

Design
Fabrication
TENSILE ARCHITECTURE
Installation
Service





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THE TAIYO GROUP

WORLD'S LEADING TENSILE MEMBRANE CONTRACTOR

Founded in 1922 in Japan, Taiyo Kogyo Corporation is the leader of the Taiyo Group of Companies, which includes: *Birdair Inc. USA*, *Taiyo Europe GmbH Germany*, *Shanghai Birdair Kogyo Corporation China*, *MakMax Australia Australia*, *Birdair Middle East UAE* and 24 other companies worldwide. Supported by our global network of offices and production facilities, as well as a cutting-edge R&D Testing Center in Japan, and with projects completed in more than 50 countries on all seven continents, we dynamically merge global solutions to local individual regional needs.

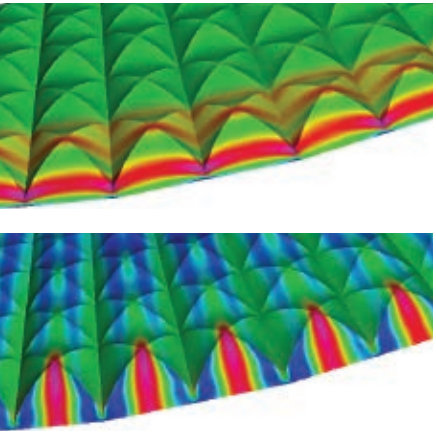
Our reputation is built upon high-quality award-winning projects across the globe: from temporary to permanent applications, with structures in all shapes and sizes, our Group has the experience and knowhow to make our client's vision reality.

Some historic benchmarks include the Sports Science and Athletics Pavilion at the University of La Verne (California, USA, 1972), the world's first PTFE-coated-fiberglass tensioned structure, and the ThyssenKrupp Testtower (Rottweil, Germany, 2017), with a height of 807 ft, the tallest membrane-clad building in the world.

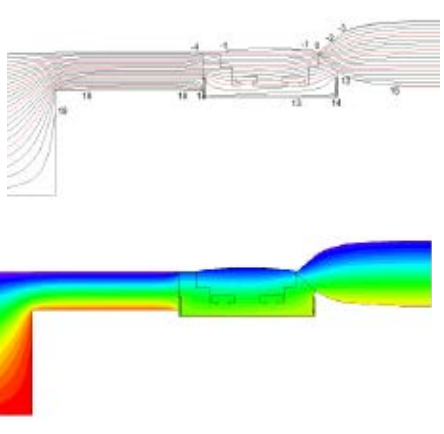
As partners to our clients at every stage of the project, we offer a complete set of in-house solutions: from concept support and development, to material selection, engineering design, fabrication, construction, and maintenance. We love collaborating with clients, combining the vision of an outstanding and elegant architecture with our expertise and experience in executing them. If you have a vision for a membrane structure, Birdair is your partner to bring it to life.



STRUCTURAL ANALYSIS



THERMAL ANALYSIS



RESEARCH & DEVELOPMENT

SHAPING THE FUTURE OF MEMBRANE ARCHITECTURE

At Birdair we believe that self-improvement shall always be our innate driving force to be industry leaders in tensile membrane architecture

Our Research & Development Department constantly works to improve our own systems, striving to increase membrane possibilities and technological development in our field. We focus on the growth and usage of recyclable materials, which can not only provide the expected life-span and performances, but can also actively reduce the environmental impact and carbon footprint.

We perform our strict testing procedures on an innumerable amount of materials and mock-up structures: only this way can we ensure that our tensile structures adhere to the highest quality standards.

Our Technical Research Center in Osaka Japan masters the most recent testing procedures. There, any kind of textile material can be tested with our advanced machines. Our Laboratory has been accredited according to ISO/IEC 17025:2005 for membrane structures and as a center of excellence for the whole industry.

