generation selective soldering machine that focuses on reducing power consumption during operation. This innovation is expected to make a significant contribution to local communities and environmental sustainability.

As electronic devices shrink in size, printed circuit board (PCB) manufacturing demands higher precision and specialized equipment. Koki Tec is focusing on post-processing and large special

components, areas where manual soldering is challenging due to component size or tight arrangements. Of course, this all comes against the background of the paradigm shift to electric vehicles.

Safety is paramount in industries like automotive, where solder joint inspection is vital. Koki Tec ensures strict quality control through a rigorous process that checks equipment's long-term reliability before installation. Also being utilized is advanced non-destructive testing equipment to inspect individual solders.

With a global expansion strategy that involves establishing local subsidiaries and sales offices in strategic regions, starting with Thailand and India, the idea is to collaborate with local partners and distributors to establish a strong presence in each market. The president knows the importance of the strength that comes from his group companies' collaboration.

"We believe that our management strategy is most effective when it creates cooperative synergies between group enterprises," he says. "Each company plays a vital and specialized role, and together they work in harmony to accelerate our activities as a global company with a competitive edge."

"This harmonization of expertise in hardware, assembly, and software is not just a perfunctory collaboration, but strategic management over the medium to long term. With the goal of gaining the top share of the global market for soldering equipment, we will accelerate our activities with an indefatigable and unyielding spirit."

As the President of Koki Tec, Mr. Ito embodies the determination and vision that drives Japan's manufacturing sector forward in a changing world, and he aims to have the world's leading manufacturer of soldering equipment.

KEL connecting the world with connectors



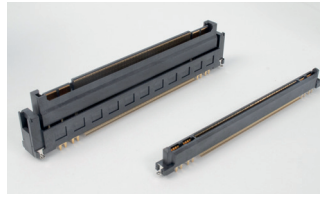
"To improve brand recognition overseas, we introduce our products through exhibition and media/web ads and aim to acquire new customers."

KEL

Akira Kasuga, President,
KEL Corporation
www.kel.jp

KEL is a Japanese connector manufacturer specializing in industrial equipment, whose focus is on niche markets and products. We boast considerable know-how and expertise in miniaturization and high-pin-count products, high-speed transmission,

By developing attractive new products for automotive, image and communication equipment, KEL aims to further expand its presence internationally with products full of originality.

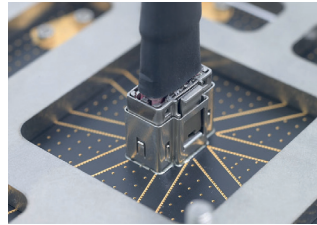


PCI Express 5.0 floating connector (JB Series)

and noise shielding, developing unique and original products based on these technologies.

Our most recent developments include the PCI Express 5.0 compatible floating connectors (JB series) and 224Gbps PAM4-compatible high-speed transmission board-to-cable connectors (HSP series). These are the industry's most advanced next-generation connectors, and in the future, KEL aims to oversee their adoption in automotive, image and communication equipment.

With a history of 62 years as a connector manufacturer, KEL has developed an excellent reputation



224 Gbps (PAM4) differential transmission cable connector (HSP Series)

for quality and technology. Our products are highly trusted and rated by many customers in Japan. Among our lineup, the product groups of floating connectors and high-speed transmission connectors offer an especially wide selection.

Our floating connector is the first 0.5 mm pitch product approved as an automotive connector. This product is our recommended connector that can be used in various markets and devices other than automotive. Meanwhile our high-performance connectors use revolutionary technologies to harness micro coaxial

cables all at once without soldering, and have applications in areas such as imaging and medical equipment.

As part of our medium-term management plan, one of KEL's growth strategies is to strengthen overseas business in China, North America and Europe, where the ratio of exports to total sales has quadrupled compared to 10 years ago. In the future, we intend to further increase brand recognition overseas and contribute to global society.

Our sustainable vision is to "contribute to an abundant, sustainable society with connector technology". We have also established a specialized unit within the company and are actively engaged in activities related to sustainability.

KEL's management vision is to "become a company that can contribute to the world as a connector manufacturer". We will continue to develop attractive products so that we can connect the world with connectors.

