Ingenuity Guides Japan's Next Industrial Chapter

Japan's manufacturers are reshaping essential systems, from mobility and materials to food and recycling, through precision, ingenuity and adaptation, revealing how a resource-strained nation builds resilience into everyday life. *By Daniel de Bomford*

Japan's factories are being asked to do more with less carbon, less waste and fewer people. After pledging carbon neutrality by 2050, the country's green transformation agenda has turned decarbonization and circularity into industrial policy rather than public relations. Within this pressure-cooker, manufacturers are redesigning materials, kitchens, mobility and steel itself, proving that a mature economy can cut emissions and resource use while still building the infrastructure of modern life.

Mobility and Infrastructure for a Changing World

Bike O sees opportunity in a shifting domestic market. Demand for premium used motorcycles remains steady, and the company pairs nationwide reach with a customer-centric approach. As CEO Atsushi Sawa notes, "There remains ample room for growth in the used motorcycle market." His strategy blends digital streamlining, lifecycle services and early steps toward overseas expansion.

Aero Lab fills a unique role in Japan's strict aviation environment. President Kenzo Colon says, "We know how to import, how to fly, how to maintain, and how to register," noting that few in Japan understand the full chain of small-aircraft operations. The company works directly with regulators to modernize outdated rules and is expanding its model abroad. "Every day, we are talking to the JCAB and pushing them," he says.

Maruichi Steel Tube blends *monozukuri* with global competitiveness. President Hiroyuki Suzuki argues that Japan's strength lies in "creating systems and solutions that only Japanese manufacturers can provide." The company's investments in semiconductor-grade tubing, including bright annealing in the U.S., position it for future demand cycles. Suzuki emphasizes teamwork across cultures: "Building a cooperative, team-oriented culture is central to how we do business globally."

Fuji Glove's craft-centered approach reflects the discipline at the heart of Japan's manufacturing ethos. President Hiroyuki Fukumoto says their mission is to "provide safety and reliability" through continuous improvement in quality and durability. Its four-layer CBK-273 glove demonstrates how user insight guides design, featuring flexible leather, aramid fibers and a waterproof film built for demanding environments. "We listen carefully to their specific requirements and develop solutions accordingly," he says.

Circularity as Strategy, Not Slogan

Hashimoto Cloth tackles waste by reinventing disposable protection. Working with the University of Tokyo and Stanford, it created a mask that is 99 percent plant-derived and is now developing a "rechargeable" model. CEO Tatsuki Hashimoto says, "Masks could be washed, recharged, and reused, significantly reducing both environmental impact and costs," turning stockpiles into long-life assets for hospitals, municipalities and global partners.

Nakanishi is turning kitchen engineering into a sustainability tool. Its systems recycle and reuse steam to cut energy consumption, while low-oxygen cooking environments extend shelf life and reduce food loss. President Kazuma Nakanishi says, "Sustainability is indeed one of the key directions shaping our industry. Our machines are designed to recycle and reuse steam, which reduces overall energy consumption." The result is cleaner, longer-lasting food with lower operating costs for schools and factories.

REFINVERSE challenges Japan's legacy waste-disposal model by treating discarded materials as assets. President Akira Ochi says, "Recycling must operate based on market principles," arguing that profitability accelerates change. The company converts fishing nets, airbags and plastics into new materials while pursuing international licensing. "Tokyo is an oil field," Ochi says, describing dense, well-managed waste streams as an untapped resource for a new circular economy.

Terabo brings more than a century of plastics expertise to Japan's circular-materials frontier. Its recycled nylon program recovers PA6 and PA66 from film, airbags and discarded fishing nets, transforming them into tailored engineering compounds. The company also develops Caracle, a biomass plastic made with finely processed eggshells. President Norio Fukawa says, "Japanese companies have developed a deep understanding of quality," a principle reflected in Terabo's pursuit of sustainable, high-performance materials.

Taken together, these companies hint at how Japan's sustainability drive will actually unfold: not in a single breakthrough, but in thousands of precise adjustments to how we move, eat, build and reuse. In a world short of both resources and time, Japan's experiment matters. If it can align *monozukuri* with net-zero goals, its green transformation may offer a workable blueprint for other aging, industrial economies.

