

Japan's Hidden Champions in the spotlight

Japanese manufacturing's global reputation for *monozukuri* (craftsmanship) and high-quality has hinged on corporate giants such as Sony, Toyota, Panasonic and Honda. But the true strength of Japanese industry lies largely with the smaller, lesser-known companies that provide high-quality products, parts and machinery as B2B manufacturers.

Today, these so-called "Hidden Champions" have put themselves at the forefront of the latest global shifts, from 5G/6G internet, Industry 4.0 technologies and electric vehicles (EVs), to renewable energies, large-scale industrial waste reduction and the path towards carbon neutrality.

Thanks to these companies, Japan will lead the way in many of these aspects that will define the first half of the 21st century, with their efforts always underpinned by a desire to contribute to society and the environment. This long-held trait of Japanese manufacturers dates back to their emergence in the post-World War II period, as Yasuyuki Hiroto, President of Kyoei Steel, explains.

"The Japanese people shifted their mindset to rebuild the country," he says. "They made efforts to contribute to the world and global society, and that included, for example, Sony and other leading Japanese companies. All of them are focused on contributing to the world, repenting the experiences of the war. The idea of contributing and creating a driving force has been the driving force behind their efforts."

Kyoei Steel's efforts focus on "green steel" manufacturing and the recycling of industrial waste, as the company looks to align itself with the UN's Sustainable Development Goals (SDGs), which are also a key priority for Ibara Seiki, a manufacturer of auto-parts, robotics and industrial machinery parts. "Our philosophy is 'The Creation of Security' to contribute to society and our mission for 2030 is based on the SDGs. In fact, we started making CO₂ reductions as part of our contribution to the environment even before the SDGs," explains president Kazuhiko Ueno.

The shift towards a carbon-neutral society is also shaping



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

the priorities of Kawasaki Thermal Engineering (KTE), which develops highly efficient and environmentally friendly hydrogen-fueled boilers. "My mission is to make steady progress towards our goals and towards the realization of a carbon-neutral society," states KTE president Susumu Shinohara. "For our new products, we are currently trying to achieve ambitious targets for carbon emission reduction and we have also been looking at the area of hydrogen products. Looking at the future, we will continue to produce solutions towards the creation of an eco-friendly society and industry."

From 5G/6G internet, IoT and Big Data, to AI and robotics, the power of Industry 4.0 technologies to change how we live and work depends greatly on the power of advanced semiconductors. And while Japan has significantly lost its global market share in semiconductor production, it remains a leader in semiconductor manufacturing equipment thanks to the likes of Tokyo Electron (TEL), which is investing ¥400bn (\$3.5bn) in R&D over three years.

"In the next 10 years, our industry will double," says Toshiki Kawai, President of TEL. "Therefore, in order to lead the industry growth while remaining a market leader, our company will continue to develop cutting-edge technologies, utilizing our long-standing expertise and ensuring the best services with the best partners. Therefore, Tokyo Electron's goal is to be the game-changer, rather than follow the industry."

A major supplier to TEL, Osaka Vacuum is a leader in the field of vacuum pumps used in semiconductor production, a market worth \$480 billion that is expected to grow to \$1 trillion by 2030. "The semiconductor in-

dustry has the biggest potential for our products. For example, iPhones ask users to send data to iCloud every two weeks, and this process uses semiconductors," says company president and CEO, Kazuyuki Kasaoka. "I'm certain that there will be an increasing amount of data science applied in electronics and devices, and our pumps will surely serve this industry well."

KYODEN, a manufacturer of printed circuit boards (PCBs), also has big plans for the future as the company looks to meet demand spurred by 5G internet, IoT and EVs. "In the future, cars will need to be connected with 5G technology, and that is our new target now. We want to concentrate on the application of 5G to cars using power semiconductors," explains president Kiyotaka Mori, adding that KYODEN is constantly accumulating high-frequency and high-heat dissipation technologies that are mainly used in power semiconductors. "Our development in this area is aimed at meeting the demands of our Japanese customers for technologies such as IoT, 5G, and edge computing. We also provide optical transceiver PCBs for 5G base stations and data centers."

Telecommunications equipment manufacturer Denki Kogyo (DKK) is also involved in the business of base stations, supplying base station antennas, broadcasting antennas, peripheral equipment, towers, and shelter structures to its clients. At the same time that DKK aims to support Japan's efforts to become a leader in 6G technology, the company is also diversifying into several new areas, including food, construction, industrial waste treatment and renewable energy. As DKK president Tadatashi Kondo explains, this diversification stems from the company's vision to contribute to society and the environment.

"In terms of the high-frequency business, in the mid to long-term our focus is on the environment," he says. "We would like to apply heat treatment technology to our environmental business and find a good partner to collaborate with. Our focus is on how to reduce and recycle plastic in an environmentally friendly way. He adds: "In

five years' time I would like to say that a sizable percentage of our business has transitioned and that we have contributed to the environment and society."

With the unstoppable shift towards EVs, diversification is also the name of the game for many Japanese companies engaged in the production of automotive parts for internal combustion engine (ICE) vehicles. Having accumulated years of experience manufacturing parts for Japan's leading automotive firms, companies like Komatsu Seiki and Mitsubishi Belting are looking to apply their technology to develop products for other industries.

