100 Years of Refining Expertise in Material Development and Extensive Fluid Control Solutions

Since its founding in 1924, PILLAR has prospered alongside the flourishing of Japanese industry, developing products that anticipate emerging needs. PILLAR's competitive advantages lie in its expertise in material development and extensive fluid control solutions. Through our consistent research and development efforts, we have gained a comprehensive understanding of the properties of a wide variety of materials. Moreover, by manufacturing everything needed in-house, from the raw materials to the final product, we have been able to provide high-quality products to a wide range of markets while supporting society behind the scenes through the control of all types of fluids. We remain committed to taking on these challenges as we continue to hone the unique competitive advantage that PILLAR offers.

PILLAR's Competitive Advantage 01 Expertise in Material Development

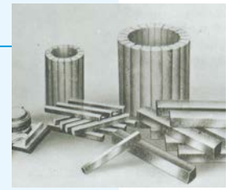
The Product Known as **PILLAR No. 1**: The Crystallization of Ingenuity and Perseverance

01 The Origin of Material Development — An Engineer Awakened to His Mission

Kaju Iwanami, our founder, worked as an engineer on ocean-going vessels, struggling daily with inferior imported gland packing in harsh environments where steam leaks were frequent. In an effort to improve his colleagues' safety and their working environments, he became convinced that his mission was to develop a domestically produced packing that was less likely to leak. This sentiment later led to the company's ethos of solidifying its position as a uniquely necessary enterprise in society.

02 The Pursuit of a Challenge — Fostering a Revolution in Materials

Conventional plant-based materials exhibit limited durability as components of packings, contributing to the problem of shaft damage due to friction. Mr. Iwanami completely changed his approach and came up with the idea of using a low-friction alloy. After a process of trial and error, he devised a composite material processed into a granular alloy of lead, antimony, and tin. This was then blended with graphite and paraffin to form flakes. By pressing these into pillar form and fabricating them into cylinders, the semi-metallic packing known as PILLAR No. 1 came into existence.



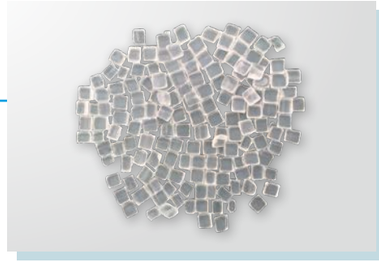
PILLAR No. 1

03 Research and Proof-of-Concept — Fostering Expertise in Material Development

Mr. Iwanami did not immediately seek to market this innovation; instead, he conducted repeated field tests on refitted and newly built ships to verify the product's performance. Five years later, in 1924, he was able to establish the PILLAR Packing Factory and begin full-scale commercialization. Mr. Iwanami's passion for material development and his empirical approach to problem-solving have been part of our company's DNA since its founding. Our commitment to solving societal issues by taking on challenges and engaging in research, rather than by simply pursuing product development, lies behind the origin of our material development expertise and represents the very heart of our competitive advantage.

Fluororesin Products

Fluid control technology for hazardous chemicals



Fluororesin

Pilaflon™ is our general term for a group of products made from fluororesins, such as polytetrafluoroethylene (PTFE). This product exhibits excellent heat resistance, chemical resistance, and non-stick properties. We offer a variety of gaskets, bearings, and other sealing products that leverage these characteristics in order to provide fluid control solutions across a wide range of industrial sectors. We also handle perfluoroalkoxy alkane (PFA), which exhibits properties comparable to PTFE and can be hot-melt molded into complex shapes. Building on our deep knowledge of fluororesins, we have also succeeded in developing fittings for the semiconductor market.

Carbon Fiber

Pioneering research that meets the challenge of asbestos replacement

Gland Packing (No. 6501L)

We began researching alternatives to asbestos even before the health hazards of this mineral, the primary material used in gland packings, emerged as a societal issue. By incorporating a carbonized fiber offering improved hardness, self-lubrication properties, and ease of handling (including shape flexibility, chemical resistance, and heat resistance), we succeeded in developing Gland Packing No. 6501L. This product offers excellent sealing performance, can withstand high peripheral speeds, and contributes minimally to shaft wear. This product has penetrated the market as an asbestos-free substitute material. It remains our flagship packing product, maintaining top sales in the water and seawater markets. This technology will continue to be incorporated into asbestos-free products featuring carbon and carbonized materials.

Silicon Carbide

Research on sliding materials for high-load environments

SiC sliding material

Silicon carbide (SiC) is second only to diamonds in hardness and exhibits three times the thermal conductivity of iron. We have established an in-house integrated production line that handles everything from mixing and granulating the raw material powder to grinding and polishing in order to produce silicon carbide as a sliding material that stands up to harsh environments. Products made from this material are now used in a wide range of industrial sectors, including petroleum plants, the chemical industry, shipbuilding, power generation, and the steel industry. Moreover, because it has been established as a material that can be used stably in strong acidic and alkaline environments, it has been adopted into a wide range of products, including seal rings for mechanical seals.

Expanded Graphite

An innovative material born from the need to comply with environmental regulations

Gland Packing (EDP15)

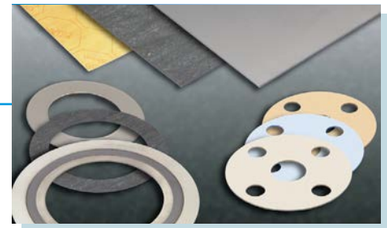
Expanded graphite exhibits stable sealing performance even in high-temperature and high-pressure environments and has played a significant role in plants where traditional asbestos packing has been difficult to use. Although the technology at the time only allowed expandable graphite to be used in sheet form, we engaged in much trial and error that eventually establish a method of processing this material into a yarn form. This technology accelerated the transition to completely asbestos-free products, which enabled us to establish a new business model based on the development of environment-friendly products.

