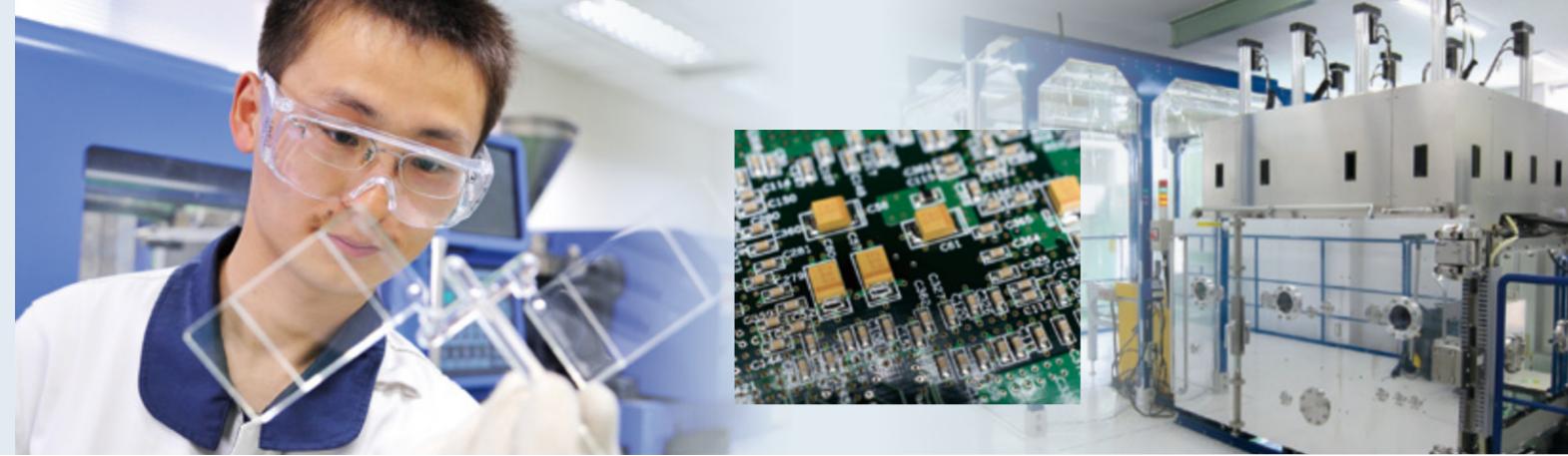




MATERIALS



Material Business Group

Aramid Fibers



Market Presence & Business Opportunities

Global share
of para-aramid fibers
Twaron and *Technora*

Approx. **50%** (1st)

Meta-aramid fiber
Teijinconex for
firefighting uniforms in Japan

Top share

Aramid fibers possess outstanding features such as high-strength, heat resistance, dimensional stability and chemical resistance properties. They can be divided into two broad categories: para-aramid fibers and meta-aramid fibers.

Para-aramid fibers are particularly outstanding in terms of strength and heat resistance. Accordingly, they are mainly used as reinforcement for tires and friction material for automobile brake pads, reinforcing optic fiber cables and for ballistic protection and protective materials. Going forward, the market for para-aramid fibers is expected to grow at an annual rate of 3%.

Meta-aramid fibers have outstanding long-term heat resistance and flame retardant properties, enabling them to be

used in special environment uniforms such as those worn by firefighters, and other industrial materials where heat resistance is required.

Fiscal 2016 Performance

Solid performance mainly in automotive applications

In para-aramid fibers, sales of *Twaron* expanded firmly for automotive applications in Europe, but sales of oil drilling and ballistic protection applications were weak. *Technora* is being used in an expanding range of applications. Sales were firm both for automotive applications in Japan and also for infrastructure-related applications overseas.

In meta-aramid fibers, sales of *Teijinconex* were robust for use in automotive applications, as well as protective clothing and industrial applications.

Production Sites

Para-aramid fibers The Netherlands, Japan
Meta-aramid fibers Japan, Thailand



Carbon Fibers

Market Presence & Business Opportunities

Global share
of carbon fibers

2nd

Contributing to
**Energy conservation and
CO₂ emissions cuts**
through weight reduction

Carbon fiber is about ten times stronger and three-quarters lighter than steel. It is attracting interest as an environmentally friendly material that will contribute to energy conservation, CO₂ emissions cuts and provide other benefits. This growing interest has driven rapid expansion in demand particularly for aerospace applications and industrial applications. The Teijin Group's *TENAX* has a high global market share, mainly in aircraft applications.

Against a backdrop of tighter environmental regulations in recent years, carbon fiber is expected to see rapid growth in applications as automotive components going forward. We are working together with automakers on various technological developments.

Fiscal 2016 Performance

Sales for use in aircraft grew steadily

Sales of *TENAX* carbon fibers continued to grow steadily for use in aircraft. In addition, sales for wind power generation in the Americas and Europe were robust, but the supply-demand balance softened for general industrial use, and for sports and leisure applications in Asia.