For Mitsubishi Belting, which manufactures industrial belts for automobiles and agricultural machinery, the focus is renewable energy and robotics. "Our Freespan belts are used in wind turbines across the globe and with calls for more renewable energy, there is growing demand for our belts," says company president Hiroshi Ikeda. "In terms of robotics and other fields, there are three things that are used to transmit motor power: belts, chains, and gears. What's good about belts is that they are easy to handle, light and oil-less. The main issue is their weakness because they are made from organic materials. So our challenge was to increase the strength of our belts and we were able to achieve that with products like the Giga Torque belt."

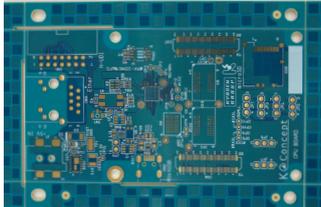
"Regarding the electrification of cars in the automotive industry, it's difficult for us to find parts required in EVs that could use our technology," reveals Komatsu Seiki president and CEO Shigeru Komatsu. "We have a factory in Thailand that focuses on automotive powertrain parts, but we're trying to shift away from engine parts and focus on areas like medical devices."

"First and foremost, as a company, we must survive the transition to a carbon-neutral society in 2033, where the industry would have changed due to the increase in electric cars," Mr. Komatsu adds. "If we're able to successfully navigate this period, I'm sure we'll be involved in some major things and hopefully, we can expand from there."

KYODEN: Making the future a reality

Through its development of semiconductor substrates, PCBs, and antenna boards for 5G technology, Japanese manufacturer KYODEN is bringing the next generation of technology to today's market.

Markets and technology are changing faster than ever, and this development is driven by companies creating the technology of tomorrow. Japanese board manufacturer KYODEN is one of those companies, supplying high-quality products for today's market as well as developing the next generation of technology.

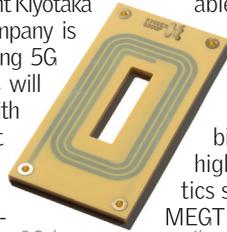


K-Concept

Established in 1983, KYODEN is a one-stop shop for PCBs (printed circuit boards), providing services from design and development, to assembly, mounting and manufacturing. The company is a key player in the supply of automotive PCBs, with a range of products for driving assistance systems and information displays. How-

ever, KYODEN president Kiyotaka Mori explains the company is looking to the emerging 5G market as well. "Cars will need to be connected with 5G technology, and that is our new target now – the application of 5G to cars using power semi-conductors," he says.

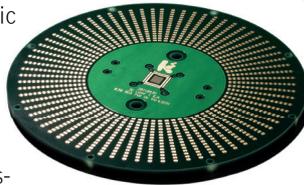
With a factory in Thailand, KYODEN has strong production capabilities but is looking to build more factories and invest in equipment for the forecasted demand in electric vehicles (EVs) and 5G. Along with the development of high-frequency and high heat dissipation technologies, KYODEN has created a high-speed thick-film copper plating technology that replaces copper inlay and is suit-



10-layer copper coil circuit board (inner layer copper foil: 210µm)

able for power semiconductor; while proposing a high-frequency build-up PCB with a composite configuration that combines a base material (with high-frequency characteristics such as MEGTRON 6 and MEGTRON 7) with a general-purpose material.

Indeed, the company is looking further into the future, and Mr. Mori explains that he is confident that KYODEN will be the first board manufacturer to develop products for 6G.



36-layer IVH probe card circuit board

The company is also well-established in manufacturing B2B equipment, from industrial products, to equipment for communications, offices, and the medical field. This has enabled KYODEN to collaborate with a wide range of partners, working with its clients to prototype and develop its products,



"By working with customers on prototyping and development, we can find the best combination of materials, machines, and methods."

Kiyotaka Mori, President, KYODEN Co., Ltd.

and sharing information to ensure synergy with its co-creators. The company aims to maintain Japan's culture of craftsmanship and innovation while moving prototyping and mass production overseas through the establishment of a sales and R&D office in Germany and expansion into the next generation of manufacturing-heavy countries.



www.kyoden.co.jp

Pump up the volume: Osaka Vacuum aiming to be a vacuum specialized manufacturer

Since 1950, Osaka Vacuum has been supplying pump systems that satisfy customers' advanced needs for production processes, analysis, and R&D.



"Vacuum technology is an essential technology in many industries; not just semiconductor manufacturing where our technology is tailored to aid in front end processing."

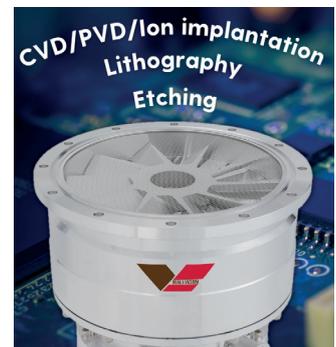
Kazuyuki Kasaoka, President and CEO, Osaka Vacuum, Ltd.

Osaka Vacuum developed the world's first compound turbo molecular pump for the advancement of the electronics industry, an innovation that burgeoned the company's reputation. After that, the company soon started developing for the semiconductor market to support the revolution in the electronics industry during the 90s and early 2000s. "This trajectory shows our company's growth," says Kazuyuki Kasaoka, President and CEO of Osaka Vacuum. "However, whilst we started as a device manufacturer, our strategy today is to

focus on our vacuum pumps and their component parts."

The company's products include various pump applications, with the turbo-molecular pump currently the company's main product for the overseas semiconductor and electronic parts manufacturing market.

"We develop new products as an extension of our business," explains Mr. Kasaoka. "We listen to our customer's needs and respond to them, and so whenever we have a peak in sales, this allows us to advance our research and development."