Reusable Mask Technology Moves Forward

Hashimoto Cloth Corporation advances biodegradable mask technology through university partnerships, aiming to reduce waste and improve long-term protective performance worldwide. *By Daniel de Bomford and Kyann Edouard*

Tatsuki Hashimoto, CEO, Hashimoto Cloth Corporation

Hashimoto Cloth Corporation, a Shiga-based producer of nonwoven materials, is advancing biodegradable filter technology through ongoing work with researchers at the University of Tokyo and Stanford. Two years ago, the company launched a mask made of 99 percent plant-derived materials using a PLA filter and expects to release a new "rechargeable mask" at the end of next year.

Prototype of the mask charger

The initiative centers on a mask made almost entirely from plant-derived materials, designed to ease storage constraints and reduce long-term waste. Currently, masks can only be stored for five to seven years before being discarded, resulting in significant waste.

Engineers are developing a method to restore the electrostatic charge that allows filters to trap airborne particles. The Mask Charger would enable masks to be washed, recharged and reused, helping hospitals and local governments reduce disposal volumes and lower procurement costs.

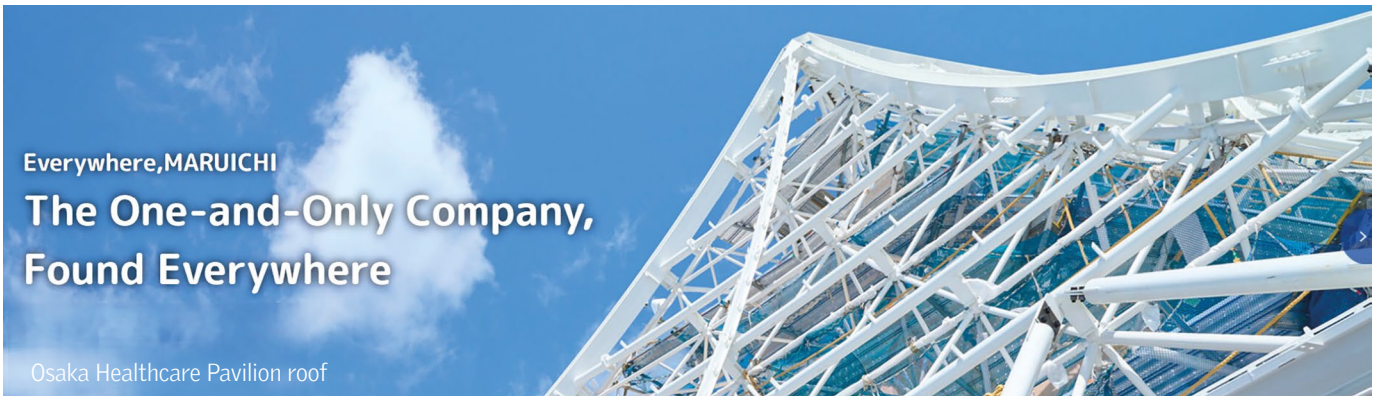
99% naturally derived sustainable mask

During the COVID-19 pandemic, critical facilities such as hospitals and nursing homes faced a severe shortage of masks, posing a serious threat to human lives. The Mask Charger ensures that masks can be stored and safely reused.

The company is now testing its third prototype with support from NEDO, Japan's national R&D agency, and plans to move into production once final evaluations are complete.

www.hashimoto-cloth.com

Hashimoto Cloth Vietnam Factory



Shaping Tomorrow with Precision Steel Solutions

Maruichi Steel Tube is shaping global manufacturing by uniting Japanese craftsmanship, advanced steel technologies and a forward-looking international strategy to support fast-growing industries and contribute meaningfully to landmark initiatives like EXPO 2025 Osaka–Kansai. *By Daniel de Bomford, Paul Mannion and Cian O'Neill*

Humanity's most extraordinary wonders are supported by a skeleton made of steel. From buildings touching the sky to machines fabricating delicate goods at a microscopic scale, bones made from steel give structure and purpose.

