Our aramids...
unlimited potential
to innovate together
In recent years, there have been significant changes in the requirements placed on both consumer and industrial goods around the world. There is a growing demand for products that combine high performance with durability and low maintenance.

Responding to global needs
At the same time, these products need to use less energy, enhance safety, and they should ideally have a smaller lifecycle ecological footprint.

Take the automotive industry. The days of heavy, gas guzzlers are over. Today’s – and tomorrow’s – cars must be strong, light, fuel and cost-efficient, and, above all, safe.

Airplanes must remain safe throughout their service lifetimes, so the composite honeycomb structures in their fuselages need to be reliable and maintenance-free.

In the oil and gas industry, as exploration moves into deeper water and less hospitable parts of the globe, mooring lines, umbilicals, and risers need to be lightweight, strong, flexible and resistant to heat, pressure and chemicals.

In the telecom industry we see a similar picture: cables need to be better protected as most of our daily work and life is dependent on digital networks.

Finally, in the protective industries and in defense, there is a demand for stronger, lighter materials that can protect people against a wider range of threats.

Proven sustainability
We have started to carry out rigorous eco-efficiency analyses of our products. We calculate energy and emissions balances from ‘cradle to cradle’ (including recycling). This work has already produced convincing results. For example, when we calculated the lifecycle impact of our rubber additive Sulfron, we discovered that it saves end-users 75 times the energy that goes into manufacturing the product.
Fortunately, there is a class of products that can meet all of these demands: aramid fibers. These remarkable manufactured fibers have high strength and resistance to deformation (high modulus). Extremely light and super-strong, aramid makes it possible to bear huge stresses and span long distances.

Building the future with aramid fibers

Aramid doesn’t have a melting point (degradation starts at 500°C), it’s flame-proof, retains its shape – even at high temperatures – and it’s resistant to stretch, making it highly suitable, for example, for manufacturing firefighters’ protective clothing. It also has excellent strength-to-weight properties and is resistant to impact, which makes it the material of choice for a huge range of applications. Applications that are sustainable.
Bringing out the best in people
We are a modern, innovative, high-tech company staffed by professionals who are fascinated by the potential of aramid. We are open and transparent, and have a strong, people-oriented culture that values respect. In short, Teijin Aramid is a committed company that employees feel proud to work for. A company that brings out the best in people with a wide range of technical and commercial backgrounds.

Dedicated to Research & Development
As a technology-driven company that invests around 5% of turnover in R&D, regardless of the economic cycle, we have built up a powerful portfolio of patents. We are continually enhancing our products, optimizing our own manufacturing processes and, where required, we also advise on those of our customers. We carry out research and development in three main areas:
• looking for new applications for existing aramid products
• improving the properties of aramids to meet the changing needs of market sectors
• tailoring products to the needs of our customers by applying sophisticated aftertreatments and, where we identify clear customer benefits, making changes upstream to spinning conditions and even to the characteristics of the polymer itself.

We provide support to our customers on three levels
• Through troubleshooting, simulations, and rapid response teams, both for our own manufacturing plants and for those of our customers.
• Through product optimization and manufacturing improvements.
• We carry out fundamental research in order to improve the composition, performance, and surface qualities of our products at the molecular level.

Leading the way into the future
Based on market demands and new global developments, we coordinate research efforts together with our Japanese colleagues. This way, we ensure that we pursue worthwhile opportunities, choose the right priorities, and thus continue to lead the way in aramid technology.
Our aramids, Twaron®, Sulfron®, Teijinconex® and Technora®, are used in aerospace and military applications, for ballistic-rated body armor fabric, in optical fiber cables, the oil & gas industry, marine construction, civil engineering, ground transportation, engineering plastics, in sporting goods and as an asbestos substitute. They’ve even been used in renovation projects to protect the roofs and walls of historic buildings against earthquake tremors, and to reinforce futuristic roof constructions such as that of the new Stedelijk Museum in Amsterdam, the Netherlands.

Virtually unlimited applications

At Teijin Aramid we have decades of experience of co-producing extremely lightweight materials that are nevertheless strong, tensile, flexible and formable, and highly resistant to abrasion and stress.
Twaron, our flagship para-aramid has considerable tensile strength, high modulus and excellent cut and impact resistance. It is chemically stable and heat-resistant. These qualities make Twaron ideal for a wide range of applications. Its main characteristics are:

**High tensile strength:** Twaron is strong and light. Weight for weight, it is five times stronger than steel.

**Dimensional stability:** Twaron’s stiff and highly oriented molecular structure delivers a high modulus of elasticity, low creep, low stress relaxation and low thermal shrinkage. In other words, it has excellent dimensional stability.

**Twaron Black:** Teijin Aramid has developed a new type of yarn: black-colored, high-modulus Twaron. This unique yarn is the first high-modulus black para-aramid yarn on the market. It has been dope dyed – which ensures the color reaches right to the core of each filament, giving it a deep black color. Its great looks are just one of many reasons to choose black Twaron. It is ideal for reinforcing sails and other sporting goods. Also in hybrid fabric constructions Twaron Black can add stiffness, strength, dimensional stability and great aesthetics.