Turbo molecular pump

As a business that recently celebrated its 70th anniversary, looking back on the company's rich history and reflecting on its past will help guide the company's future direction, believes Mr. Kasaoka. "Our founder, my father, didn't leave a document outlining the company's philosophy. By looking back at 70 years on historical case studies, we documented our philosophy and produced the 70th anniversary document. The document was written with the purpose of passing the company's philosophy and culture down to the next generations as a vacuum specialized company."



www.osakavacuum.co.jp/en

DKK eyes overseas for future growth and societal contribution

Denki Kogyo Co., Ltd. (DKK), established in 1950, currently successfully operates in the high and low-frequency segments of the telecommunications industry.



"Software is borderless, so we would like to take that abroad as well."

Tadatoshi Kondo,
President and
Representative Director,
Denki Kogyo Co., Ltd.



Small cell antenna

Throughout its 70 years in the telecommunications industry, DKK has consistently played a central role in the provision of a more convenient living environment for all of society's stakeholders, a feat achieved through the instalment of social infrastructure, such as the establishment of communication and broadcasting networks in the advanced information society and important contributions to safety in the automobile industry.

As everybody knows, the business environment is evidently in the midst of rapid change – and at a pace never seen before. The needs of society and customers are diversifying due to the further sophistication of the advanced information society and ongoing globalization. The DKK Group is therefore fixated

on guaranteeing a diversified range of higher quality products and services to suit the shifting desires within the industry. But not only that; the company also strongly believes in the importance of a wider contribution to society, both now and in the future. The company believes it is important to carefully nurture technology and hone the techniques required for the spread of technology, and then subsequently pass it down to the next generation.

Such a dedication to continuous advancement as well as a more holistic future proofing of the industry itself can be especially appreciated in the telecommunications field. The President of DKK, Tadatoshi Kondo, outlines where the company envisions itself in regard to its broad approach. "If you think about contributing to society, it is important to nurture the technology and technique and pass it down to the next generation. In this sense, DKK is playing a key role in establishing technology's foundation for the future as well," he says.

DKK is also eyeing overseas growth. Presently, two markets in the radio frequency business that are being looked into as potentially prime for expansion are the construction machinery and food industries. As a machinery manufacturer whose radio frequency technology can produce superheated steam, DKK has

established a facility within its factory where clients can do trial testing for antioxidants. One part of the company which is currently earmarked for expansion is the telecommunications division. DKK believes it can conduct more value-added business in the U.S. than in Southeast Asia, so it is focusing on the North American market, especially in niche areas where Japanese technologies are applicable. Mr. Kondo outlines the company's plan: "We have our local subsidiary in North America, and since the U.S. also uses the same frequencies as Japan, and we are currently focusing on 28 gigahertz: the



Superheated steam rotational roaster

same products used in Japan could also be applied to the U.S."

One of DKK's strengths is that Japan is an island nation, meaning the company has had to miniaturize its devices and to ensure multiple frequencies are boarded onto the same device. This provides DKK with a strong advantage in new markets and means that its

venture into the North American market will undoubtedly bear fruit.

In order to continuously adapt to society's shifting landscape, DKK is also currently pursuing the prospect of partnering and collaborating with other companies. The possibilities are broad and exciting for DKK: the high frequency area of its business is actively looking into working with food industry partners, whereas the telecommunications area of the company has been working with partners in hardware and infrastructure.

DKK will continue its unremitting effort to contribute to society through further growth and development as a group. At the same time, the Japanese firm will continue to satisfy the needs of the market by developing innovative products and services, exploring new technologies and entering new business fields – endeavours reliably supported by the know-how and trust it has cultivated over its 70 years in operation.

THE FUTURE OF COMMUNICATIONS IS HERE



28GHz RF Signal Repeater

DKK Co., Ltd.

www.denkikogyo.co.jp/en



28GHz O-RU

A century of experience under its belt – and ready for the future

A leading manufacturer of mechanical belts for automobiles and other machinery, Mitsubishi Belting is expanding both its global reach and its range of products, and is primed for the shift to renewable energy sources.

Established in Kobe in 1919, the Japanese company Mitsubishi Belting Ltd. specializes in the manufacture of mechanical belts for automobiles, motorcycles and a wide range of other machinery. A firm with a burgeoning global presence, it has also branched out from belts to other products in the century since its founding.

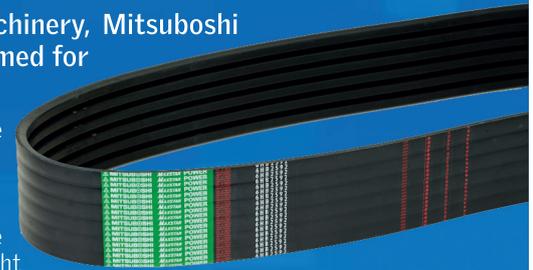
"Demand for belts comes not only from automotive companies, but from wherever there's machinery with a motor," Mitsubishi's president, Hiroshi Ikeda, explains. "This includes agricultural machinery, office appliances and financial-related machinery such as ATMs. Within machinery, the belt is such a small component and cost-wise it's very cheap compared to other parts, but it's a crucial component, so it's important for the quality to match the needs of that machinery."

With electric vehicles (EVs) on the rise, the automotive industry is changing – and Mitsubishi is preparing for the changing needs of its customers. "We provide fan belts and camshaft timing belts for cars with internal combustion engines, but when they shift to EVs there'll be no need for these because of the new type of motors," Mr. Ikeda says. "However,

in Poland, is employed in wind turbines worldwide. "The FREESPAN belt is used to change the angle of the turbine blade," Mr. Ikeda says. "It's been a big hit, so we're increasing the production line."