Steel tubes for structures

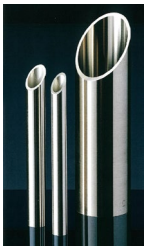
During Japan's construction and industrial boom, it was Maruichi Steel Tube that fashioned the invisible structures supporting many twentieth-century wonders that were built around and upon. The company is now a leading tube manufacturer with the largest market share in Japan. As the domestic market cooled, Maruichi Steel Tube looked outwards, evolving into a global group.

Chairman Hiroyuki Suzuki says one core principle is to source locally so as to provide the best possible products in each market. The chairman's vision for the future lies in value creation, reliability and customer centricity, rather than cost competition, which is the essence of Japanese manufacturing.

Maruichi Steel Tube manufactures a diverse range of steel tubes for a wide variety of industries. Its carbon steel tubes support the housing, construction, agriculture and automotive industries. High-frequency welded, they are integral to structural frames, piping, and agricultural products.

Maruichi's surface-treated steel sheet business delivers high-performance materials engineered for durability, aesthetics and versatility. Pickled, cold-rolled, and hot-dip galvanized, the steel sheets produced by the company provide outstanding corrosion resistance and a clean, premium finish. Its AL-Z55 hot-dip 55 percent aluminum-zinc alloy coated sheets offer even greater protective strength, ensuring long-lasting performance in demanding environments.

Many modern, advanced sectors and high-purity industrial applications require quality and corrosion resistance, which is where the company's stainless steel tubes excel. These tubes are vital for transporting everything from gases used in semiconductor manufacturing to future fuels like hydrogen or ammonia. Precision and quality are non-negotiable, as Suzuki explains, "Even slight turbulence can disrupt the process or affect device performance."



Stainless steel precision tubes

Exterior view of MST-X(Texas)

Globally minded, Texas is where the company has set its latest aspirations. The state is a burgeoning semiconductor hub in the United States, and Suzuki sees this growing market as a natural opportunity. It has already invested $80 million stateside and emphasizes the company's long-term view. "We are confident semiconductor demand will grow steadily," he says.

Surface-treated steel sheet

With the 2025 Osaka-Kansai Expo, Maruichi Steel Tube saw an opportunity to make a meaningful contribution by supplying essential building materials for key structures. From lightning poles, fences and frameworks to the grand ring foundations and the Osaka Healthcare Pavilion, the company significantly shaped the international event.

But it wasn't just construction; the company leveraged the expo as a platform for global engagement and brought together around 700 employees from its worldwide group companies. Together, they explored DE&I initiatives and deepened their understanding of the Maruichi 2030 vision, strengthening cross-cultural communication.

Maruichi Steel Tube continues to strengthen its global presence by combining its advanced manufacturing capabilities with its customer-centric, collaborative approach. As the company looks toward 2030, its world-class products, global talent development and forward-looking investments position it to play a vital role in shaping the future.

> "We take a long-term view; we don't make decisions based on short-term market fluctuations."
>
> **Hiroyuki Suzuki**, Chairman, Maruichi Steel Tube

MARUICHI STEEL TUBE LTD.

www.maruichikokan.co.jp

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NAKANISHI Leads the Future of Kitchen Automation

As Japan grapples with a shrinking workforce, NAKANISHI's vision for automated, sustainable kitchen technologies guarantees that it preserves wholesome, nourishing food for generations to come. *By Daniel de Bomford and Arthur Menkes*

> "We plan to roll out practical automation systems that can be adopted by schools, restaurants and food factories."
>
> **Kazuma Nakanishi**, President, NAKANISHI MFG. CO., LTD.

Food has long been the backbone of human socialization. A lunch break is more than just a time to eat; during our school days, it's where we solidify the bonds that can last a lifetime. It's a moment of nourishment, both physically and spiritually, shared by millions of children around the world. Here is where habits are formed, tastes are acquired and a sense of care is passed between the community and the child.