Driving sustainable innovation: JNC Group's journey as a pioneer in Japan's chemical industry

With history dating back more than a century, JNC continues to develop technology and harness expertise for a rapidly evolving world.



Chromatography resins

In a move towards sustainable growth, JNC Corporation's president, Keizo Yamada, believes the company's pioneering culture and strength in materials design based on top-class computational science in Japan will enable global expansion targeting new customers. And at the core of this is our contribution to the harmony and development of people, society, and the environment.

"Since our founding, we have been promoting the use of hy-

"As a leading chemical company, we aim to contribute to society's progress through superior technology."

Keizo Yamada,
President,
JNC Corporation



droelectric power in our production activities," Mr. Yamada says. "Renewal of the facility is underway for future use, and is scheduled for completion in 2024."

JNC's production hub in Kumamoto, Japan, is now fully powered by hydroelectricity.

The company is also active in research and development to reduce environmental impact and become carbon neutral.



Hydroelectric power plant

In the area of silicon materials with low GHG emissions, the company develops and sells reactive silicon agents, applied to contact lenses, heat dissipation materials, and paint/coatings, as well as silane coupling agents used for semiconductor encapsulation materials.

The company manufactures and sells chromatography resins for biopharmaceutical and vaccine purifications. These are



naturally derived and have a low environmental impact, and recently contributed to the purification of a new type of corona vaccine.

In the Performance Products segment, the company's products for Liquid Crystals and Organic EL can contribute to energy conservation. In addition, JNC's blue light-emitting materials contribute to the realization of OLED displays with high color reproducibility that are less stressful on the eyes.

There is also an uncompromising commitment to quality assurance and ethics. "Ethical concerns, particularly those pertaining to human rights, lead to immediate termination of partnerships," the president states.

JNC
www.jnc-corp.co.jp

Kanto looking to provide quality reagents for the growing semiconductor and life science industries

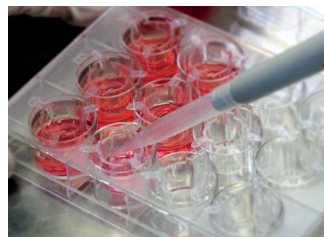
With over 50,000 reagents, Kanto Chemical is developing unique and innovative technologies to support research and manufacturing in the ever-growing semiconductor and life science sectors.

While Japan has faced stiffer competition from regional competitors in the chemical manufacturing industry, Japanese firms still hold dominance when it comes to the high-performance chemicals segment. One such company in this field is Kanto Chemical, which produces chemical reagents that are utilized in a variety of industries, including medicine, food, chemistry, and semiconductor manufacturing.



Ultrapur™

Since its foundation in 1944, Kanto Chemical has been actively contributing to society as a comprehensive reagent manufacturer, by striving to make products that meet customer needs. With over 55,000 products in its extensive line-up, the company ensures its clients have a wide variety of solutions available, from basic reagents up to high-performance grade.



ad-MED Vitrigel™

One of the Japanese enterprise's main focus areas these days is high-purity, high-performance chemicals for semiconductor manufacturing. The sensitivity and accuracy of analytical instruments used to improve the analysis of ultra-trace elements in semiconductor manufacturing has become an ever-growing need in the industry. As such, strict specifications are now necessary for the reagents used in the manufacturing process. In response, Kanto Chemical has developed the Ultrapur se-

ries, which consists of ultra-grade, high-purity reagents specifically designed for ultra-trace analysis.

"This Ultrapur series is specifically designed for the analysis of ultra-trace elements, making it the highest-quality reagent available in our acid product lineup," says company president Manabu Nozawa. "We offer two variations within this series: Ultrapur and Ultrapur 100. Ultrapur represents the highest grade and consists of an 11-product lineup, while Ultrapur 100 is a slightly lower grade with four different products. The Ultrapur reagents ensure the traceability of 41 elements, ranging from one part per trillion (PPT) to 10 PPT, whereas Ultrapur 100 offers reduced cost while maintaining satisfactory quality. Based on our customers' specific needs, we recommend the most suitable reagent type."