Meanwhile, the MAXSTAR POWER, which Mitsubishi says was "developed to satisfy the

produce the Giga Torque GX, which can replace chains in chain-drive machines. "What's good about belts is that they're easy to handle, they're light and they're oil-less, but the main issue is their weakness compared to chains, because



MAXSTAR POWER

says. "Because they're made of EPDM (ethylene propylene diene monomer) synthetic rubber, they're superior in durability and weather resistance."

Mitsubishi also manufactures engineering plastics, coating materials, and pastes for electronic components, including its MDot conductive silver paste, which was developed using proprietary technologies. "Our paste products are guaranteed to be of high quality because of their proven track record of use in satellites, where they must be able to withstand the harshest of environments," Mr. Ikeda says. "We believe these products have great potential and we would like to expand their sales in the future."

In addition to Poland, Mitsubishi has international sites in the U.S., Germany, China, Hong Kong, India, Indonesia, Singapore, Thailand and Vietnam. "India is a big market we're focusing on," Mr. Ikeda says. "We entered the country 10 years



"Our tailored belts cater not only to car manufacturers, but also makers of office appliances, agricultural machinery, and much more."

Hiroshi Ikeda, President, Mitsubishi Belting Ltd.



To give attentive consideration to both humanity and nature.

special requirements of agricultural machinery like harvesters and combines", is a prime example of the outstanding durability provided by the firm's belts.

they're made from organic material," Mr. Ikeda says. "So our challenge was to increase the strength of the belt and we were able to achieve that with our



NEO-ROOFING roofing membrane for electric power steering units, electric parking brake units and sliding door units, our products will be used and there'll be more demand for them."

Mitsubishi's role in the move to clean energy sources is not limited to supplying belts for EVs. For example, the FREESPAN belt, produced at the company's factory



FREESPAN belt

"When it comes to agricultural machinery, it's especially important that it doesn't stop while it's operating," Mr. Ikeda says. "For instance, if the belt breaks while harvesting rice, you can't continue working – and the harvesting time is limited."

Mitsubishi's drive for long-lasting belts has also led it to



Giga Torque GX

products like the Giga Torque GX belt."

Aside from belts, Mitsubishi's widening portfolio of products includes waterproofing materials for construction, such as the NEO-ROOFING protective membrane for roofs. "We're number one for waterproofing membranes made of synthetic rubber," Mr. Ikeda



MDot silver paste

ago to supply car manufacturers, but after a few years we moved to a larger factory due to more demand. That facility will be our big foothold going into Africa and Europe."



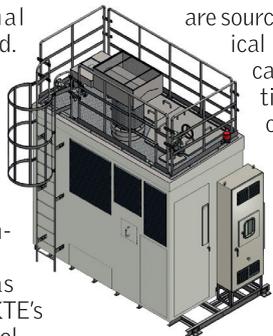
www.mitsubishi.com/english/

A highly efficient heat energy source today for the carbon-free future of tomorrow

For over 120 years, Kawasaki Thermal Engineering has been on the boil in providing world firsts when it comes to package boilers and absorption chillers.

Kawasaki Thermal Engineering Co., Ltd. (KTE) is proud to have launched the WILLHEAT series of compact once-through boilers, equipped with low-NOx hydrogen combustion dry burners.

This product was developed based on KTE's experience and technologies in the manufacturing of boilers that use hydrogen byproducts, which



Hydrogen-fired Multi tube once-through boiler

are sourced from petrochemical plants, steelworks, caustic soda production operations and other such facilities and processes, as fuel. Development also took advantage of Kawasaki Heavy Industries' knowledge in hydrogen-related fields. For these latest boilers, KTE developed a new type of burner fueled by hydrogen, which is a highly promising, environmentally friendly, next-generation energy source.

Hydrogen is a clean energy source that emits no CO₂ during combustion, but due to its high burning temperature it produces roughly three times the NOx emissions of natural gas fuel. KTE's new products

use dry burners, which do not require NOx-reduction measures seen in standard-type burner combustion chambers such as steam-spraying systems and exhaust-gas recirculation.



Susumu Shinohara, President, KTE

Features

- NOx emissions are kept at 60 ppm or less (at 0% O₂) based on the low-air-ratio standards specified in the Energy Saving Act
- Rated boiler efficiency of 98%
- PID continuous control is applied for feed water to control the steam-water separator's water level, which facilitates stable water levels, and this used in conjunction with the separator's rotation function achieves a high level of steam dryness (99.8%)



Low-NOx hydrogen combustion dry burner



Kawasaki Thermal Engineering

Kawasaki Thermal Engineering Co., Ltd.

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TOUNETSU: Industrial furnaces for a greener future

TOUNETSU's commitment to reducing carbon emissions goes hand in hand with that of its clients.



TOUNETSU Tomato Farm – President Kiyata with Chairperson Shunji

Founded in 1981, TOUNETSU is a major manufacturer of industrial furnaces, based not only in Japan, but also in China, India and Thailand.

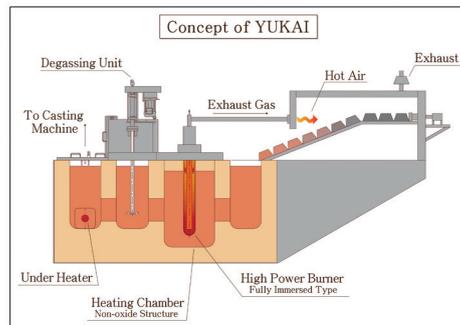
TOUNETSU specializes in aluminum casting furnaces, catering particularly to the automotive industry. As electric vehicles (EVs) take on a growing market share amid a push towards cleaner and more sustainable energy sources, the company is adapting to the changing needs of its clients.

