ZOOS BOTANIC GARDENS

vector foiltec CREATE. SUCCESS.



NEW MANGROVE HALL. ARNHEM GONDWANALAND. LEIPZIG

ELEPHANT PARK. ZURICH

ZOOS. BOTANICAL GARDENS.

TEXLON® ETFE SYSTEMS – IT WON'T GET ANY CLOSER TO NATURE THAN THIS

TRANSPARENT ROOFS ARE OUR BUSINESS. BUT DELIVERING A HOME FOR YOUR PLANTS AND ANIMALS IS OUR PASSION.

The beauty of nature is hard to mimic. And creating a manmade environment for plants and animals starts with understanding the fragile ecosystems and their inhabitants. The global elite of those who understand zoos and the best botanic gardens have been partnering with Vector Foiltec for more than 40 years. Why? Because we understand what it takes to create an artificial space that is as close to nature as it gets. The impact of natural light, temperature, and humidity is closely tied to the performance of your building skin.

The Texlon[®] ETFE system is the transparent roofing solution that covers unique spaces and can be tailored to the exact needs of the project.

Benefits of working with Vector Foiltec:

- / Market leader in ETFE application
- / Most experience with zoos
- / ETFE detail design and engineering competence
- Expertise in interface management of ETFE and structure
- In-depth understanding of the interface between cladding and structure
- / Worldwide presence



Natural daylight (also UV!) floods through the lightweight panels with unique shapes. Limitations of the building structure magically disappear to enable owners and architects to make their dreams of large spaces without posts and pillars possible. A place to roam around and feel as comfortable as in nature – with a roof that protects you from the elements, but virtually disappears when you look up at the sky.

Vector Foiltec has completed thousands of projects over last decades, covering spaces for many different applications such as retail, offices, sports stadia and of course zoos and botanical gardens.



Benefits of ETFE:

- UV transparency for optimal plant growth
- / Self-cleansing under natural acts of rain
- / Low maintenance efforts
- / Durability of the system
- / No limits on architectural creativity
- / Lightweight design allows innovative structures
- / Eco-friendly and sustainable



Project: Burgers' Mangrove

Owner: Burgers' Zoo

Architect: ABT

Texlon[®] System: 3 Layers of transparent ETFE foils

Structure: Exterior steel structure

Vector Foiltec Scope: Texlon® ETFE system design, fabrication and installation, support with steel structure design, perimeter connection and gutter system

© all images Burgers' Zoo





Burger's Zoo and Vector Foiltec are long term partners. The Mangrove is the newest addition to the portfolio of Texlon[®] buildings.

NEW MANGROVE HALL ARNHEM NETHERLANDS

TURN AROUND HOW A ZOO WORKS.

In 1982, Antoon van Hooff of Burgers' Zoo had a vision. He wanted nothing less than to completely turn around the concept of how a zoo works. The 'normal' zoo was a chain of cages and compounds where visitors walk from one to the other to gaze at the animals on display. Van Hoff's idea: In his new jungle hall, there would be one big space where all of the animals could live as close to their natural environment as possible. And the people visiting in this space would be surrounded by nature and animals.

In collaboration with Vector Foiltec, Burgers' Zoo created the concept of a large hall without structural pillars, to grant maximum freedom of movement for the animals. The level of transparency chosen provides natural light and enough UV impact to work without artificial lights and pesticides.



CHALLENGE 1: SHORT ERECTION PERI-OD.

With only 2 months, construction time was cut very short. Vector Foiltecs installation crews worked hand in hand with the steel erectors to ensure an on time opening ceremony.

CHALLENGE 2: VALUE ENGINEERING.

Several options were drafted and evaluated for optimized cost, architectural intent and the most practical solution for erection and operation.

CHALLENGE 3: FREE SPANS.

With the chosen setup, the zoo created a hall of 3,000 m² floor space with no supporting pillars obstructing the interior with its lake, housing hundreds of different plants and animals.



Project: Gondwanaland

Owner: Zoo Leipzig GmbH

Architect: Henchion Reuter Architects

Texlon[®] System: 3 Layers of transparent ETFE foils

Structure: Exterior tubular steel structure

Vector Foiltec Scope: Texlon® ETFE system design, fabrication and installation, roof surveillance system, support with steel structure design, gutter system

All technical drawings and the aerial view by © Henchion Reuter Architects Image obove © Vector Foiltec Image inside hall and titel © Werner Huthmacher, Berlin





Manage the interface between structure, gutters and sidewalls and ETFE.

GONDWANALAND LEIPZIG GERMANY

NOT A COPY: ZOO LEIPZIG BUILT AN ACTUAL RAINFOREST.