PILLAR's Competitive Advantage 02

Extensive Fluid Control Solutions

From Sea to Land

Gasket development



Gaskets

Following the successful launch of our PILLAR No. 1 product, the company turned its attention to accommodating internal combustion engines for non-marine applications, such as those used in automobiles, which were still in their infancy at the time. In 1932, we applied our technology for marine packings to develop metal-jacketed gaskets for use in automobile engines. This crucial component prevents the leakage of explosive gases between engine cylinders and was a strategic product developed in anticipation of future market needs. Initially, demand was low, as gaskets were primarily used as a replacement part. However, their high quality earned the confidence of the market, and they eventually became certified parts for Toyota. Our gaskets are also used in the petroleum refining and chemical industries. In 2003, in response to stricter environmental regulations, we launched PILLAR Techno Black and PILLAR Techno White, high-performance asbestos-free gaskets that have helped to service the growth in demand.

Mechanical seals

Serving the Petrochemical Industry

Development of Japan's first mechanical seal

In the 1950s, as Japan entered a period of rapid economic growth and shifted its energy policy from coal to oil, a need arose for sealing materials that would reduce leakage compared to previous sealing materials used with flammable and toxic liquids. Our company launched a new product development project to replace gland packing. As a result of the combined efforts of all employees, in 1951 we developed Japan's first mechanical seal, which demonstrated high-precision sealing. During the subsequent era of growth in the heavy chemical industries, this product quickly became popular and was adopted for pumps used in the petrochemical, chemical, and power generation industries. Even today, we continue to develop products that meet diverse needs, maintaining our position as a leader in these industries.

Serving the Semiconductor Industry

Globally renowned fluororesin fittings for chemical piping

Super 300 Type PILLAR Fitting

In 1984, we entered the semiconductor market with the introduction of fluororesin PILLAR Fitting. Utilizing PFA resin, which combines chemical resistance, heat resistance, and high purity, these fittings earned high praise as innovative products suited to clean manufacturing environments. In 1988, we developed the Super Type PILLAR Fitting, which incorporates a sleeve inserted into the tube. The Super 300 Type PILLAR Fitting (S300) represented a further evolution, achieving improved sealing performance and workability through the adoption of a pin seal structure. Moreover, to accommodate the ongoing miniaturization of semiconductors, the design addressed issues such as reduced pressure loss and improved liquid displacement. The 2002 version, which incorporated multiple improvements, earned the trust of semiconductor fabrication equipment manufacturers worldwide, ultimately capturing the leading share of the global market. As of 2024, the fitting boasts a market share of over 90% for use in wafer cleaning equipment.

Rigid sliding bearings

Serving the Construction Industry

Leveraging our expertise in fluororesins

Our seismically isolated sliding bearings, certified by the Minister of Land, Infrastructure, Transport and Tourism in 2001, incorporate a fluororesin slide material that achieves one of the lowest friction coefficients in the industry. The Great Hanshin-Awaji Earthquake of 1995 sparked growing interest in seismic isolation structures. Much attention was placed on the introduction of sliding bearings, in addition to conventional laminated rubber bearings, to extend the building's long-period ground motion. We launched the development of an innovative sliding bearing compatible with seismic isolation structures based on our existing UNI-TON™ Bearing. We constructed a full-scale dynamic testing facility and focused on performance evaluation and friction reduction. We eventually succeeded in achieving the target performance through our proprietary PTFE formulation and coating technology. In 2003, we expanded the certification range to a maximum vertical load of 10,000 kilonewtons, leading to increased adoption of this product in high-rise residential buildings, semiconductor fabrication plants, and other structures. As PILLAR became increasingly recognized as a producer of sliding materials, we were able to gather more knowledge of friction coefficients related to building characteristics, which provided important insights for future improvements.

Serving the Medical Industry

Continued development of new markets

PFA tubing

The PVC tubing used in hemodialysis offers excellent chemical resistance but poor heat resistance, making it susceptible to damage from hot water during cleaning. In response to requests from medical practitioners for an improved dialysis tubing material, we began offering that industry our PFA tubing, which has a proven track record in the semiconductor industry, as well as our Super 300 Type PILLAR Fitting (S300). PFA tubing offers excellent chemical resistance, heat resistance, and non-stick properties, contributing to improved maintenance and cleanliness. Since its launch in 2010, our sales and technical staff have been present at installation sites and have provided guidance, which has enhanced reliability and gradually increasing market penetration. This tubing is now winning high acclaim, primarily from clinics seeking increased functionality, and is well-established as a maintenance-free product that does not require replacement of the piping components. This initiative has served as a reminder that markets exist outside of the semiconductor industry that are also seeking high-performance products. This success has also provided an opportunity for the development of new applications for our fluororesin products.

The Ongoing Evolution of PILLAR

Through the initiatives outlined above, we have been able to manufacture products of ever higher quality by producing everything we need in-house, from the raw materials onwards, and by maintaining consistency in our internal production processes. We value the technical expertise that enables us to continue meeting customer needs, an asset that we have built on throughout the 100 years since our founding. We pledge to continue honing our production technologies and promoting research and development as we work to fulfill the emerging needs of the marketplace.

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