C=Chemicals
I=Industrial Products
C=Collect
A=Associate

Origin of the corporate logo

Kanto Chemical's primary customers are laboratories and researchers engaged in ultra-fine trace analysis, with its ultra-high purity reagents used for semiconductor, pharmaceutical industry and environmental analysis. "To ensure accurate analysis, with contamination eliminated to the maximum extent possible with chemicals and storage containers, ultra-high purity reagents and chemicals play a crucial role," adds Mr. Nozawa.

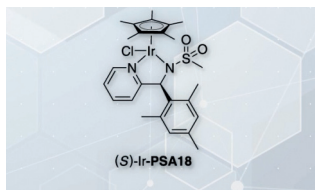
At this year's Environmental Chemistry Symposium in May, Kanto Chemical was there to promote its product Vitrigel-EIT, a cell culture testing method listed under OECD test guidelines that enables the assessment of chemical substances for potential eye damage. "Formerly, rabbit eyes were used for such testing, but with the

ban on animal testing, in-vitro test methods using human cells are now necessary," the company president explains. "We provide equipment that enables the culture of corneal cells and estimates the irritancy of chemical substances based on electrical resistance. Currently, we are focusing on the European and U.S. markets, where there is growing demand for our product."

Another of Kanto Chemical's highlight products is Ir-PSA, an asymmetric, reductive amination catalyst that can efficiently synthesize optically active compounds and, as such, has garnered significant attention from pharmaceutical companies.

This innovation came about thanks to Kanto's joint research with Nobel laureate Dr. Noyori related to Enantiomer more than 20 years ago.

"Utilizing this technology, we produced Ir-PSA, which is an iridium-based catalyst," says Mr. Nozawa. "What sets our catalyst apart is that it's simplifying the process of synthesizing the optically active amine, which is an important structure of API (Active Pharmaceutical Ingredient). Our current focus is on promoting this catalyst to overseas pharmaceutical companies that have shown a keen interest in our product. We recently showcased it in Chemspec Europe."



Asymmetric Reductive Amination Catalyst

Indeed collaboration with academia has been key to Kanto Chemical's product development, with the company having partnered with several Japanese academic and research institutions in Japan in various fields, including semiconductors, pharmaceuticals, and biosciences. And Mr. Nozawa reveals he would like to extend collaboration with overseas universities, particularly those in the



"We have been actively contributing to society, as a comprehensive reagent manufacturer, by striving to make products that meet customer needs, and by supplying high-quality reagents."

Manabu Nozawa,
 President & CEO,
 Kanto Chemical Co., Inc

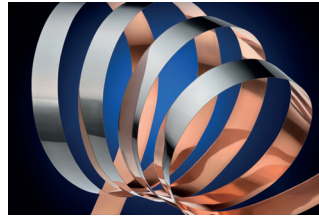
United States. When it comes to international business expansion, the U.S. is also the company's main focus, particularly due to the resurgence of the semiconductor industry that is currently happening stateside. "We are collaborating with Kanto Corporation in the U.S., along with our partner companies, to launch a robust sales promotion campaign within the U.S. market," explains Mr. Nozawa.

International growth in the U.S. and beyond will tie into the overarching mission for the company, which the Kanto Chemical president stresses, is "to provide products that are needed, useful, and contribute to society".

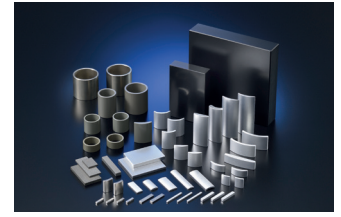
"With the changing dynamics of society, new industries will emerge, and there will be a growing demand for different products. Our goal is to meet these evolving needs by leveraging our expertise in *monozukuri*. We aim to support the growth of our company and countries worldwide, while also nurturing the well-being and happiness of people around the globe."



10,000-ton free forging press



Clad metals



Neodymium magnets NEOMAX®



Turbine case



Industrial robot cables

Professional, progressive and proactive: that's the Proterial way

Having begun 2023 with a major rebrand, the century-old supplier of high-performance materials has embarked on a new, exciting chapter with big ambitions for global growth.

Founded in 1910, Proterial supplies high-quality, cutting-edge materials to manufacturers in Japan and abroad, chiefly in the automobile industry.

The company also focuses on clients in industrial infrastructure – principally rolling stock and aerospace – and the electronics sector.

Previously owned by Hitachi, Proterial was known as Hitachi Metals until January this year, when it changed its name following the company's purchase by a consortium led by the private equity firm Bain Capital.

