

TEIJIN

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**Gert Frederiks**, CEO and President of Teijin Aramid

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# An icon: the largest composite building in the world

**The Museumplein in Amsterdam has gained a new icon. A 100-metre-long composite façade has been added to the original 19th century home of the Stedelijk Museum. In technical terms, this is a daring construction. In architectural terms, the large white ‘bathtub’ is a world first.**

The 3000 square metre, white, shiny surface was conceived by Benthem Crouwel Architects and presents a major contrast to the original structure of the museum. The façade, which is suspended above the Amsterdam Museumplein like a large bathtub, was realised by main contractors VolkerWessels and Holland Composites. To achieve this, composite material was used, fortified using over 8,500 kilometres of Twaron® aramid fiber and Tenax® carbon fiber, the only material with which the façade could be realised. The fibers, both produced by Teijin, will not expand or contract when the temperature changes.

## Relationship between technology and art

The Japanese company, which is the main founder of the Stedelijk Museum, has roots in the Netherlands. The aramid fiber Twaron® was developed by AkzoNobel in the 1970s. Since the takeover by the Japanese company Teijin, more than 1 billion euros have already been invested in their Dutch production sites. “As well as investing in the economy, it was also important for Teijin to invest in art and culture”, explains Gert Frederiks, CEO and President of Teijin Aramid. “The relationship between the revolutionary technology of Teijin and a museum that is aimed at modern art, was quickly established”. In addition to the required composite fibers, Teijin also made a substantial financial contribution to the construction of this iconic piece through sponsorship.



## Five times stronger than steel

The correct combination of the fibers Twaron® and Tenax® ensures that the expansion and contraction of the material is minimal as temperatures shift, which is an important attribute for a seamless 100-metre façade which is intended to appear as though it consists of a single piece of material. This is also an important attribute as materials such as concrete, glass and aluminium expand by over 17.5 cm if the

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temperature increases from -20 to +50°C. In the event of an expansion of that size, seams would need to be introduced in the façade and that would ruin the image of a smooth façade.

“There are still very few people who are familiar with the unique properties that Twaron® has to offer”, explains Gert Frederiks. “It is a unique fiber that is five times stronger than steel of the same weight and it is capable of withstanding extreme temperatures”. The high quality Twaron® fibers are proving to be a suitable material throughout the world in the case of products in which weight, strength and behaviour

in different temperatures are important. In the construction industry, Twaron® is used to fortify bridges and concrete pillars, often in areas ravaged by natural disasters. However, Twaron® is also used, for example, in the aircraft industry, for car tyres and in heat-resistant products.

This intense collaboration has resulted in the birth of an icon of which Amsterdam can be proud. This daring architectural expansion will enable the museum to put itself back on the map as a revolutionary museum for modern and contemporary art and design.



### **Teijin Aramid supplied the aramid fiber Twaron® (type: 2200, 8050 dtex)**

- > Twaron® has unique properties: it is 5 times stronger than steel, has a large dimensional stability, no melting point, low flammability, is not conductive and is sustainable.
- > The fiber can be used in different applications such as threads, staple-fiber and laminates.
- > The number 8050 refers to the weight of the fiber per unit of length (thickness) and means that the fiber weighs approximately 8 kg per 10 km.
- > Type 2200 is a high modulus aramid fiber, which means that the fiber has an optimum level of rigidity: the lowest possible level of elasticity at a specific force.
- > Quantity Twaron® used in the façade of the Stedelijk Museum: 4850 kg (is the same as approximately 6,000 km of fiber).
- > Twaron® is used in the fortification of bridges and concrete pillars in seismic areas, yachting, car tyres, heat-resistant products, bulletproof vests, etc.

### **Toho Tenax®, also part of the Teijin Group, supplied the carbon fiber Tenax® (type STS40, 24 k)**

- > Tenax® is a standard type of carbon fiber that is suitable for a number of (composite) applications.
- > 24k means that the fiber consists of 24,000 filaments. Filaments are the number of threads in a bundle of threads in the fiber. The more threads there are, the stronger the material is. 24k means that this is an extremely strong material.
- > Quantity Tenax® used in the façade of the Stedelijk Museum: 4050 kg (is the same as approximately 2,500 km of fiber).
- > Tenax® is used in technical appliances, cars and the aircraft industry, to name but a few examples.

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## Use of Twaron® and Tenax® for the Stedelijk Museum façade

The Stedelijk Museum is the largest composite building in the world and an iconic structure that was made possible by combining the two fibers of Teijin: Twaron® and Tenax®. Due to an opposite reaction to temperature changes, this combination ensures that the expansion of the material is kept to a minimum. The unique properties of the fibers make it possible to create a smooth façade from a single piece of material.

Teijin: Japanese company with roots in the Netherlands  
Teijin Aramid, part of the Japanese Teijin Ltd. has its full history in the Netherlands. The aramid fiber Twaron® was developed

by AkzoNobel in the 1970s, and after the takeover by the Japanese company Teijin Ltd., investments continued to be made to further develop this sustainable super fiber. In recent years, the Japanese parent company Teijin Ltd. has invested over 1 billion euros in the Dutch economy.

As well as investing in the economy, Teijin believes that investing in art, culture and Dutch society is an investment in the future. The Netherlands is known throughout the world for its pioneering architecture and innovation. The construction of the new Stedelijk Museum marks the advent of a new icon to which Teijin was happy to contribute with its Twaron® façade.

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