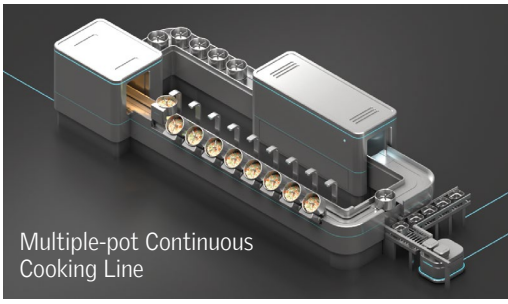
In Japan, behind the seemingly mundane, is an intricate choreography of hygiene, precision and warmth. For decades, NAKANISHI MFG has been one of the unseen conductors guiding that choreography with its systems and technologies, which allow food to be prepared safely, beautifully and at scale. The company's work begins long before the rice is washed and continues long after the final tray is served.

For over 80 years, the company has played a foundational role in food preparation in Japan, supporting both local kitchens and global brands to the highest standards of safety, hygiene and quality. The company provides integrated kitchen systems that span architectural facility planning, equipment manufacturing, installation and maintenance, ensuring reliable and consistent food production environments. President Kazuma Nakanishi says that Japan's strength lies in its holistic approach, which is responsible for the country's reputation for safe, hygienic and consistently high-quality food.

Today, the company is advancing a new mission: developing kitchens in a future challenged by labor shortages, rising quality expectations and a rising demand for sustainability. "As labor shortages intensify, automation supported by robotics and AI is not an option but a necessity," the president says.

Japan's renowned school lunch system illustrates the challenges ahead perfectly, with hygiene and operational standards among the world's highest. "It is not just about rules—it is an entire system of design, equipment, workflow and even maintenance," President Nakanishi says.

As Japan faces severe labor shortages, NAKANISHI has identified automation as essential to sustaining high-quality kitchens. "Imagine a system where ingredients are delivered, processed, cooked and served entirely without human intervention—robots handling every stage, with AI ensuring consistency and quality," he says.



Multiple-pot Continuous Cooking Line

However, to get there, the company is rolling out practical automation systems that can be adopted by schools, central kitchens and factories that will serve as stepping stones for the kitchens of the future.

One of the company's flagship automation-forward technologies is the SV Roaster, a continuous conveyor-type oven that uses "SuperHeated Steam" to cook food evenly and efficiently. The roaster creates an ultra-low-oxygen environment, reducing oxygen levels to below 0.1 percent, creating an atmosphere that prevents oxidation and preserves freshness and flavor. With high heat transfer and shorter cooking time, the SV Roaster improves yields and offers scalability for kitchens while requiring less labor than traditional machinery.

For rice, Japan's cultural foundation, NAKANISHI's rice-cooking solutions solve the pressing challenges of cost, labor and sustainability. The company's energy-saving continuous rice-cooking system reduces gas consumption by approximately 23 percent, supporting lower running costs and creating a cooler, safer working environment where heat and stress are minimized.

Tokyo Head Office

Meanwhile, its water-saving continuous rice washer reduces water usage by up to 60 percent, lowering both utility expenses and the environmental load of wastewater treatment. The result is a system that honors the texture and character of properly prepared food while meeting the growing call for sustainability.

NAKANISHI will be exhibiting at Food and Hospitality Asia 2026 in Singapore and will be found at booth number 2D2-01 to showcase its food service and hospitality equipment.

NAKANISHI's vision is to ensure that the next generation of Japanese school lunches maintains its high quality, while being safe and sustainable, in an environment with fewer hands to prepare them.

Energy-Save Rice Cooking system

Gas-Semi-Automated Rice-Cooking System

SV Roaster

Induction Rice Cooker

Make the future "ITADAKIMASU"

NAKANISHI

www.nakanishi.co.jp

BIKE O

www.8190.co.jp/en/support/partner.html

WHERE MOTORCYCLE PASSION DRIVES INNOVATION

Bike O reshapes riding culture with a bold strategic vision. *By Daniel de Bomford*

In a shifting global landscape, one segment in Japan is accelerating ahead: the premium used motorcycle market. And no company is tearing down the track quite as confidently as Bike O, the nation's leading pre-owned motorcycle retailer. CEO Atsushi Sawa says the appeal of freedom on two wheels has never been stronger: "Anyone who has ridden before remembers that exhilarating feeling. Our business strategy is built on the conviction that there is still significant potential for growth in the motorcycle market."