- DEVELOPING CUTTING-EDGE SOLUTIONS
- WIDE RANGE OF MATERIALS TESTED
- ENVIRONMENTAL CONTRIBUTION
- TENSILE MEMBRANE INNOVATION
- ACCREDITED PROPRIETARY LABORATORY
- VAST RANGE OF PHYSICAL TESTS
- ISO/IEC 17025:2005 ACCREDITED

TAIYO KOGYO CORPORATION
WORLD'S LEADING TENSILE MEMBRANE CONTRACTOR

1922

Kaneshige Nohmura establishes Nohmura Tent Company in Osaka, Japan.

1929

Development of tents supported by inflated tubes instead of tent poles.

1947

Company name changed to Taiyo Kogyo Corporation.

1970

Expo '70: World Expo in Osaka, Japan – first large-scale application of a cable-restrained, air-supported membrane structure: the US Pavilion.

1988

Tokyo Dome: Japan's first, permanent air-supported structure.

1992

Taiyo Kogyo acquires Birdair, Inc.

1994

Expansion of the Asian market.

2003

Establishment of Taiyo Australia.

2016

MakMax Flex Experience Center is opened at Osaka Headquarters.

2022

100th anniversary of Taiyo Kogyo Corporation.

HISTORY
BIRDAIR IS YOUR IDEAL PARTNER FOR DESIGN & REALIZATION OF TENSILE MEMBRANE STRUCTURES

BIRDAIR, INC.
DEFINING THE STATE OF THE ART IN MEMBRANE STRUCTURES

1956

Inception of Birdair, Inc. headquartered in Buffalo, NY by founder Walter Bird.

1972

First permanent PTFE tensile membrane structure constructed at Univ. of La Verne, CA College – still up today!

1980

Completion of Hajj Terminal, world's largest tensile membrane structure with over 4.5M ft² of PTFE.

1994

New iconic Denver Airport Roof is completed, a design emulating the Rocky Mountains.

2000

Birdair acquires Stromeier, now Taiyo Europe & completion of O2 Dome, formally Millennium Dome.

2002

Completion of Houston's NFL NRG Stadium – First retractable stadium in the U.S.

2009

First Tensotherm™ Roof was completed, Dedmon Center at Radford University.

2010 & 2014

Birdair completes World Cup Stadiums; South Africa (3) and Brazil (3).

2017

Atlanta's new NFL Mercedes-Benz Stadium featuring an ETFE retractable roof and ETFE facade.

2018

Original iconic sails at San Diego Convention Center receives new renovated PTFE roof.

2023

New state-of-the-art Clearwater Amphitheater featuring Birdair Tensotherm™ roof.

WORLDWIDE PRESENCE
WE WORK TOGETHER AS ONE TO SERVE OUR CLIENTS WHEREVER THEY NEED US.

● HEADQUARTERS

Japan
HQ – Taiyo Kogyo Corporation, Osaka
HQ – Taiyo Kogyo Corporation, Tokyo

● COMPANIES OF THE TAIYO GROUP

USA
Birdair, Inc., Buffalo
Birdair, Inc., Irvine
Birdair, Inc., Mexico

Germany
Taiyo Europe GmbH

UAE
Taiyo Middle East, UAE

Thailand
Taiyo Kogyo Co., Ltd. Ayutthaya
Thai Taiyo Tent Co., Ltd. Bangkok

Indonesia
PT.Taiyo Kogyo Indonesia, Jakarta

Cambodia
Taiyo Kogyo Co., Ltd. Phnom Penh

China
Shanghai Taiyo Kogyo Co., Ltd.