"Our new product is called YUKAI," TOUNETSU president Kiyata Mochizuki says. "The characteristic of this furnace is that it's used to melt aluminum used in EVs, which is thinner and of higher quality."



"YUKAI will meet next-generation requirements in the automotive sector and will increase heat efficiency."

Kiyata Mochizuki, President, TOUNETSU Corporation



The furnace itself is more environmentally friendly, Mr. Mochizuki also notes: "If you burn aluminum, H₂O and carbon dioxide are emitted

into the atmosphere. To eliminate this, we are melting aluminum in liquid via a non-direct flame form with a non-oxidative environment."

In addition to being present elsewhere in Asia, TOUNETSU has a partnership with the company Pyrotek Inc. in the U.S. and the Czech Republic. "We provide them with technical guidance, make factory visits, and share our technology," Mr. Mochizuki says.

Sharing knowledge is key to TOUNETSU's international plans. "Our strategy is to license our patents," Mr. Mochizuki explains. "We're looking to ensure our patents expand to many countries, and let companies use our licenses."



Next Generation LP Furnace – ALST

TOUNETSU also has an agricultural business, which employs retired workers over 65. "Our chairperson, who established the company, is working in the agricultural department, which is very high tech; they use autonomous driving trucks and GPS, for example," Mr. Mochizuki says.



www.globaltounetsu.com/en

Green steel to meet sustainable development goals

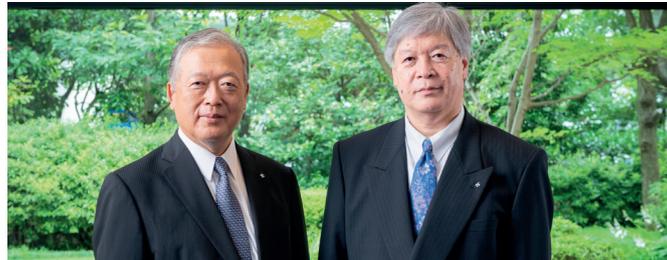
Kyoei Steel brings green steel to the world thanks to efficient production through electric furnaces, which produce 75% less carbon emissions than traditional blast furnaces.

With relatively few significant natural resources to speak of, Japan holds the claim of being one of the world's largest steel-producing nations. Whilst a testament to Japan's great manufacturing prowess, its status as a steel making heavyweight consistently leaves many marvelling at the country's productivity despite its resource scarcity.

"Though we cannot procure iron ore, which is the ingredient used in the Western method of making steel, traditionally Japanese people have used iron sand, refined it, and extracted the steel element to make knives and swords, for example," explains Yasuyuki Hirotoomi, President of Kyoei Steel Ltd.

"Japanese people have this custom of working with iron sand, and this is a very fine technology that requires very detailed attention. This long history of using iron sand technology, together with the mass production ability of the Western method, has allowed Japanese people to come up with an original method of steel manufacturing and that is why the Japanese are still strong at it."

Kyoei Steel, which manufactures and sells steel products for



Hideichiro Takashima, Chairman (right) & Yasuyuki Hirotoomi, President (left), Kyoei Steel Ltd.



Vina Kyoei Steel (Southern Vietnam)

construction use in the domestic and international markets, is an example of a Japanese company that has become one of the first steel makers to utilize more environmentally friendly electric arc furnaces that melt steel scrap for steel making, and the first in the world to use a one-furnace system.

"We cannot say that we were the very first ones to introduce the electric arc furnace to Japan, but we can say that we were the first ones in the world to introduce the one-furnace system," says Mr. Hirotoomi. "At the time, it was common to use two furnaces to make sure production could continue if one of them failed, but we introduced a new



Vinton Steel (U.S.)

and very efficient way of using one furnace for the high-speed production of steel."

The main difference between blast furnaces and electric furnaces is that the former needs to operate constantly with a consistent temperature. However, with electric furnaces, you can operate them on a demand basis. With the current shift in society towards carbon-neutrality, this method uses electricity, producing 75% less carbon emissions than blast furnaces and can be reset multiple times without a deterioration of performance. "For these reasons, steel making with electric furnaces is now considered an efficient method, conforming to the

reuse, reduce, recycle ethos," says the Kyoei Steel president.

The company now plans to increase its capacity through strategic investments in environmentally friendly processing methods, including through mergers and acquisitions. "Our strategy is not to purchase one large facility and have it supply a large region," explains Mr. Hirotoomi. "Our focus is more on having mini mills around the globe, which procure and sell locally. That is the theme of our company." For example, about 32 billion tonnes of steel are currently used in bridges, roads, buildings, and vehicles around the globe and of those, only about 2% is recycled ev-



Rebar

ery year, which is about 600 million tonnes, but in the near future, this amount will likely increase by about 200 million or more.

"It is estimated that about 50% of steel demand, of about 1.9 billion tonnes in total, should be met with recycled steel to meet the UN's Sustainable Development Goals' (SDGs) targets, so with our electric furnace technology, we want to contribute to green steel manufacturing and having mini mills around the globe as our strategy."



BRINGING GREEN STEEL TO THE WORLD
KYOEI STEEL

Mitsuya Seiko: Pushing the limits of performance

A pioneer supplier of plain bearings for automobiles, Mitsuya Seiko has set its sight on tackling the global automotive industry.