Artificially creating a tropical rainforest is not easy. Doing it in the middle of Germany, where the climate is far from the temperature and humidity levels you find close to the equator, made it an even bigger challenge. When the team of Zoo Leipzig, around legendary Prof. Dr. Jörg Junhold, proclaimed that building the new Gondwanaland Hall was "impossible", this was not an acceptable response for the team of architects, engineers and contractors. The sheer size of the space that needed to be covered was already a challenge with free spans of up to 154 meters. And value engineering was the name of the game in the partly state-funded project that needed to be completed on a tight budget.



The steel structure carries the 20,000 m² Texlon[®] ETFE shell, consisting of 439 single foil cushions in the roof and 138 foil cushions for the facade, many of them bigger than the footprint of the average 1-family house. The zoo team had very specific requirements for the interior climate – which required tight specifications for the building skin to ensure the proper climate for animals and plants. This had to be accomplished while minimizing operating costs. The setup of the transparent TexIon® ETFE system was specifically optimized per the requirements of the climate engineering team.

Vector Foiltec was a vital partner in the team of experts and optimized an exterior steel structure, that carries the 20,000 m² Texlon[®] ETFE shell, consisting of 577 single foil cushions for roof and facade.

While the interior climate was the main concern for the operations team, optimization of the complex structure, the interfaces, and the huge gutter system needed to be considered for the construction team. And the deadlines were tight: An erection time of just 3.5 months put additional constraints on the project. Team collaboration was key, and Vector Foiltec was able to design a system within budget, that also met the time constraints of the construction phase. This allowed for an on-time opening of the Gondwanaland Tropics Hall – which has become a landmark in the zoological world.





CHALLENGE 1: CLIMATE DESIGN

Temperature and humidity are crucial for the survival of more than 140 exotic animals and 500 different plants. The UV-transparent system ensures proper lighting while operable panels control ventilation.

CHALLENGE 2: CUSTOM ENGINEERING

The exterior structure required a custom designed suspension system for the roofing elements that measure more than 80 m² each.

CHALLENGE 3: SNOW LOAD MITIGATION

Harsh outside climate does not just require good building-skin insulation. The TexIon[®] ETFE system was equipped with snow sensors that make sure the cushions withstand all possible snow loads.



Project: Kaeng Krachan Elephant Park

Owner: Zoo Zürich AG

Architect: Markus Schietsch Architekten

Texlon[®] System: 3 Layers of transparent ETFE foils with hail protection layer

Structure: Custom shaped wood structure

Vector Foiltec Scope: Texlon[®] ETFE system design, fabrication, installation and complex climatic analysis

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The extreme variety of shapes and sizes that made up the shell and skin of the building, required a high level of focus and organization.

CHALLENGE 1: INTERIOR CLIMATE.

The required humidity levels pose a threat to all building materials. Vector Foiltec helped design systems and interfaces that prevent negative impacts and create the feelgood atmosphere for the animals.

ELEPHANT PARK ZURICH SWITZERLAND

SOLVING COMPLEX DEMANDS IN A WOODEN BUILDING.

The Elephant Park in Zürich is an architectural gem on the world map of zoo buildings. The intent of Markus Schietsch Architekten and the Swiss zoo operators was to create a structure that resembles the random pattern of trees and leaves in the animal's natural habitat.

The complex 3D-bent structure spans 85 m and holds 271 custom-shaped Texlon[®] ETFE cushions – a challenge for our designers. Vector Foiltec also supported the client's team in creating a favorable climate for the Asian Elephants, whose well-being was a top priority for the building system design. The impact of sunlight on animals and plants, surface temperatures and humidity were the zoo-keepers concerns. These needed to be tightly aligned with building skin and structure.



CHALLENGE 2: LOCAL CODES.

The strict Swiss building codes call for special measure to protect the building and its inhabitants. A dedicated protection system was developed and installed that met all code and insurance requirements.

CHALLENGE 3: SITE LOGISTICS.

The extremely complex 3D wood structure with the 271 uniquely sized Texlon[®] cushions needed expert-knowledge in site logistics and installation methodology to make the puzzle fit.

CLEVELAND METROPARKS RAINFOREST CLEVELAND, OH, USA



TRANSPARENT DOME FOR THE HEALTH OF PLANTS AND ANIMALS

The Rainforest exhibit at the Cleveland Metroparks Zoo, includes an iconic transparent geodesic dome. This transparent dome, comprised of 840 m2 of Texlon[®] ETFE is overhead the orangutan area.