Australia
MakMax Australia, Brisbane

● FACTORIES

Thailand
Ayutthaya

Cambodia
Phnom Penh

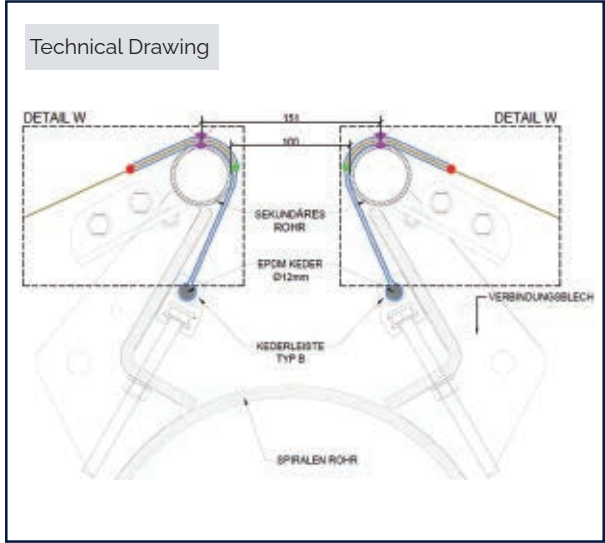
Australia
Brisbane

Japan
Hirakata
Mizuho
Fukui

China
Songjiang



Architectural Drawing



Technical Drawing



Membrane Manufacturing



Steel installation



Membrane Installation



Finished Project

UNDER ONE ROOF: DESIGN-BUILD CAPABILITIES

WE FOCUS ON OUR CLIENTS & ON QUALITY

For years architects, engineers, contractors, owners and developers have relied on Birdair for services that range from preconstruction support to field installation and maintenance of tensile architecture. Whether the topic is design, material and technology selection, construction physics, execution, commitment to costs and deadlines, or maintenance and repair: Birdair offers a complete range of technical services, ensuring that you receive unparalleled experienced and reliable commitment right from the start.

DESIGN ASSISTANCE

Birdair's in-house team of engineers and designers works with clients during the design development phase, presenting material options and samples, design solutions and renderings in order to turn a client's idea into a signature design. This early design support allows the project's architects and structural engineers to determine the most effective details for an elegant tensile fabric structure. Birdair can also provide conceptual budgeting at the earliest stage of the project.

ENGINEERING

We combine architectural designs with engineering solutions, anticipating any and all onsite challenges to ensure your project quality is second to none. Our experience and expertise in value management allows us to create complex structures economically. Through engineering analysis and peer review, Birdair delivers reaction loads, connection details, member sizing, interface details, and construction methodologies.

FABRICATION AND QUALITY CONTROL

Birdair, a member of the Taiyo Group, is ISO 9001 (Quality Management) and ISO 14001 (Environmental Management) certified. During the manufacturing phase of a project and with six fabrication facilities worldwide, we have the essential capability to fabricate over 1,000,000 ft² of fabric structures per annum. Our commitment to excellence meets our client expectations with quality and quantity, putting us in an advanced position to secure relevant commercial aspects.

INSTALLATION

Offering a complete end-to-end solution, our expert installation team executes an on-time delivery with minimal impact on your venue's activities. Installation takes place according to the project quality standards and specifications, considering all HSE measures in different regions and temperatures. After intensive coordination with the site team, all parts are delivered prefabricated, enabling all installation activities to be carried out smoothly and efficiently.

MAINTENANCE SERVICE & WARRANTY

Our commitment to customer service doesn't end when the project is completed. Birdair offers clients a wealth of post-project resources and assistance, ensuring that building owners have their structures looking as breathtaking years from now as they did the day the last element was installed. These services range from cleanings to comprehensive structural reviews and modifications. Our maintenance team is on call 24/7, allowing Birdair to promptly respond to any service requests.

MEMBRANE MATERIALS

BIRDAIR DESIGNS, FABRICATES, INSTALLS, AND MAINTAINS UNIQUE ROOFS, FACADES, ATRIUMS



TENSOSKY® ETFE FILM

TRANSPARENT, FLEXIBLE & LIGHTWEIGHT

ETFE (Ethylene Tetrafluoroethylene) is a durable, highly transparent and very lightweight new generation membrane material which goes beyond glass. This membrane is considered the material of choice from traditional skylight applications to long-span structures and building facades. Thanks to its flexibility, it can be formed into irregular and curved surfaces, offering elegance and modern design possibilities. Birdair’s TensoSky ETFE system is the best solution for environmentally oriented projects, supporting the aquisition of LEED® credits, and has its own environmental product declaration (EPD).