Mitsuya Seiko's plain bearings

Since its founding in 1913, Japanese firm Mitsuya Seiko has worked faithfully in accordance with its motto of "being a company that the customer needs". This approach sets the company apart from regional competitors in one main way: its synergistic relationship with its customers means new products always come to market to specifically meet an existing need. This customer-led approach has brought great success for the company for over 100 years, and moreover, provides the firm with a clear and reliable identity.

As the electrification of the automobile marches on, some of the

30,000 parts required to make one single car will disappear, but there will be a requirement for additional new parts. President of Mitsuya Seiko, Naoki Takahashi, believes this market prospect can



High load SBS30 plain bearing shape

provide the company with scope to work in tandem with other companies: "There are some fields of expertise where we are lacking in terms of *monozukuri*. We want to cooperate with other companies to develop and complete the necessary process for new products."

One area of the company with which the Tokyo-based manufac-



MD2100F & MD2500F plain bearing series - impregnated with special bronze-layered resin

turer needs no outside help is its vital human resources, whose expertise and focus Mr. Takahashi is rightly proud of: "Many of our employees have worked here for many years, and they start from a young age; meaning they dedicate their entire career to the company. And I want to show my appreciation and highlight how much they've achieved, not only for the company, but also for their growth as human beings."

Having established a plant in Thailand in 2012, Mitsuya Seiko continues to secure the unwav-



"What is important to us is being well prepared for the next mainstream product."

Naoki Takahashi, President & Representative Director, Mitsuya Seiko Co., Ltd.

ering trust of its customers in response to the increasingly globalized horizon facing Japanese companies, creating more advanced products that anticipate customer and market needs.



www.mitsuya-seiko.co.jp

Die maker stamps path for growing markets to come

Nissin Precision Machines is repurposing its fine processing technology to assist the vehicle electrification and semiconductor markets.

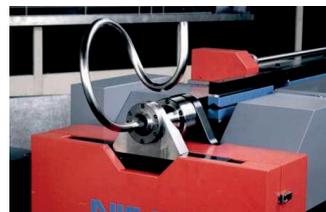


"Our technology can be applied to the vehicle electrification and semiconductor manufacturing equipment (SME) industries, where Japanese companies have a dominant market share."

Takao Ito, President, Nissin Precision Machines

Having started out as a precision die maker in Ohta city, Tokyo, Nissin Precision has gone on to pioneer the use

of cemented carbide as a material for its specialized press stamping dies. "Today we offer products like progressive stamping dies, and we also make deep drawing pressed



Nissin CNC Freeform Tube Bender (NFB) to which die making technology is applied

products," says Takao Ito, President of Nissin Precision Machines.

"When creating them, we must think about a lot of elements. For example, the cost of the process, the quality of the product, the thickness, the hardness, and the elongation of the materials. We control all these elements to create our products, which remains



Progressive Stamping Die

impossible to automate, and which is why our technology can't be copied easily. We now make more than 7,000 types of die."

In addition to die making, the company's main customer segments for its press stamping business are the vehicle electrification and semiconductor manufacturing equipment (SME) industries – sectors in which the president sees the most growth potential.

"Our technology can be applied to next-generation vehicle electrification and SME industries, where Japanese companies have a dominant market share," he

says. "Our technique is even suitable for making electric vehicles (EV), which consists of three important elements: the motor, the battery, and the inverter. Extremely fine processing is required to produce these, and since we can do it, we can take advantage of this trend. Our pressed



3D Wave-Truss® processed by NFB

products are also incorporated into control units for SME and the deep drawing technique is used for this industry as well. Their demand is increasing, and so we can meet it."



www.nissin-precision.com/en

Komatsu Seiki targets hydrogen and medical as prime growth sectors

nanoSUS®

Since its founding as a watch parts maker, Komatsu Seiki has served a number of industries and is now poised to advance the shift to low-carbon hydrogen fuel as well as serving the medical industry with its novel nanoSUS technology.



"Our business is under pressure due to the automobile industry's transformation. However, there are high expectations for our microfabrication technology in various industries."

Shigeru Komatsu,
President and CEO, KOMATSU
SEIKI KOSAKUSHO CO., LTD.

In all sectors of the economy, Japanese companies have become highly successful in some of the most niche manufacturing fields, creating dominant market shares worldwide in the process. Komatsu Seiki Kosakusho, which was established as a manufacturer of watch parts in 1953, is one such example. Its specialist adaptable, high-precision technology has since seen the organization diversify and become a market leader in the automotive industry.

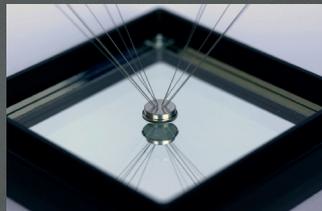
"The ultrafine processing that we have engaged in through the production of watch parts has led us to become a manufacturer for fuel injectors, which often involves slanted holes. The only companies that can make such fuel injector components are German, Swiss and Japanese, and they all originated from wrist watch manufacturing,"



Komatsu plant aerial view

explains Shigeru Komatsu, President of Komatsu Seiki Kosakusho. "The manufacture of watch parts has since become applicable to automotive parts manufacturing, helping us today obtain approximately 30% of domestic and foreign market share of electronic-controlled fuel injector parts."

Fuel injectors help elevate the fuel efficiency of internal combustion engine (ICE) vehicles and their compliance with environmental regulations. The components which Komatsu Seiki Kosakusho makes for the automotive industry for this purpose today accounts for 98% of the company's com-



Orifice plate

mercial activity. However, with the automotive industry's transition away from ICE vehicles to electric vehicles (EVs), this is a challenge on the immediate horizon for which Komatsu Seiki Kosakusho is now preparing.