"The name change provided a unique opportunity to rebrand the business and differentiate ourselves from Hitachi's diverse portfolio," explains Proterial's president and CEO, Sean M. Stack.

"While we respect the history of the original Hitachi Metals business, the new name allowed us to focus on our core business and showcase our commitment to providing the attention, capital and resources necessary for success.

"Proterial reflects the essence of our corporate philosophy. It combines 'pro' with the word 'material'. 'Pro' represents our 'three pros': professional – work that exceeds expectations; progressive – a spirit that keeps challenging; and proactive – an enterprising attitude.

"Material" refers to the high-performance materials that our



"The decision to rebrand was driven by the team at Proterial. They analyzed our business, culture and future aspirations, resulting in the choice of the new name."

Sean M. Stack, President & CEO, Proterial, Ltd.

original technologies produce, underpinned by the 'three pros'."

Proterial, Mr. Stack adds, has a "more international sound" – a quality that goes hand in hand with efforts to bolster the worldwide market presence of a company that has established overseas sites in Asia, Europe and the United States.

"Historically, we have been primarily focused on the Japanese market," he says. "However, we recognize the tremendous opportunities to expand and gain more market share with customers outside of Japan. To achieve this, we need to adopt a global mindset and become a leader on a global scale.

"This entails deploying resources strategically in different regions to

cater to the needs of our Japanese customers while also penetrating new markets, such as North America and Europe.

"We possess technologically advanced products that have great potential in these markets. We need to develop a forward-thinking mindset and establish the necessary infrastructure to capitalize on these opportunities."

Proterial has been identifying specific segments in the company's business portfolio where there is ample room for growth, Mr. Stack continues.

"Our specialty steel business unit, which focuses on nickel-based alloys, is also an important area of focus," he reveals, "In the business

unit, we have allocated resources to become a more impactful player in the global aerospace market."

Significantly, specialty steels have a major role to play as Proterial's automotive clients tackle the transition to electric vehicles (EVs).

"In our specialty steel business, we focus on products that increase EV battery performance and productivity, such as clad metals," Mr. Stack says. "Through our ability to combine materials effectively for battery platforms, we are able to offer benefits that alternative methods like welding cannot provide."

As Proterial embarks on the latest exciting chapter in the firm's 113-year history, Mr. Stack concludes one thing is crucial to achieving success: the company culture.

"When my last day as president and CEO arrives," he says, "I would like to have created a culture of accountability, where everyone feels ownership of the results. We would collaborate with our customers to more efficiently identify and resolve problems.

"Being able to create this culture would mean successfully delivering our strategy, satisfying our customers, and achieving a strong financial performance."

PROTERIAL

www.proterial.com/e

With the pride of carbon

To realize carbon neutrality, our products are widely contributing to various industries.

Since its founding in 1934, SEC Carbon has consistently led the way in developing and producing top-quality graphite products. Today, as a vital contributor to carbon neutrality efforts, the company offers a range of innovative products that play a pivotal role in reducing CO₂ emissions and advancing sustainability.

This includes graphite electrodes for electric furnaces, offering substantial reductions in emissions compared to traditional blast furnaces, and SK-B cathode blocks crucial for aluminum production, helping to reduce the weight of automobiles. The company also specializes in Carbon & Graphite specialty products and Fine Powder, essential components and battery materials for electric vehicles.



Carbon & Graphite Specialties

These Carbon & Graphite specialty products have applications across various industrial sectors, including chemical, electrochemical, machinery, and metallurgy, and can be used independently or as composite materials with resins and metals. SEC Carbon excels in precision machining, utilizing large and long-sized graphitized blocks manufactured through extrusion forming. These products possess outstanding heat and chemical resistance plus electrical conductivity, making them ideal for use in molten salt electrolysis electrodes. The resultant production of lightweight and robust metals like magnesium and titanium, used in portable devices, automobiles, and aircraft, contribute to weight reduction and fuel efficiency. Continuous



Large and long-sized graphite block



refinement of product grades and exploration of new product development taps into new markets and attracts new customers.