Key Benefits

Extremely lightweight, durable, thermal insulation, exceptional light transmission, solar control and shading, printable, illuminable, dirt resistant, recyclable.

Applications

Building envelopes where light transmission, flexibility and lightweight meet. Applied in a single-layer, or in multiple-layers incorporating a pneumatic system.



PVC-POLYESTER FABRIC

COST-EFFECTIVE, ADAPTABLE, MULTI-COLOR

PVC (Polyvinyl Chloride) coated polyester fabric is immensely popular in membrane architecture and allows affordable solutions. This membrane is a cost-effective alternative to traditional roofing systems and can be produced in a multitude of colors to coordinate with individual building project needs. It is available as a solid watertight fabric, or as an open mesh. For unique projects with a sustainable and low-maintenance approach, PVC coated photocatalytic (TiO₂) fabrics and Air Purify mesh are the materials of choice. For improved fire rating, alternative PVC coated fiberglass yarns are also available.

Key Benefits

Translucent, cost-efficient, fire-resistant, colorful, minimum maintenance required, in solid and mesh, TiO₂ (titanium dioxide) self-cleaning and air purify options available.

Applications

Permanent and temporary applications, in roofs and facades, in different shapes and environments, different colors and combinations.



PTFE-COATED FIBERGLASS

DURABLE, NON-FLAMMABLE, SELF-CLEANING

PTFE (polytetrafluoroethylene) coated fiberglass fabric is an extremely durable and weather-resistant material that lends itself to many bespoke designs and applications. This membrane can be installed in climates ranging from the frigid arctic to the scorching desert heat with an expected project life exceeding 30 years. PTFE fiberglass membrane is chemically inert and completely immune to UV degradation, also having the ability to evenly disperse light, creating comfortable shade during the day.

Key Benefits

Extremely resistant to UV radiation, and to chemical and biological attack, translucent, high reflectance, non-flammable flammable Class A, long lasting, TiO₂ (titanium dioxide) self-cleaning and air purify options available.

Applications

Permanent applications, in roofs and facades, in different shapes and environments, from small canopies to large stadium structures.



TENSOTHERM™

INSULATED TRANSLUCENT TENSILE MEMBRANE

Tensotherm, an innovative membrane developed by the Taiyo Group, can be as thin as 9 mm and is the only translucent and insulated tensile fabric roofing material that delivers diffused glare-free natural daylight, enhanced temperature control (even in extreme instances) and innovative sustainability. To create Tensotherm, a thin translucent blanket, embedded with aerogel, is placed between a PTFE or PVC-coated fabric membrane exterior skin and an acoustic interior liner.

Key Benefits

Translucent and glare-free, thermal insulation, enhanced acoustical performance, lightweight and engineered for long spans.

Applications

Permanent, where thermal insulation and natural daylight are required in association with the structural lightness of tensile membrane structures.

SPORTS

IT DOESN'T MATTER WHO YOU CHEER FOR:
WE COVER EVERYONE



WANDA METROPOLITANO

Taiyo Europe was responsible for the detailed engineering, fabrication and installation of the tensile roof structure, including its cable net system, big lift procedure and PTFE-glass membrane roof, in a mix of solid and mesh materials. This project received the 2019 International Achievement Award (IFAI).