"With 98% of our profit coming from the automotive industry, and mainly from fuel injectors which use gasoline and diesel oil, the shift to EV will be a challenge for us, but we're still committed to providing our products to those who need them, whilst also looking for new fields to potentially enter," says Mr. Komatsu. "Regarding the electrification of cars in the automotive industry, it's difficult for us to find parts required in EVs that could use our technology, and we feel that it's too late for us to enter the electric motor or lithium-ion battery fields. Instead, we're look-

ing further ahead into the potential of hydrogen fuel cells, which we plan to develop products and solutions for in the future. Under current technology, hydrogen fuel cells allow for a greater range than EV, so for countries with bigger land masses – like in Asia and North America – hydrogen could be the way to go."

With the use of hydrogen as a transport fuel still very much in the research and development stage in terms of its application globally, Komatsu Seiki Kosakusho is also investing in other technology areas in order to further diversify into other industries and attract new customers. One such product is nanoSUS, which the company has developed and refined from stainless steel without changing any chemical composition. The material has many advantages when compared to more conventional materials, such as normal stainless-steel, titanium and high-grade carbon steel, Mr. Komatsu explains.

"The development of nanoSUS began by making the crystals finer by plastic deformation and heating technologies in order to strengthen and harden the material," he says. "Since it becomes harder by itself, you don't need to apply a heat treatment to it, and that is its selling point. We began



Machines parts

by focusing on the homogeneous strength of the material and cost reduction during the processes, however, later we realized that there was an antibacterial effect, as well as a hydrogen embrittlement resistance, and these qualities have been applicable to

many fields, especially medical and hydrogen energy supply."

Focusing on this antibacterial effect, Komatsu Seiki Kosakusho recently opened a branch in the U.S. market and has committed to providing its new nanoSUS product to manufacturers of medical devices and related industries. For this product development, the organization has partnered with universities and other bio-labs overseas.

"We have worked together with Northeastern University in Boston, evaluating the antibacterial effect of nanoSUS. In Japan, there is a limit to bacterial experimentation, so we decided to conduct research with this university," says Mr. Komatsu. "Boston is a key area when it comes to medical device devel-



Wrist watch parts

opment, which is why we decided to launch our site there."

The company has also established Nanograins, a subsidiary to bridge the communication gap that exists between end-users of nanoSUS – who are doctors – and the manufacturers. "We have received personnel from Olympus, who specialize in medical device development, and we're focusing on our new development process and the sales of medical devices," says Mr. Komatsu. "As we prepare for a carbon neutral society, this is an example of how we're trying to shift away from engine parts and focus on these new growth areas like medical devices."

KOMATSUSEIKI
KOSAKUSHO CO., LTD.

www.komatsuseiki.co.jp/english/

Turning Heads: The mechatronics maker of tomorrow

A leading provider in automation and transport systems, Heads Holdings represents the next step in Japan's *monozukuri*.

Having started out in 1975 as a maintenance company for Japanese automotive behemoth, Nissan, Fukuoka-based Heads Holdings has since diversified and expanded its business to provide automation and transportation systems for factories as well as non-contact automatic charging systems. The group also produces equipment such as conveyor belts and transfer systems, and has other complimentary business areas including logistics, dispatched labor, and real estate.

"We see the benefits of the synergy created from doing things simultaneously," says Keiichi Honda, Chairman of Heads Holding. "Besides our focus on AGVs

(automated guided vehicles) and AMRs (automated mobile robots), we also do real estate and dispatched labor. The combination of assets, house buildings, rental spaces, human capital, and machinery works very well. When somebody rents from us, we provide the facility and dispatch labor; and later introduce our machinery to that plant. Since they are all interconnected, we can combine all our efforts and business approaches in catering to a particular customer."

With such a diverse range of business and products, the objective of the Group, explains Mr. Honda, is to be a total solution provider that caters for many different types of clients. "We have

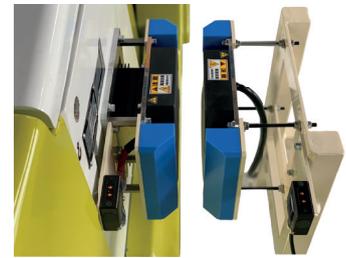
around five business segments now, but we are looking to expand to 10 business segments in the future. The diversification of our company gives more stability to our business and employees. We are always trying to see the broader picture."

However, AGVs and AMRs remain a particular priority for the Group, with global manufacturing trends seeing a shift from mass production to that of mass customization, driven by the increased adoption of automation, the ever growing popularity of e-commerce, and requirements for improved safety standards in factories. With the market for these technologies set to grow from \$2.1 billion to \$3.2 billion over the next five years, Heads Holdings is in prime position to take advantage.

"Singapore, Thailand, America, India and many other countries that need solutions for factory automation will demand our products and services," says Mr. Honda. "When the time is right, we will be introducing and supplying our products to them."



Takumi Honda,
President & Representative
Director, Heads Holding
HEADS
GROUP
<https://heads-hd.co.jp/group>



Aero face



HRVT-M 800



GLORIE

SDGs the focus as Ibara Seiki branches out



"We don't give up easily when faced with a manufacturing challenge, and it is possible to overcome anything by digging and exploring."

Kazuhiko Ueno, President,
Ibara Seiki Co., Ltd.