Pyromex Oxidized PAN fiber has continued to post steady sales mainly for use in aircraft brake pads.

Production Sites

Carbon fibers..... Japan, Germany

For information on composites, please refer to "Feature: Establish New Businesses to Reshape the Future and the Supporting Management Base" beginning on page 22 of this report.

Resin and Plastics Processing

Market Presence & Business Opportunities

Polycarbonate resins
in Asia

Top share

Providing high added
value through
**Teijin's proprietary
technologies**

Polycarbonate resins possess an impact resistance 200 times greater than glass, but are lighter at just half the weight. Other properties include outstanding heat resistance, transparency and weatherability. These resins are now widely used in the markets of the electronics and automotive fields.

The market is growing at an annual rate of about 3–4%. Teijin has a strong presence in Asia, mainly in the OA equipment and electronic components fields. The reason is that we have materials technologies that comprise compounds with other resins and are developing specialty polymers, and we also have large-scale molding and coating technologies.

Fiscal 2016 Performance

Steady performance by polycarbonate resins

Our mainstay *Panlite* and *Multilon* polycarbonate resin products saw firm supply-demand dynamics, and maintained high capacity utilization at both production sites in China and Japan. To further expand high-performance applications, we are actively expanding sales in the automotive market. We are also pushing ahead with sales in growing markets such as housing, along with promoting composite materials that combine polycarbonate resins with high-performance fibers. In high-performance resins, we are working to upgrade and expand our lineup of specialty polycarbonate resins for camera lenses in order to offer optimal products for smartphones as well as for use in vehicle and surveillance cameras expected to see market expansion.

Production Sites

Polycarbonate resins Japan, China



Films

Market Presence & Business Opportunities

Expanded Teijin's proprietary
PEN film products
to automotive
applications

**Strengths in processing
technologies**

Multi-layer film formation
technologies, surface
processing and secondary
processing technologies

Polyester films feature balanced physical properties in terms of such characteristics as strength, heat resistance, and optical properties, together with outstanding cost performance. For these reasons, polyester films are used in a wide array of applications. Our proprietary development polyethylene naphthalate (PEN) is a highly functional film with outstanding properties. It is used in the automotive and environmental and energy fields in addition to high-density data backup tapes and electronic materials.

Polycarbonate sheets and films are also used in products that leverage their outstanding functionality due to factors including sophisticated optical control technologies.

Fiscal 2016 Performance

Integrated our domestic polyester film production facilities and converted joint ventures in Japan and Indonesia into wholly owned subsidiaries

We posted relatively firm sales of *Purex* release films for use in manufacturing processes for parts used in smartphones, as well as special packaging application exports and polyethylene-naphthalate (PEN) film for use in magnetic materials. In addition, *PURE-ACE* optical film using specialty polycarbonate resin saw expanded sales for reverse-dispersion solvent-cast retardation film for use as an organic electroluminescent display (OLED) antireflective film.

We have been working to strengthen competitiveness by advancing restructuring initiatives. Specifically, we halted production at the Gifu Factory at the end of September 2016, and converted film joint ventures in Japan and Indonesia into wholly owned subsidiaries.

Production Sites

Polyester films Japan, Indonesia
Polycarbonate films and sheets Japan





Medium- and Long-Term Strategies

“We will accelerate the expansion of solutions-oriented businesses using our competitive, high-performance materials.”

Toshiya Koyama
General Manager,
Material Business Group



Environmental Value Solutions

Focus on the Aircraft and Automotive Businesses

In the aircraft field, global demand for aircraft has been increasing, and the number of aircraft produced, centered on smaller aircraft models, will continue to hold steady or increase. In the automotive field, the market environment has been changing. Specific developments have included stricter environmental regulations, the adoption of electric vehicles, and a transformation in design philosophy driven by technological innovation.

In response to these conditions, Teijin will drive the expansion of the strong yet lightweight high-performance materials business in order to achieve higher fuel efficiency through weight reduction. Through these measures, Teijin will strive to maintain and enhance profitability.

▶ Aircraft Field

In carbon fibers, we will intensively allocate resources to intermediate materials. We will build a competitive edge by accelerating the expansion of thermoplastic prepreg and the textile materials business, thereby steadily expanding sales. For *Pyromex* Oxidized PAN fiber, we are expanding production capacity in response to favorable demand for use in aircraft brake pads.

In para-aramid fibers, we will work to develop air freight containers with high durability and fire resistance using *Twaron*, for the purpose of realizing safer and more efficient air freight transportation.

▶ Automotive field

In para-aramid fibers, particularly *Twaron*, we will focus on expanding products to address demands for weight reduction and higher performance, including tire reinforcement materials and rubber materials. We will also use *Technora* to respond to the expansion of demand for the reinforcement of rubber materials.

In resins, we will propose weight reduction and design improvements using our high-performance compound products, along with the “super engineering plastic” polyphenylene sulfide (PPS) resin, in addition to polycarbonate resins.