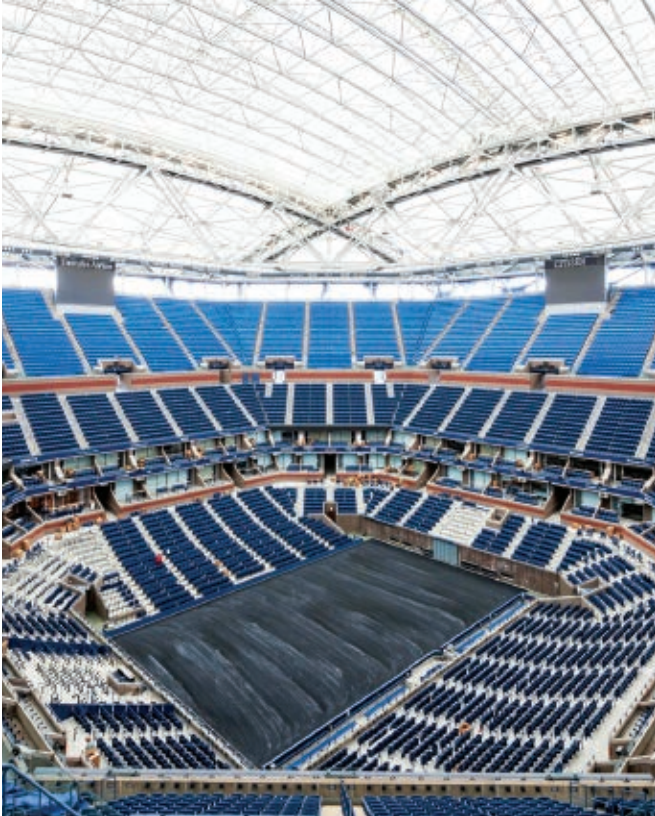
Year of Construction: 2017

Architect: Cruz y Ortiz Arquitectos, Spain

Engineering: Schlaich Bergermann und Partner, Germany; Maffei Engineering S.p.A, Italy
Taiyo Europe GmbH, Germany

Size/Material: 405 tons of cables and 915,000 ft²
PTFE-glass fabric

Location: Madrid, Spain



USTA ARTHUR ASHE

A new lightweight translucent retractable roofing system featuring PTFE membrane was added to the existing tennis stadium to prevent future weather delays.

Year of Construction:	2016
Architect:	Rossetti Architects
Engineering:	WSP
Size/Material:	210,000 ft ² PTFE-coated fiberglass
Location:	Flushing, New York USA

McCLAIN ATHLETIC FACILITY

The new upgraded Tensotherm roof allows McClain Athletic Facility to maintain the barrel vault look of it previous roof non-insulated PTFE by Birdair in 1988.

Year of Construction:	2012
Architect:	VOA Associates
Engineering:	Berners Schober Associates
Size/Material:	42,000 ft ² Tensotherm™ - Insulated Translucent Membrane System
Location:	Madison, Wisconsin USA

KHALIFA STADIUM

The New Khalifa Stadium is the first soccer stadium worldwide to use Tensotherm, and the first one in the Arabian Gulf to use single-layer ETFE. With this unique membrane roof, the stadium is rated four stars by the Global Sustainability Assessment System (GSAS).

Year of Construction:	2017
Architect:	DAR Al-Handasah, Lebanon
Engineering:	Maffei Engineering SpA, Italy
Size/Material:	600,000 ft ² Tensosky single-layer ETFE, PTFE-glass fabric and Tensotherm system
Location:	Doha, Qatar

MERCEDES-BENZ STADIUM

The new state-of-the-art facility features an ETFE retractable roof consisting of eight petals that retract similar to a camera lens. The roof features 135,000 ft² of triple-layer ETFE pillows and 165,000 ft² of vertical single-layer ETFE film supported with a cable net.

Year of Construction:	2017
Architect:	HOK & tvsdesign
Engineering:	Buro Happold
Size/Material:	300,000 ft ² of ETFE Cushions and single-layer facade
Location:	Atlanta, Georgia

COWBOYS STADIUM

World's longest retractable roof designed to open or close depending on the weather in just 12 minutes. It is also the first athletic facility in the US to use the self cleaning TiO₂-coated architectural fabric membrane roofing system.

Year of Construction:	2009
Architect:	HKS, Inc., USA
Engineering:	Walter P. Moore, USA
Size/Material:	150,000 ft ² TiO ₂ coated PTFE-glass fabric
Location:	Arlington, Texas USA

ESTADIO CIUDAD DE VALENCIA

New membrane roof covers all the stands with 28 membrane panels supported by two arches and fixed in the cable net structure. The total covered surface is around 97,000 ft². Taiyo Europe was responsible for the detailed engineering, fabrication and installation of the tensile membrane roof.