Twaron is used to reinforce:

- Ballistic-protection products
- Civil engineering products
- Composites
  (e.g. in marine, aerospace, ground transportation, and sports and leisure products)
- Conveyor belts
- Cut-protection products
- Elastomer reinforcements
  (e.g. automotive hoses, compound reinforcement, industrial hoses, power transmission belts, other rubber products)
- Engineering plastics for the electrical, electronic and automotive industries
- Flexible flowlines and umbilicals
- Friction products (e.g. brake linings and clutch facings)
- Heat-protection products
- Optical fiber cables
- Reinforced pipes
- Ropes and cables
- Sealing materials
- Specialty paper
- Tires
**Technora** is a para-aramid that provides materials with resistance to fatigue, superior chemical stability and excellent heat stability. It has many qualities that are similar to Twaron, but Technora is the best choice when maximum strength and robustness are required and it’s very suitable for dynamic applications. Its main characteristics are:

**High tensile strength:** Strong and light: weight for weight, Technora is eight times stronger than steel and three times stronger than fiberglass, polyester or nylon yarns.

**Fatigue resistance:** Maintains its strength even during repeated abrasion, flexing and stretching.

**Dimensional stability:** Its stiff and highly oriented molecular structure leads to a high modulus of elasticity, low creep and low stress relaxation and low thermal shrinkage. It also has excellent dimensional stability.

**Heat resistance:** With a thermal decomposition threshold of 500°C, Technora can be used at 200°C for long periods.

**Chemical resistance:** Highly resistant to acids, alkalis and organic solvents; not vulnerable to damage caused by steam or sea water.

**Technora is used to reinforce:**

- Civil engineering products
- Composites (e.g. for marine, aerospace, and sports and leisure applications)
- Elastomer reinforcements (e.g. compound reinforcement, industrial hoses, power transmission belts, other rubber products)
- Engineering plastics for the electrical, electronic and automotive industries
- Flexible flowlines and umbilicals
- Heat-protection products
- Ropes and cables
Sulfron is a chemically modified Twaron aramid that is used as an additive to enhance the performance of tires and elastomer reinforcements. It reduces hysteresis, heat build-up and abrasion, while improving flexibility, tear and fatigue properties. By reducing rolling resistance it cuts fuel use. This makes belts and tires more durable and long-lasting, thus making transport more sustainable, without compromising performance. It is also cut, chip and chunk-resistant.

**Sulfron is used to reinforce:**
- Conveyor belts
- Elastomer reinforcements (e.g. automotive hoses, compound reinforcement, power transmission belts, other rubber products)
- Tires
Teijinconex is a strong, soft, lightweight meta-aramid that doesn't catch fire, doesn't melt, insulates against heat, and doesn't adhere to human skin. Amongst others, it is used in fire resistant clothing. Its main characteristics are:

**Excellent resistance to long-term heat exposure:** Teijinconex doesn’t burn nor melts, which means it cannot stick to the skin.

**Heat-insulation as well as high flame resistance:** Teijinconex will not catch fire through exposure to direct flame or heat.

**Self-lubricating and good abrasion resistance:** Teijinconex minimizes the shrinkage of fabrics and enhances tear strength and abrasion resistance.

**Strong, light and soft:** Teijinconex meets the standard requirements of a clothing material - it is lightweight, easy to clean, and comfortable to wear.

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**Teijinconex is used to reinforce:**

- Conveyor belts
- Elastomer reinforcements (e.g. automotive hoses, compound reinforcement, power transmission belts, other rubber products)
- Heat-protection products
At Teijin Aramid our prime aim is to add value to our customers’ products. In practice, what we develop and sell is advanced concepts, rather than standard products. That’s why we work closely with manufacturers in a wide range of sectors and make sure we have insight into the latest technologies.

Sharing your ambitions

Because our engineers understand both manufacturing processes and applications, we have been able to continually enhance the qualities of our aramids, leading to higher quality products and easier, more efficient processing.
Divisions of experts
The way we're structured reflects the market segments we support. There's extremely close cooperation between our production, sales and R&D people. These experts in a wide variety of industry sectors meet regularly to develop and enhance products that are often tailored to specific customers' needs. For example, when developing aramid products designed to strengthen and protect optical fiber cables for the telecom industry, we take into account not only size, strength, thickness, long spans, and reliable connectivity, but also dynamic just-in-time stock-keeping.

Smart manufacturing
We regularly modify yarn properties to help our customers find optimal solutions. For example, by adding water-blocking capabilities, we solve two problems at the same time: We replace the messy gels that were previously used to protect cables from moisture, while reducing the number of production steps needed at the customer's site. In engineering plastics we impregnated our yarns and introduced dispersed short fibers, thus ensuring a good spin finish. Similarly we developed special marine finishes for cables in the oil and gas industry. But we go further. We also work closely with manufacturers to help them make cables in the most cost-effective and reliable way.