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Safety, Security and Disaster Mitigation Solutions

Address Growing Needs for Social Infrastructure

In Japan, following a succession of natural disasters, there are growing needs for measures to address aging social infrastructure and for further earthquake countermeasures. In addition, demand is expanding in Asia and emerging countries for high-performance fibers for use in the development of the infrastructure base and in protective clothing.

Teijin will deliver optimal solutions by working to properly address this heightened disaster mitigation awareness and growing needs for refurbishing and expanding infrastructure.

▶ Infrastructure

In para-aramid fibers, we will expand sales of optical fiber cable in China and India. *Technora* has outstanding corrosion, humidity and heat resistance properties in extreme environments. Demand for *Technora* is thus anticipated in a wide range of applications, such as rope and deep sea oil drilling.

In carbon fibers, we will address growing needs for use in the infrastructure and energy fields. Specifically, we will work to expand sales of pressure vessels for the transportation of shale gas, along with sales of products and materials for wind turbine blades.

▶ Protective clothing

In fiscal 2015, we began production and sales of the meta-aramid fiber *Teijinconex neo* at our new factory in Thailand. In addition to offering heat resistance, *Teijinconex neo* achieves stable dyeability, enabling it to be used in various textiles according to user needs. We will drive growth in demand for protective clothing in Asia and emerging countries, where high growth is expected against the backdrop of increasingly stringent regulations pertaining to flame-retardant materials and environmental safety.

Develop a Growth Platform

In each business, we will also work to develop a growth platform to support steady execution of our strategies.

▶ Aramid fibers

We will enhance our cost competitiveness by working to increase productivity and production capacity through the automation of production processes at existing plants.

▶ Carbon fibers

To address further growth in demand for carbon fiber primarily in North America, we are studying investment in a new plant in the U.S., and have completed the acquisition of land for the construction of the new U.S. plant.

▶ Resin and plastics processing

We will specialize in fields with high profitability that are difficult for competitors to enter, as we advance measures to further improve the sales mix.

▶ Films

We will enhance cost competitiveness by steadily realizing the benefits of integrating domestic production sites.





Polyester Fibers & Trading and Retail Business Group

■ Market Presence & Business Opportunities

Specialized textiles trading company

Among the **top class** in Japan

Delivering innovative **solutions**

by integrating manufacturing and trading company functions

Teijin Frontier Co., Ltd. is among the top class of specialized textiles trading companies in Japan and develops a wide array of products. These products include fiber materials and sewn products in the fashion and apparel field. In the industrial textiles and materials field, products include automotive materials and components, materials for tents, and living-related materials.

One of our strengths in this business is our integrated global production and sales structure, from materials development to production and sales. In April 2017, we integrated polyester fiber production, sales and R&D functions into the trading and retail business. This will enable us to further strengthen our integrated production and sales structure.

■ Fiscal 2016 Performance

Steady growth in sales of materials for sports and outdoor use and automotive materials

In fiber materials and apparel, sales of high-performance materials for sports and outdoor use grew in the Americas and Europe, and the Japanese market. In apparel, where the environment remained under pressure, we strengthened the operating structure through such means as promoting production at optimal sites, and pushed ahead with differentiated businesses centered on our proprietary materials.

In industrial textiles and materials, sales of automotive materials such as reinforcement materials for tires and civil engineering materials were firm. Sales were also solid for materials for agriculture, fisheries, and the environment, and for water treatment membrane applications.

■ Production Sites

Polyester fibers.....Japan, Thailand
 TextilesJapan, China, Thailand
 Sewn products.....Japan, Vietnam

Medium- and Long-Term Strategies

“With a constant pioneering spirit, we aim to identify needs at the forefront of the markets and develop and supply materials and products that fit those needs.”

Shinji Nikko
 General Manager,
 Fibers & Products
 Converting Business Group



Further Strengthening Our Ability to Deliver Solutions Through Business Integration

To rigorously pursue a customer-focused approach, that is, to further advance its solutions-oriented business model, Teijin has integrated the polyester fibers business and the trading and retail business. By strengthening collaboration between manufacturing and sales even more than before, we will drive further evolution in our ability to deliver solutions.

Our strengths lie in our global supply chain spanning manufacturing to retail. We will create and supply products that meet customer needs, as well as products that are not currently available on the market, by developing even more sophisticated differentiated products.

Teijin will continue to reinforce its production capabilities through proactive M&A and alliances in pursuit of globally

optimized local production for local consumption. Notably, in automotive materials, we are working to strengthen supply chains in the four key regions of Japan, China, ASEAN and North America, in conjunction with expanding our production sites further.

In the environmental field, we formulated *THINK ECO* as an activity guideline based on the six main themes of 1) recycling; 2) derived from biomaterial; 3) energy conservation; 4) organic; 5) reduced use of hazardous chemicals; and 6) reduced emissions of environmental-burdening substances. With this in mind, we are working to build and expand our environment-conscious business, in addition to focusing on CSR procurement activities.