ETFE ended up being the perfect fit for this renovation. The need for controlled UV transparency, and a lightweight structure were both important. And at the same time, the roof also includes vent's, which are also made of our Texlon[®] ETFE system. These vents are operable panels that open for fresh air flow.

Not only is it important that the material use positively affects the environment and animals below it, but it was also very important that the zoo used a material that was sustainable.

"Being a renovation project, we knew we had to overcome several challenges, inducing the highly complex geometry of a geodesic dome, the design of the custom-made operable vents, and a very challenging schedule. Not only was your team able to finish ahead of our already fast-tracked schedule, but they did so amidst a global pandemic, with a stellar safety record and professionalism. Even more impressive was the execution and quality of the work; every stage of the project was meticulously planned and executed with great precision."

- Christopher Widdowson, Cleveland Metroparks, Architect

TROPICAL BIOME UNDER A TEXLON® ETFE ROOF

'The Leaf' encloses a tropical biome that features a six-story, free-flowing waterfall and pond, as well as a canopy walkway that gives guests a bird's-eye view of the space. There is 6,000 m² of our Texlon[®] ETFE system enclosing the building. The Leaf is an indoor horticultural attraction at Assiniboine Park, where visitors will journey through four distinct biomes; the Hartley and Heather Richardson Tropical Biome, Mediterranean Biome, Babs Asper Display House, and the Shirley Richardson Butterfly Garden.

Visitors can experience a stunning showcase of diverse plants that shape our lives across the world. The environment indoors remains a tropical, warm paradise throughout the cold winter months in Winnipeg, Canada.

THE LEAF – ASSINIBOINE PARK WINNIPEG, CANADA





PAIRI DAIZA - THE LAND OF THE COLD BRUGELETTE, BELGIUM



If you visit the zoo overnight you can choose a room next to the penguins environment and enjoy a view of the penguins' underwater acrobatics.

NATURAL LIGHT FOR PENGUINS WITH TEXLON $^{\ensuremath{\$}}$ ETFE

The penguin cave at Pairi Daiza Zoo is covered with a 107 m² Texlon[®] ETFE roof. Pairi Daiza is one of Europe's most impressive ones, awarded "Best Zoo in Europe" on several occasions. Seeing so many Papuan penguins relax under our ETFE roof makes us feel happy and proud.

We built a printed, 4-layer Texlon[®] ETFE cushion system for the penguins.

The challenge was to retain a cold environment (under 7 °C) for the penguins and assist the zoo to adapt the penguin's natural behavior. Further, a 350 m³ saltwater basin and snow from a snowing-making machine helped to reach the goal.

TRANSMISSION OF ALL WAVELENGTHS OF VISIBLE LIGHT THROUGH THE ETFE DOME

The Swamp Forest at the Auckland Zoo is a special habitat for Tomistoma – a species of freshwater crocodile, which are native to Southeast Asia. They are currently classified as vulnerable, therefore action is required now to help protect their future.

The 30 m diameter Texlon[®] ETFE dome was the perfect choice for the 'Swamp Forest'. Firstly, it maximizes the thermal efficiency for the habitat. Therefore, it ensures that the crocodile – and their accompanying fauna – are kept at their ideal temperatures. Secondly, ETFE permits the transmission of all wavelengths of visible light – UV light included. As a result, the animals and plants receive all the light they need to thrive. Additionally, the UV-light helps to kill fungi within the enclosed building.

SWAMP FOREST AUCKLAND, NZ



Vector Foiltec worked closely with the project architects, structural engineers, the zoo and the head contractor. The close partnership ensured the successful realization of the project. Our work included everything – from the initial geometry to coordinating the services. In conclusion, the teamwork with our partners guaranteed the functionality of the exhibit. This includes the specialized vented panels at the top of the dome



PANDA HOUSE COLOANE, MACAU



Texlon® ETFE is highly transparent allowing the pandas, Kai Kai and Xin Xin, to enjoy the natural sunshine while the insulation properties of the system keep the pavilion at the ideal temperature for the pandas

MIMIC THE NATURAL HILLS OF THE TERRAIN WITH TEXLON® ETFE

The Panda House Macau was built on the location of the old Seac Pai Van Park Zoo, on the island of Coloane. The architecture of the enclosure was designed to mimic the natural hills of the terrain. It is clad with the highly transparent Texlon[®] ETFE foils. These create an enclosed controllable environment for the pandas by allowing in natural light – no need for artificial light.

Texlon[®] ETFE is highly transparent, allowing the pandas Kai Kai and Xin Xin, to enjoy the natural sunshine, while the insulation properties of the system keep the pavilion at the ideal temperature for the pandas. The shape of the enclosure is high enough to allow space for the tall vegetation and trees to grow.