The use of Fine Powder, an exceptionally pure and crystalline graphite powder, includes sliding materials, batteries, paints, and electrical components. These are manufactured using state-of-the-art production equipment and advanced graphitization and processing technology, ensuring unmatched stability in product quality. In addition, a diverse lineup of natural graphite and carbon powder is tailored to customer applications,

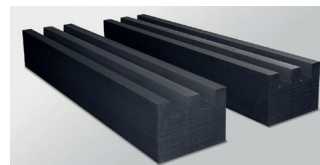


Fine Powder

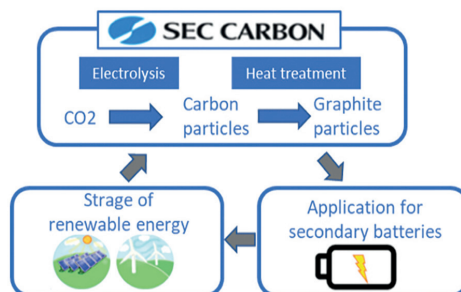
available in a broad range of series and sizes from 1 to 100 micrometers. The increasing demand, particularly in the expanding EV market, has prompted a continuous expansion of production capacity.

The importance of aluminum in reducing automotive weight and achieving global energy savings and carbon neutrality cannot be

overstated. The demand for cathode blocks used in aluminum smelting is on the rise, and SEC Carbon stands



SK-B, Graphitized Cathode Block as the world's pioneer in the development of graphitized cathode blocks for highly efficient aluminum production. The company's consistent quality and production for over 50 years has earned the trust of aluminum smelters worldwide. The Kyoto Plant, the world's largest graphitized cathode production facility, employs a highly efficient swing production system with



Graphite Electrodes

graphite electrodes for steelmaking, ensuring price competitiveness.

The global shift towards achieving carbon neutrality has led to a growing preference for electric furnaces, which can reduce CO₂ emissions to one-fourth compared to blast furnaces, with demand for associated graphite electrodes expected to soar. SEC Carbon's legacy dates back to 1962 when it successfully commercialized a 24-inch large-diameter electrode, then the world's largest, and the company has since established unwavering trust and gained recognition for its development capabilities and quality at home and abroad. Through its premium graphite electrode, the company remains committed to making substantial contributions to energy cost reduction and productivity improvement in electric furnaces.

Furthermore, as part of its dedication to achieving carbon neutrality, SEC Carbon is actively working on capturing and repurposing CO₂ as a valuable resource. The company plans to commercialize this groundbreaking technology and extend its use globally. In line with the call for "carbon neutrality and the realization of a decarbonized society by 2050," there is a growing demand for "CO₂ recycling" alongside CO₂ emission reduction efforts. SEC Carbon's pioneering work involves producing carbon particles from carbon dioxide using molten salt

electrolysis technology, subsequently transforming them into graphite particles through heat treatment. An innovative approach to converting carbon dioxide into a valuable resource, and contributing to a more sustainable future.

VALQUA strengthening semiconductor and digital areas

With its unique technology and accumulated know-how, VALQUA is providing key sealing products to a range of industries.

Established in 1927, VALQUA Group is a pioneering company in the fields of seal engineering and fluororesin-based materials, with the Japanese firm having established a successful presence in this niche area thanks to the trust and brand strength it has built up over the past 90 years.

VALQUA is well-known as the manufacturer of Valflon, a PTFE-based (polytetrafluoroethylene, commonly known as Teflon) material that has a wide range of applications. Having acquired PTFE raw material from DuPont in the U.S. some 70 years ago, VALQUA was the first company to successfully commercialize it, according to Chairman Toshikazu Takisawa. "Valflon has excellent characteristics in terms of temperature control, friction and high resistance. Even though this material is difficult to process, we were able to establish the methodology to do so, which gives us an advantage. This also applies to other materials we have created, such as Elastomer. We are able to come up with the right recipe to create the material that is best suited for our customer's applications, and we have the right processing technologies."

VALQUA's main focus used to be on sealing materials for petrochemical and petroleum refining industries. However, these days sales of sealing materials for semiconductor manufacturing account for about half of its total sales. Aside from the semiconductor industry, the company is also expanding its services into aerospace, bioscience and particularly defense applications. "Since contributing to the defense industry has been a part of our history, we want to look more into it as it is one of our four new focus fields," adds Mr. Takisawa. "We are a trusted industrial partner for defense industry agencies. There is a need for Elastomer materials in the air and marine fields. Japan and the U.S. are working together to develop defense equipment. As a certified supplier, we are aware of the information that we receive.