While new bike dealerships in Japan have continued to improve their service, the used space has lagged. Bike O saw the gap and turned it into its greatest opportunity. With a nationwide scale, specialist-driven operations and an incredible brand recognition of 95 percent among enthusiasts, the company has changed the community's perception of pre-owned. It's about the experience.

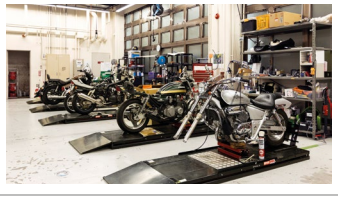
As Japan approaches a demographic turning point, Sawa steers the company with digital transformation at its core, streamlining operations while expanding domestic market share. But the company's ambitions aren't confined to Japan. Bike O is already exporting to Eastern Europe and Dubai. "I'm interested in markets that still represent a 'blue ocean' — places where motorcycle culture and mobility are still developing."

While traditional dealerships focus on specific models, having sold over two million units, Bike O isn't constrained by any brand and concentrates instead on riders by providing comprehensive services. "We are evolving into a full-spectrum mobility partner," Sawa says.

The finish line for Sawa may not be around the bend, but it is clear: to transform Bike O from a founder-led success story to a multigenerational institution.

"Every motorcycle has its own character, its own story."

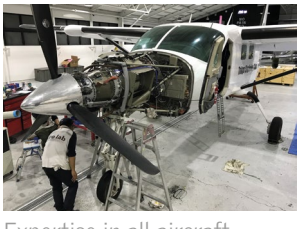
Atsushi Sawa
CEO, BIKE O



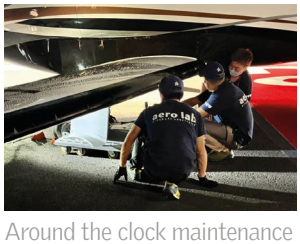
Aero Lab Guides Japan's Skies

Armed with unmatched industry expertise, the company is pushing Japan into a new era of aviation. *By Daniel de Bomford and Paul Mannion*

Aircraft exposition



Expertise in all aircraft



Around the clock maintenance

As private and business aviation grow across Asia, Japan is facing a unique set of challenges. While demand for aircraft ownership is increasing, the regulatory and operational environment remains exceptionally complex. However, Aero Lab International, an Osaka-based aviation services firm, is working to change that reality.

When Aero Lab was founded in 2014, a significant knowledge and skill gap existed for importing, maintaining and managing aircraft in Japan. The company specializes in importing, exporting, maintaining and managing aircraft for private and commercial clients. It provides the expert navigation required to bring aircraft safely and legally into service in Japan, something few companies have been equipped to handle.

Aero Lab's advantage lies in its unique expertise in working directly with the Japan Civil Aviation Bureau (JCAB). Over the years, the company has not only learned how to navigate complex procedures but has also played a visible role in improving them. This ability to guide clients through registration, compliance and ongoing operational requirements sets the firm apart in a market where knowledge is often fragmented and experience uneven.

Beyond regulatory fluency, the company's technicians and engineers maintain expertise in the evolving sector. They are capable of handling everything from routine maintenance to structural work, avionics integration, painting and performance analysis. Aero Lab's philosophy emphasizes real-world mastery built through hands-on experience.

President Kenzo Colon says that he is looking at new technology daily. The company strives to remain on the cutting edge of technology and works with companies, such as Garmin, to build expertise on industry-standard components.

Looking ahead, Aero Lab is expanding its presence across neighboring Asian markets while continuing to advocate for smarter, more modern aviation frameworks. For aircraft owners seeking clarity, confidence and craftsmanship, Aero Lab International sets the standard in Japanese aviation support.

AIRCRAFT SPECIALITY aero lab INTERNATIONAL

https://aerolab.jp

> "We know how to import, how to fly, how to maintain, and how to register."
>
> **Kenzo Colon**, President, Aero Lab International Inc.