Safer and easier to use
Acute[ly aware of the fact that fire can travel through cables and thus compromise safety in buildings, we worked with cable makers to modify our yarns and thus reduce the flammability of their products. And, in response to the growing demand for thin fiber-optic cables to complete the “last mile” to the home in telecom systems, we provided an aramid solution that could be folded around the cable, making processing easier.

Meeting the demand for greater comfort
In ballistics, we have co-developed products that not only stop bullets and avoid trauma, but also make protective clothing more comfortable to wear. Similarly we have developed protective glove yarns that are more cut-resistant, more cost-effective, and more comfortable. This involved modification at the molecular level, which we made to optimize the characteristics and performance of the fibers.

Cooperation in timing belt development
In recent years, a Twaron-based industrial timing belt has been developed by a project group including Contitech Research & Development, application developers and marketing, and Teijin Aramid application research and marketing and a converter. In this close cooperation, Teijin Aramid came up with possible Twaron constructions. Contitech tested a number of these and finally the best construction was being worked out by the converter with Teijin Aramid's help and translated into an industrial process.
Around the world there is a growing lack of trust, both in governments and in business. What people look for is companies and individuals who show a commitment to improving the world we live in.

Part of a global community

In business, there is a growing need for cooperation that is based upon reliability and responsibility. Your concerns are our concerns.
Finding sustainable solutions together
What we call co-creation is often key to mutual success. For example, our engineers co-developed a hybrid cable with aramid inside and steel outside. This innovative product, which is lighter, more flexible, and longer lasting, has a wide variety of applications, in mining as well as in the oil and gas industry.

For the automotive industry we work with manufacturers to help ensure that tires, brake pads and clutch linings, gaskets and technical paper, as well as hoses and transmission belts last longer and put less pressure on the environment. Our products help reduce emissions, use less energy, and are suitable for extensive recycling.

Optimistic, pioneering, versatile
We intend to be the global market leader in the high-performance fiber industry by providing future-oriented products that meet the needs of a world of increasing scarcity and ever more urgent environmental challenges. We believe these problems can be overcome. This is why we're constantly working to create innovative applications for our products and it's also why we support our customers in their product development.

Working for mutual benefit
We endorse the concept of the New Green Deal, which we are convinced can benefit the planet and society, while regenerating economic growth. We're loyal to our partners and customers and do everything in our power to meet their needs. We combine our Dutch technology and trading instincts with Japanese technology and quality standards, and with a long-term customer focus.

In harmony with people and nature
We are committed to sustainability and responsible care for the environment and we strive to use energy, water and raw materials as efficiently as possible. Most of our products can be recycled, for example crushed and converted into pulp, which is then made into new products. We have dedicated, highly automated recycling factories in the Netherlands.

At Teijin Aramid we aim to develop unique technologies and products, provide high levels of service, and build loyal, long-term relationships. We aim to work together so that we can continue to make a difference in the decades ahead.

Partnership in revolutionary cable development
Steel cables are used in many applications and large quantities. Several years ago, Teijin Aramid took the initiative to approach mining companies in order to explain the immediate efficiency benefits of light weight, full aramid mine winding cables compared to steel cables. The weight reduction of the long cable in the mine shaft can be used to increase the weight of rocks hoisted out of the mine in each pass. The bottleneck was a safety requirement: regular inspection of the condition of the cable. Unfortunately, this is not possible with a full synthetic cable. The solution was found in a compromise. Together with steel wire rope producer Casar Drahtseilwerk Saar, fibre rope producer Phillystran and consultancy companies Wire Rope Technology and Tension Technology International, a hybrid cable has been designed consisting of an aramid core and a steel wire outer layer. This concept fulfills the requirements of the mining companies for inspectable, low weight mine winding cables.
Teijin Aramid’s commitment both to its customers and to its products has made it the global leader in aramids. Wherever strength, safety, heat or flame resistance, low weight or sustainability is required, you will find our aramid fibers Twaron®, Sulfron®, Teijinconex®, Technora® or our ultra high molecular weight polyethylene (UHMW-PE) Endumax®. Our products are used worldwide in many different applications and markets, including automotive, ballistic protection, marine, civil engineering, protective clothing, ropes, optical fiber cables, and oil & gas. With our high performance materials – produced at our plants in The Netherlands and Japan – we offer the widest range of products. And, with unrivalled expertise and years of experience we are able to continuously work on further innovations. Often in cooperation with customers and partners through our worldwide sales and marketing organization. If you would like to learn more about the world of aramid and our other high performance products, please visit www.teijinaramid.com and www.teijinendumax.com.

Teijin Aramid is part of Teijin – a technology-driven global group offering advanced solutions in the areas of sustainable transportation, information and electronics, safety and protection, environment and energy, and healthcare. Its main fields of operation are high-performance fibers such as aramid, carbon fibers & composites, healthcare, films, resin & plastic processing, polyester fibers, products converting and IT. The group has some 150 companies and around 17,000 employees spread out over 20 countries worldwide. Please visit www.teijin.com
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