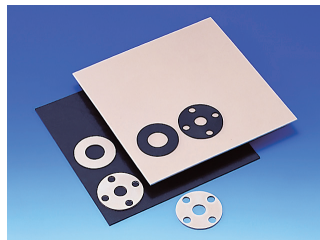
"We at the VALQUA Group have worked tirelessly to offer our customers both the 'value' and 'quality' that our company name derives from."

Toshikazu Takisawa,
Chairman & CEO,
VALQUA, Ltd.

Meanwhile, the resurgence of the semiconductor industry domestically – with TSMC and Rapidus investing and building factories in Japan once again – bodes well for VALQUA, which is a global supplier to both companies. "As we are their global supplier, we will be able to cater to them domestically in Japan too," states the VALQUA chairman. "Also, we are now about to build new factories in Japan, and we are relocating our manufacturing location from China to other countries in the Asian region. I am taking the U.S.-China decoupling rather positively because it may serve as a trigger to bring back *monozukuri* manufacturing possibilities and innovation to Japan. Moreover, it could be the start of another technical innovation expansion in Japan."

When it comes to innovative technologies, VALQUA has recently introduced MONiPLAT, an equipment inspection platform used to assess factory operations. Asked about the motivation behind this development, Mr Takisawa responds: "We supply seals and gaskets to customers, which are our main products. However, these days, there are not as many experienced workers working at the factories who can pass down their knowledge to the younger, less experienced workers. There are fewer people who are able to really properly utilize our products. To fill in this gap, we are offering this service to help our customers transfer the knowledge of operating these materials and ensure safety while using IT and AI."

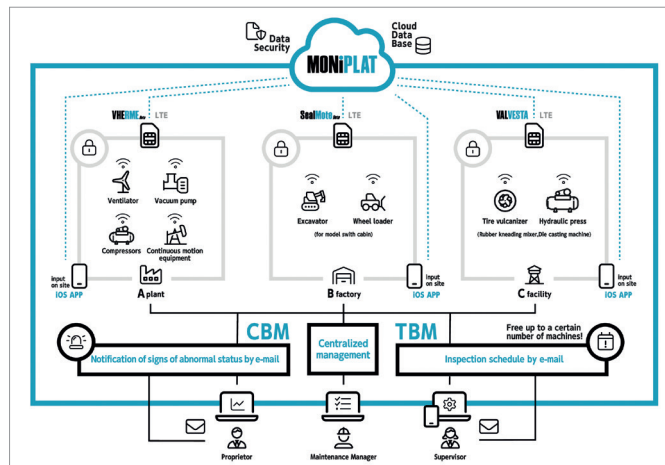
Indeed, commitment to skills development is at the core of VALQUA's values. "For us, *monozukuri* (manufacturing) goes hand in hand with *hitozukuri* (human development), which refers to people, and we have been emphasizing it. We are training and educating the right people to manufacture the products that we need to make."