TERABO'S RECYCLED PLASTIC FUTURE

Terabo offers a wide range of environmentally friendly materials, from recycled plastics to biomass materials enhanced with eggshells. *By Bernard Thompson*

"Japanese companies have developed a deep understanding of quality."

Norio Fukawa
President, Terabo Co., Ltd.

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Founded in 1912, Terabo Co., Ltd. is a 113-year-old plastics manufacturer based in Osaka, Japan. For the past five decades, it has produced an array of engineering plastics, with a recent focus on environmentally friendly materials for industries such as the automotive sector.

One of Terabo's core efforts is its recycled nylon business, built around polyamide 6 (PA6) and polyamide 66 (PA66). The company recovers a wide range of scrap, including PA6 film, PA66 airbags and even discarded fishing nets retrieved from the ocean, and transforms them into high-quality materials.

By tailoring each blend to meet specific strength and sustainability goals, Terabo delivers custom compounds reinforced or mixed with virgin polymers as needed. These materials find their way into everything from household items to auto parts. Within the automotive sector, Terabo plays a key role in sustainability projects now underway.

The second standout product is Caracle, a biomass plastic blended with eggshell powder—an innovation that's recently drawn national media attention in Japan. Terabo creates this material by finely cleaning, processing and micronizing eggshells, then compounding them into various plastics tailored to customer needs.

Eggshells, a familiar and easily recognizable waste material, offer a compelling example of circular design: the more that's added, the more eco-friendly the product becomes. Rich in calcium carbonate, they bond well with many plastics, allowing for a wide range of custom formulations. Caracle is already in use across industries, from consumer goods to automotive parts.

Plastic often sits at the center of environmental debates, yet it remains essential to modern life. Terabo is committed to developing plastics that reduce environmental impact—materials designed to meet today's needs without compromising the future.

REFINVERSE Powers Circular Future

REFINVERSE Group innovates to recycle industrial waste into new materials with greater value, using economic incentives to usher in a new age of sustainability. *By Daniel de Bomford and Bernard Thompson*

As industries worldwide confront the growing urgency of sustainability, Japan's recycling innovators are rethinking how waste can fuel economic growth. Among them, REFINVERSE Group stands out as a leader in transforming industrial waste into valuable resources.

For more than 20 years, the company has carried out horizontal recycling of carpet tiles. Over the past seven years, it has expanded that work to include recycling discarded fishing nets and airbags made from nylon and polyamide while developing its regenerated material, REAMIDE.

President Akira Ochi believes recycling must evolve beyond outdated waste management systems rooted in disposal and pollution control. He says the company's mission is to prove that recycling can generate both environmental and economic value.

"When we process waste, recycling it into new materials creates greater economic value," he says. "That's the foundation of our company's philosophy." The company is focused on developing technology that maximizes economic returns and building its business around those innovations.

REAMIDE recycled from fishing nets

REFINVERSE Group is expanding internationally by licensing its technology, with its airbag recycling licensed to Toyota Tsusho in Vietnam. Ochi cites profitability and confidence as to why the company's technology is so attractive. "But what sets us apart is the simplicity of our process," he says, "We're able to maintain high material quality without large-scale investment, making our recycling model both economically and operationally efficient.

It is ReFEZER, a keratin-rich bioplastic created from upcycled chicken feathers, which biodegrades naturally in water and soil. The long-term goal of ReFEZER is to help restore ecosystems, with the nitrogen-rich keratin functioning as a natural fertilizer for seaweed and marine plants.

In the automotive sector, the company is in the final stages of R&D for a world-first system to recycle interior materials, called REOCA. According to REFINVERSE's Group's own research, Japan produces approximately 16,000 tons, over 10 percent, of material scraps during automotive manufacturing. REOCA is an asphalt modifier made from these scrap materials, which improves asphalt durability and significantly reduces CO2 emissions generated by processing the materials.

Refinverse Innovation Center (RIVIC)

REFINVERSE Group's focus on creating economic incentives sets it apart in the recycling space and is creating a better world for future generations.

"Profitability is the engine that drives true societal change."

Akira Ochi, President, REFINVERSE Group Inc.

REFINVERSE Group

https://r-inverse.com

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