ENTER UNDER ETFE SKYLIGHTS

The Vancouver Aquarium, located in Stanley Park, British Columbia, is a popular marine science center and aquarium. As Canada's largest aquarium, it has undergone various renovations and expansions over the years to enhance its exhibits and facilities. One of those transformations was the entrance pavilion to the aquarium, where visitors enter under ETFE skylights.

Major renovations are often undertaken to update infrastructure, improve animal habitats, and enhance visitor experiences. Renovations also focused on incorporating new technologies and educational elements to align with evolving standards in animal care and environmental conservation. This also happens through the integration of Texlon[®] ETFE solutions.

VANCOUVER AQUARIUM SKYLIGHTS CANADA



GRUGAPARK ESSEN CONSERVATORIES ESSEN, GERMANY





Vector Foiltec not only manufactured and installed a new Texlon® ETFE roof, but also refurbished the existing structure. In the first step, our team dismantled the old acryl glass cladding. Further, the existing structure was cleaned and maintained. Lastly, Vector Foiltec installed a new lightweight Texlon® ETFE roof, consisting of 146 3-layered cushions and several smoke vents.

A BOTANICAL RESTORATION PROJECT

The Grugapark in Essen is home to a vast variety of exotic and regional plants. With its beautiful botanical gardens, barbecue areas and open-air sculpture exhibition, this extensive park forms the green heart of the city. In 2021, the conservatories underwent an elaborate restoration, featuring a new Texlon[®] ETFE roof.

The Grugapark is home to a variety of plants. The three botanical show houses provide the perfect environment for flora from around the globe. The plants and structure of the conservatories are heritage protected, which brought two challenges to the design. Firstly, the existing steel structure was to be kept as part of the refurbished buildings. Secondly, the new cladding material needed to be non-damaging to the already existing components.

GLOBAL FLORA HOUSE WELLESLEY, MA, USA

SUSTAINABLE GREENHOUSE

The replacement of the 100 year-old Margaret Ferguson Greenhouse Conservatory resulted in the creation of the Global Flora House. This sustainable project was extremely important as it would be home to the college's renowned collection of plants. The architect's chosen, KVA (Kennedy & Violich Architecture) Team, began with the design in the fall of 2015.

The Global Flora took the design of a sustainable greenhouse, and coupled it with science education and a deeper public understanding of nature.

The curved form of Global Flora considers the positioning of the sun to maximize passive heat gain for the plants. Not only was this taken into consideration for heat gain, but also design aesthetics. Transparency between the biomes was successfully integrated through the use of a translucent Texlon[®] ETFE partitions. This enables the visual comparison of plant forms between the climate biomes with extreme differences.



One species in particular, the iconic Durant Camellia tree, which is over 140 years old, continues to occupy a central location in the facility, housed in a seasonal Texlon® ETFE pavilion designed specifically for that plant.



ONE-STOP-SHOP



CONCEPT AND DESIGN.

When a project first hits the drawing board, it is vital to have final result in mind. And that does not just go for structure and cladding, but also for the use of the building. With far more than 1,500 references, we have an extensive pool of knowledge that we share with our clients from day one. Getting your project right from the start saves you money and takes away risk.



THE TEXLON® SYSTEM.

As the inventors of the Texlon[®] ETFE system, we can humbly say: We know our stuff! An optimized supply chain, the most rigorous quality assurance measures, and our in-house design and engineering team, make the core of our system the best in the industry. And if you have big plans: We've got you covered with our two high performance production facilities that grant on-time delivery, even for the biggest challenges.



ALL AROUND THE TEXLON® SYSTEM.

Putting together the structure, skin and perimeter interfaces seems easy on paper, but contractors know: The devil is in the details. At Vector Foiltec we believe that the best ETFE system is only one piece of the puzzle. But rest assured, we have the other ones covered as well! An orchestrated arrangement of optimized components is what really creates the overall success.





PUTTING IT ALL TOGETHER.

Access, hoisting, schedule, local restrictions: There are a lot of challenges on the last mile of a building marathon: The construction / installation. That's why you should choose a partner that knows the ins and outs. So here we are! With 18 offices around the world, connections to local labor unions and the solution to that little detail that no one thought about. In short: Let us put it all together for you!

YOU'LL NEVER WALK ALONE!

There is not much additional that our Texlon[®] ETFE system needs. But for the few things that it does need, our Service Team will be there! We care for your system and make sure it serves you well for decades. Our maintenance crews come for regular check-ups. And in urgent cases, we are right around the corner. That is our promise as a true global player.



You will find Vector Foiltec with 18 offices all around the world.

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