Valflon™



Lined Tank



MONiPLAT diagram



O-ring



Wire Harness Seal



Metal Bellows

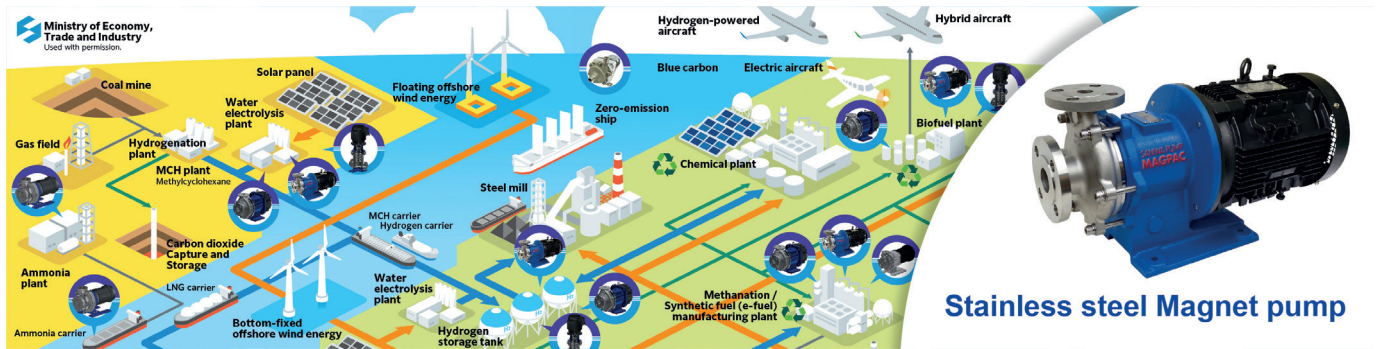


Lined Pipe



Striving for a net-zero society through innovative magnetic pump technology

As a top niche manufacturer of stainless steel magnetic pumps, Sanwa Hydrotech aims to establish a leading position in this specialized global market to achieve a net zero society.



Stainless steel Magnet pump

Founded in 1934 as a pioneer in stainless steel casting, Sanwa Hydrotech has grown to become a top niche manufacturer of stainless steel magnetic pumps in Japan. Under a strategic vision to create new niche markets and become the leading manufacturer in these, we have expanded into a wide variety of industries, including the semiconductor, liquid crystal, energy, and food industries, rather than limiting ourselves only to the conventional petrochemical sector.



The inspiration to develop magnetic pumps came from a shift in our environmental conscience. We saw a growing demand in the petrochemical industry for pumps with superior corrosion resistance and durability, and that could fully prevent leakage of harmful and toxic liquids, both for the sake of the natural environment and human safety. As a result of our continuous efforts in pioneering leak-free magnetic drive pumps, our global sales had approached 200,000 units by 2022, making us the top manufacturer of metal magnetic pumps, including the development of loading pumps

for LPG transport trucks, cooling systems for data centers, pumps for semiconductor applications, and aseptic-compliant magnetic pumps for the food industry. In the spirit of always challenging ourselves in new ways, Sanwa Hydrotech is now focusing on two main objectives as we approach our 100th anniversary: to enhance global recognition of Sanwa Pump and to build strong partnerships. In pursuit of these goals, we will participate in AICHEMA 2024 in Germany – the world’s largest chemical machinery and equipment exhibition – for the second time. Led by a project team consisting of young professionals, we will promote Sanwa Pump globally and work to deepen relationships with international distributors and forge new business partnerships.

Net zero is an emerging focus of our global operations. At Sanwa Hydrotech, we believe that our magnetic pumps will be crucial in novel industries that will emerge during the global transition to net zero. Our magnetic pumps use few consumables, are highly efficient, and work without additional equipment, making them well-suited for net zero ini-

tiatives. They have already been implemented in processes such as chemical recycling of plastic bottles, materials manufacturing for lithium-ion batteries essential for smartphones, and fuel stations for hydrogen-powered vehicles. They also have a proven track record of adoption in the latest technologies such as methanation aiming to economically reduce CO₂ emissions using existing infrastructure, green hydrogen production equipment, and CO₂ separation and recovery systems.

The latest net zero technologies are still in the process of evolving, and what is required of pumps in such systems changes constantly. Therefore, we believe that by actively exploring potential needs and making proposals, we will be able to contribute to achieving a net zero. Currently, we are working on the development of magnetic pumps for liquefied ammonia gas, which must meet strict requirements: no ammonia leakage, as it is a flammable liquid harmful to the human body, and the ability to withstand high pressure and low temperatures. While these criteria are quite demand-



“We believe the potential of magnetic pumps will expand globally in the future.”

Kiyotaka Horiuchi, President, Sanwa Hydrotech Corporation

ing, if achieved, these pumps will expand the potential of ammonia as a new energy source.

Following in the footsteps of our founder, who had a true pioneering ethos of “constantly developing new technologies, new materials, and new products”, Sanwa Hydrotech aims to grow its business to become an industry leader through the development of “NET ZERO” markets and with our products that combine superior technical know-how with added value. As well as meeting customer needs, we aim to become the top manufacturer in this highly specialized market by building excellent relationships with partners and tapping into potential needs to become an indispensable company across a wide range of industries – especially those related to net zero.



Precision thermal spraying for any situation

Kurashiki Boring specializes in surface modification and thermal spraying that creates lightweight components and restores worn parts to their former glory.