At Ibara Seiki, a major Japanese automotive parts company founded in 1944, the core philosophy is "creation of security", says the firm's president, Kazuhiko Ueno.

Contributing to society by working towards the UN's Sustainable Development Goals, established in

2015, is also key to Ibara Seiki's activities. "Our mission for 2030 is based on the SDGs, and specifically, we started making CO₂ reductions in our contribution to the environment even before the SDGs," Mr. Ueno says.

Having implemented a management philosophy to reduce the use of raw materials and to manufacture in an environmentally friendly way in 2011, Ibara Seiki aims to "contribute to the realization of carbon neutrality in the future", he explains.



Auto parts

Prioritizing a positive social impact is typical of Japanese businesses – and it serves to boost their potential, Mr. Ueno explains: "Because of this noble



Robot system

purpose, we don't give up easily when faced with a manufacturing challenge, and it is possible to overcome anything by digging and exploring."

In an industry in which "a lot of changes are happening", Mr. Ueno notes, Ibara Seiki is "speedily adapting to the electrification of car systems", producing a "new generation" of components not only for electric vehicles – whose market share is growing – but also for non-EVs.

While automotive parts are its core business, Ibara Seiki also provides solutions as a robot system integrator and, working with part-

ner company Cyberdyne, has entered the wearable cyborgs market, too. "We also want to develop wellness products such as disinfectant stands," Mr. Ueno says.

Having established joint ventures in China and Indonesia, Ibara Seiki's international focus is on consolidating its partnerships in those two countries, he says. "But we are always open to communication with potential companies."



Disinfectant stand



Cyberdyne's HAL®



www.ibaraseiki.co.jp/



NT Techno West Factory (built in 2015)



Continuous gas carburizing furnace



Shaft cutting automation line



Grinding machines

Collaboration the key to ignition for NT Techno



"My mission is to develop greater collaboration within the NT group, and it has already started."

Daisuke Naito,
President,
NT Techno

"I'm sure we have the best products in the world; we offer the highest quality," says Daisuke Naito, President of NT Techno, a Japanese manufacturer of automotive automatic transmission parts. "Whilst some say Japanese prices can be high, the best car makers – those who prioritize quality and safety of their vehicles – choose the highest quality parts. That is the main advantage of Japanese products."

Indeed, if you were to ask automotive industry stakeholders to pick a Japanese supplier who embodies this quality, many might name Aisin, the Fortune Global 500 company that develops automotive components and systems. Yet, even Aisin

– despite being the globally recognized brand – depends on lesser-known small and medium sized enterprises (SMEs) like NT Techno to serve their international clients. "We're dedicated 100% to working for Aisin as a subcontractor," says Mr. Naito. In fact, such is the dedication to this client, that the NT Group has split up its group of companies to accommodate this key relationship, with NT Techno serving mainly the needs of Aisin and its clients, and sister business NT Seimitsu looking after other automotive customers. However, the NT strategy going forward is to increase collaboration and crossover between these entities in order to develop

new products and expand the client base.

"My mission is to develop greater collaboration within the NT group, and that has already started," explains Mr. Naito. "NT Seimitsu has the technology to make certain materials, so my plan is to get parts from them and for the whole process to be kept within the NT group. That's my first goal. My second goal is to begin making parts for EVs – we're even now working on flying cars as well – and to challenge ourselves to make the transition to working for other companies too."

NT TECHNO CORP.
www.nt-techno.co.jp

Crafting electric equipment to power key industries

Through its pursuit of craftsmanship and expertise in high-mix low-volume production, Nikko Electric supplies electric equipment to key industries, including a high efficiency IPM motor with huge potential for the electric vehicle transition.



"We plan to use our IPM motor as an EV motor that is much more cost-effective."

Shigeo Tsuyuki, President,
Nikko Electric Industry

Faced with growing regional competition across all sectors of the manufacturing industry, Japanese companies have continued to thrive in specialized products and technologies thanks to a steadfast commitment to quality through the *monozukuri* philosophy.

"The Japanese craftsmanship that companies are proud of is not always suitable for mass production, so Japanese firms are pursuing

areas that overseas companies are not," says Shigeo Tsuyuki, President of Nikko Electric Industry – an electrical equipment manufacturer for the automotive sector. "By keeping a foothold in these fields and pursuing technology in the context of that craftsmanship, Japanese companies can continue to thrive. This applies to Nikko Electric as well."

Following this strategy, Nikko Electric has pursued high-mix, low-volume production, gaining worldwide demand for its specialized products mainly focused on internal combustion engine manufacturing. "Our current best-selling products are the starting motors and alternators for diesel engines, especially the high-output alternator," says Mr.

Tsuyuki. "However, our next focus is the IPM motor, which is a high efficiency motor, and we are looking to expand into industrial machinery utilizations. Many companies are working towards electric vehicle (EV) motors, for example, and we want to add value to them by promoting the IPM motor."

Whilst making an EV motor is fairly simple, many companies are cautious about entering the market due to concerns about cost efficiency, the Nikko Electric president explains. "It is worth noting that a few years ago in China, EV motors were being developed and produced by medium-sized automotive companies, but they were not making profits. We are trying to focus on our IPM motor and by upgrading it, we are planning for it to be used as an EV motor that is much more cost-effective."



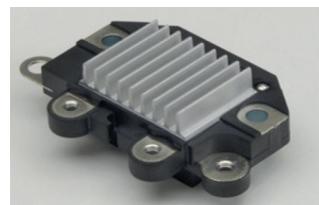
DC motor



IPM motor



Alternator



Regulator



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