The *monozukuri* behind materials science innovations

***Monozukuri* is found at the core of all of Japan's industries, including in the field of materials science, where Japanese companies continue to develop innovative new polymers and plastics based on high-quality and environmental sustainability.**

Combining the traditional values of *monozukuri* craftsmanship with the constant pursuit of innovation, Japanese companies involved in material science are developing state-of-the-art technologies and products to respond to the latest demands of industry and society.

"Japanese *monozukuri* has its root in our traditional values of diligence and constant improvement. We know that what appears to be a weak area, or even just the slightest inconvenience, can be turned into an advantage. So, we always like to work hard to improve things," says Ms. Toko Sakane, President of I.S.T Corporation – a global leader in cutting-edge materials for a wide range of industries.

A company deeply committed to R&D and innovation, I.S.T Corp. develops functional polymer materials centering on polyimide resin, which have applications in several areas, such as office automation equipment, textile materials and measuring instruments.

With one-third of its employees working in R&D, I.S.T has developed several innovative materials such as IMIDETEX, a superfiber made of polyimide resin that plays active roles in various fields, including sports clothing for harsh outdoor environments; and TORMED, a transparent polyimide film whose applications include LCD/LED displays, touch panels, solar battery panels, lighting equipment and semiconductors.

Another leader in materials science, Fuji Seal, meanwhile, combines *monozukuri* manufacturing and large investments in R&D to develop the latest recyclable plastic packaging materials for fast-moving consumer goods (FMCG).

Fuji Seal's innovations, which have been adopted by some of the world's biggest FMCG brands, include RecShrink, a shrink sleeve label containing a special film and washable ink that can be recycled together with the plastic bottle (significantly improving the recycling process); and Fuji Pouch, one of the company's spouted pouch packaging solutions that offer reusability, portability, and extended shelf life – as well as increased environmental sustainability thanks to significant material reduction.

"We aim to grow together with our customers by introducing our unique *monozukuri* technologies," says president, Shigeko Okazaki. "Being a packaging company, along the changes of packaging, we have changed to meet the needs of the market and we will continue to do so in the future."

Like Fuji Seal, as a manufacturer of plastics, Yoshida's *monozukuri* is very much focused on sustainability. For over 70 years, Yoshida has been a top-choice supplier of plastic packaging for major brands in the beauty industry. But as some of its innovate products have increasingly crossed over beyond beauty to other industries, such as electronics and automotive, Yoshida aims to become a globally recognized leader in the field of materials science. For example, its proprietary Crystal Clear Seamless Glass Insert Molding technology has been adopted by smartphone manufacturers and has potential uses in domestic electronics and electronic vehicles.

Yuzo Yoshida, President, Yoshida Industries Co., Ltd.

"We believe the only way forward is with responsible manufacturing processes and developing innovation together with our partners," says president, Yuzo Yoshida. "We lead in sustainability and are world renowned as the finest supplier of prestige packaging and new innovations for cosmetics. We have many technologies that go beyond beauty and we look forward to bringing them to the world marketplace."

YOSHIDA: Innovations in plastic for brands seeking higher

It's hard to imagine manufacturing innovations in cosmetics packaging being employed in the electronics and automotive industries. But that is exactly the case thanks to Yoshida, a globally renowned supplier of high-quality and environmentally sustainable cosmetics packaging, such as bottles, tubes, jars, and compacts, as well as industry-leading decoration technologies.

World leader in plastic innovation

With over 70 years of experience in the industry, Yoshida has continued to develop state-of-the-art technologies to fulfill the needs of the world's top cosmetic brands. And many of these technologies have been used beyond cosmetics in the production of other ubiquitous consumer products.

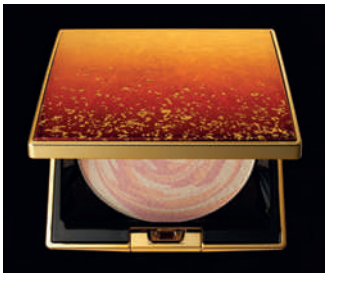
For example, the company's in-mold decoration technology 'YK Print' – which was first developed in 1973 to allow for limitless designs and customization in the decoration of compact cases – was used on the Sony Walkman and

TV remote controls. As Yoshida's production has evolved, the design possibilities have increased, and the company looks forward to expanding the boundaries and usage of this decoration technology.

Innovation Spotlight: Crystal Clear Seamless Glass Insert Molding

But Yoshida's innovation has not stopped there. "We were the first to commercialize Crystal Clear Seamless Glass Insert Molding, where glass and plastic are precisely joined to form a decorated, seamless single body," explains president, Yuzo Yoshida. "The features of this duo-molded product result in high performance strength while keeping the original characteristics and luxury clarity of glass."

With this innovative manufacturing method having been widely adopted by smartphone companies, Yoshida now wants to expand its utilization to the production of light electricals and home appliances, as well as electronic vehicles – as the company continues to bring world-leading innovation beyond beauty.