Shock diamonds
(High velocity oxy-fuel spraying)

In the world of manufacturing, every company seeks marginal gains to get one step ahead of the competition. Japanese thermal spraying company Kurashiki Boring help its customers achieve by creating lightweight components with high-quality functionality.

Established in 1957, Kurashiki Boring specializes in surface modification and thermal spraying, a process that applies wear-resistance, anti-corrosion properties or thermal insulation to components. The company's services and products can be used in extreme environments; from 1,000-degree-Celsius temperatures, to high pressure environments, and even in sea water. This is made possible by Kurashiki Boring's network of in-

"Our coatings and services can extend the life of manufacturers' equipment, which I believe creates better value than a piece of new equipment."

Sayaka Sako, President,
Kurashiki Boring Kiko Co., Ltd.



dustry experts who are consulted when new coatings are developed.

Company president Sayaka Sako says one of her company's strengths is being able to respond to the specific demands of any customer – be they end-users, OEMs, or assembly manufacturers. Kurashiki Boring's coatings can be used for CFRP and alumi-

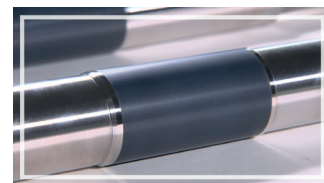
num, while in the semiconductor market its products extend the life of manufacturers' equipment through its coatings for worn or damaged parts. This restoration

service can be applied across a wide range of industries to ensure accurate roundness and cylindricity in worn items.

Mrs. Sako reveals Kurashiki



Various mechanical parts



Wear-resistance coating (ceramics)

Boring is seeking to expand into the aerospace field, especially in parts such as combustion chambers, compressors and turbines. The company's spraying services have enabled it to grow internationally, working with representatives from countries such as Australia, Indonesia, and South Korea, and Mrs. Sako says further expansion into the Asian market is on the horizon. As the world seeks evermore lightweight solutions, and sustainable practices like the restoration of worn parts, specialized companies such as Kurashiki Boring will continue to play a key role in driving manufacturers into the future.



**KURASHIKI
BORING KIKO**

www.kbknet.co.jp

Cutting into new markets

Despite its relatively short history, MicroCut is looking to bring its unique expertise to the wider U.S. market.



"Our primary focus is to make a strategic entry into the lucrative U.S. market, with particular emphasis on key sectors such as medical equipment, military, aircraft, and space industries."

Harukuni Takagi,
President, MicroCut Co., Ltd.

Complex problems often require tailor-made solutions, and this is certainly the case when it comes to working with intricate materials.

Japanese firm MicroCut has not been deterred by the intricacies of difficult-to-cut metal materials and has grown into one of the leading solutions providers for the industry.



Streamlined production lines

Established in 2003, MicroCut has always had precision engineering and digitalization at the heart of its company philosophy. The company has developed a start-of-the-art management system with a track record of maintaining high accuracy in its operations and management processes. MicroCut is targeting zero defects in its production process, and company president Harukuni Takagi says:

"We have harnessed a wealth of valuable data, ensuring the utmost precision in our cost calculations and defect prevention efforts."

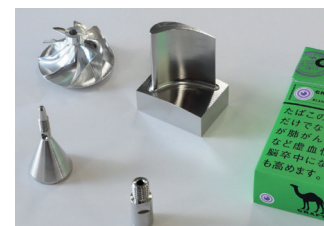
In parallel, MicroCut's production management system plays an essential role in its processes, encompassing essential components such as planning, lot management, analysis, and cost analysis to create an interconnected workflow.

As an innovator, MicroCut is focused on the future of its industry and is currently developing



Automated production system

solutions for the plating of electric vehicle semiconductors, while during the pandemic it launched



High-precision products

its U.S. branch in San Diego to develop medical equipment. With a base established in the U.S., Mr. Takagi reveals the company has its eye set on entry into the country's medical equipment, military, aircraft, and space industries.

Throughout this expansion, MicroCut will remain focused on quality, as Mr. Takagi says himself: "Delivering excellence has consistently positioned us as industry leaders in high-quality outputs and reliable delivery, a legacy we have proudly upheld since our establishment."



www.microcut.jp