YOSHIDA COSMEWORKS CO., LTD. & YOSHIDA INDUSTRIES CO., LTD.
http://www.yoshida-cw.co.jp/en/

I.S.T Corp: Technology Thought Leaders

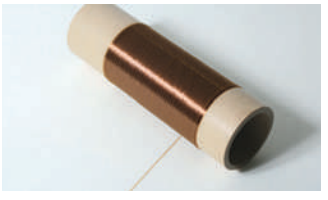
Most businesses attribute 'innovation' as a value to varying degrees. For I.S.T Corporation, innovation is not just a pillar of its organizational structure, it is the very foundation upon which the company is built.

"In Japan, we know what appears to be a weak area, or even just the slightest inconvenience, can be turned into an advantage". That, beyond the traditional definition of *monozukuri*, is what summarizes the Japanese values behind its manufacturing success, believes Toshiko Sakane, CEO of Industrial Summit Technology (I.S.T) Corporation.

Ms. Sakane describes her company as "technology thought leaders", in other words, always looking ahead to the future, and always willing to take on new research and development to invent materials that make products come alive.

"Not only products themselves, production methods, production lines and measuring and testing methods, we create all in-house," she explains. "Keeping the entire R&D and manufacturing process in a black box and maintaining good security over our technologies is our way of ensuring the highest-quality products."

I.S.T, a so-called "material brand", specializes in high-functioning material R&D. For example, I.S.T invented a super fiber which can be used in composites and convertible with aramid and carbon fibers. Besides existing characteristics of super fibers, such as high-temperature resistance and high-tensile strength, their super fiber has high UV resistance and high vibration damping. Because of these, this fiber is considered to improve performance in the automotive and sporting goods industries. They then engage market-leaders to jointly develop products that didn't exist before.



"The industries in which our technologies are highly in demand are all set to grow," says Ms. Sakane. "With increased sensitivity to the environment, lightweight materials are more popular, for example lighter automobiles and airplanes because they save energy. AR and high-tech displays are also in need and, of course, 5G radio wave innovation is greatly desired. We are fortunate that what we produce has been in line with market trends."

> "The industries that we are heavily involved in are all set to grow... We have been fortunate that what we produce has been in line with market trends"
>
> Toshiko Sakane, President & CEO, I.S.T Corporation

INDUSTRIAL SUMMIT TECHNOLOGY

www.istcorp.jp/en/

Powder power: The surprising versatility of powder products

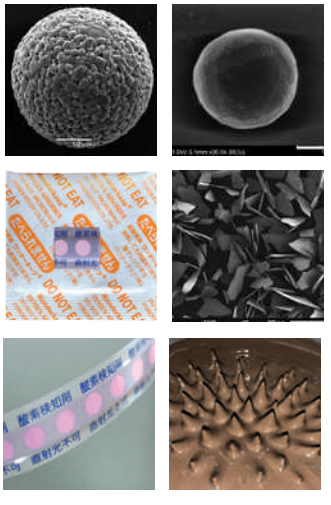
Besides electrophotographics, innovative powder is made for various useful solutions.

High quality, high durability, and high energy saving are the common characteristics associated with the carrier powders used in the production of state-of-the-art electrophotographic technology. Similarly, these are also the exact features of *monozukuri* – the value for fine craftsmanship made famous by Japan's manufacturers and their world-leading products.

A Japanese company renowned for its carrier powder production – made for electronic copying machines and printers – and equally a chief proponent of *monozukuri,* is Powdertech.

"We have been able to respond to constantly changing needs of our customers through our measures to address technological disruptions such as digitalization, colorization, and environmental regulations," says Yuji Sato, president of Powdertech.

"This has allowed us to have a large world market share and a good reputation, not only with our customer's R&D departments but with production and procurement departments too. We believe that earning the trust of all areas of customers' organizations is the essence of our *monozukuri.*"



Clockwise from top left:
Ferrite carrier (35 um);
Fine spherical ferrite;
Flake-shaped ferrite;
Magnetic fluid;
Oxygen sensor;
and Oxygen absorber

"On top of that, we have launched new products developed by our innovation division," explains Mr. Sato. "For instance, we have succeeded in developing numerous products that have precisely controlled magnetic properties and particle sizes, from nano to single micron. Such ferrite powder products are utilized in communication-related electronic components and electromagnetic shields and have many advantages, including higher resistance to acids and alkalis than metal powder."

Even something as unobvious as powder can be highly innovative and play a huge role in terms of its societal impact, says Mr. Sato.

> "We have inherited and further developed powder technology and continue to research and develop new functional materials"
>
> Yuji Sato, President, Powdertech Co., Ltd.

"We want to develop and provide materials that are useful to society by establishing something unique that does not currently exist, through processes that do not currently exist either."

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