Year of Construction:	2020
Architect:	IDOM, Spain
Engineering:	Taiyo Europe GmbH, Germany Maffei Engineering SpA, Italy
Size/Material:	97,000 ft ² PVC-polyester
Location:	Valencia, Spain



RENNES TRAIN STATION

The new multimodal exchange hub in Rennes is the transportation core of the capital of Brittany. The old building was transformed in order to simulate the typical regional landscape. This was possible due to the 38,000 ft² of ETFE cushions that mimic the cloudy and foggy sky. On the southern end of the building the ETFE roof is equipped with a movable-layer system that gives the possibility of managing the solar gain value.

Year of Construction: 2019	
Architect:	AREP, France
Engineering:	MAP3, France, LEICHT France SAS, France
Size/Material:	56,000 ft ² of a mix of TensoSky ETFE single-layer and cushions, including movable-middle-layer system
Location:	Rennes, France



HEATHROW TERMINAL 2A

Terminal 2A, The Queen's Terminal, became a landmark building in terms of energy efficiency. Its unique undulating membrane ceiling distributes the natural light, while ensuring the required acoustic and aesthetic performances.

Year of Construction:	2014
Architect:	Luis Vidal + Architects, Spain
Engineering:	Maffei Engineering SpA, Italy
Size/Material:	600,000 ft² of silicone-glass fabric and TensoSky ETFE, secondary steel structure
Location:	London, UK

TRAM STATION LODZ

The lightweight steel structure elevates the colourful translucent roof, creating this landmark tram station. This is the first large scale colour printed TensoSky ETFE. The structure consists of a mix of 32,300 ft² uniquely printed ETFE roof and 6,500 ft² of transparent facade, supported by stainless steel cables.

Year of Construction:	2014
Architect:	FOROOM, Poland
Engineering:	Buro Happold, Poland; konstrukt AG, Germany
Size/Material:	38,750 ft² TensoSky ETFE single-layer, digitally printed
Location:	Lodz, Poland

SPLIT AIRPORT

In the 1990's Birdair has already built the PTFE front canopy of the main terminal. The satisfied client then asked Birdair to also execute all four-layer skylights during the terminal's renovation, as well as the extension of the original canopy and the Bus Terminal, both consisting of PTFE-glass material.

Year of Construction:	2020
Architect:	VV -PROJEKT d.o.o, Croatia
Engineering:	RADNIC d.o.o, Croatia Taiyo Europe GmbH, Germany
Size/Material:	15,000 ft² TensoSky ETFE four-layers and 43,000 ft² PTFE-glass fabric
Location:	Split, Croatia

DENVER INT'L. AIRPORT

Paying homage to the iconic Rocky Mountains while serving more than 47 million travelers who pass through annually, the massive 1,200 by 240 foot facility utilizes Birdair's innovative steel and cable systems and PTFE-coated membrane.

Year of Construction:	1994
Architect:	C.W. Fentress J.H. Bradburn Associates
Engineering:	Severud Associates / Horst Berger
Size/Material:	375,000 ft² PTFE Outer & Liner
Location:	Denver, Colorado USA

THE RAPID CENTRAL STATION

The two-tiered, PTFE membrane tensile canopy designed and built by Birdair undulates dramatically over the terminal and platform, rising and falling from 14 to 45 ft to remind patrons of the swirling rapids of the Grand River, calmed long ago by dams and locks.

Year of Construction:	2004
Architect:	Progressive AE
Engineering:	Wendel Duchscherer
Size/Material:	56,000 ft² PTFE-coated fiberglass
Location:	Grand Rapids, Michigan USA

HAJJ TERMINAL

Considered the largest cable-stayed tensile membrane roof structure in the world, 210 semiconical PTFE-coated fiberglass roof units supported by 135 ft high steel pylons were constructed to handle the large flow of pilgrims using the King Abdul Aziz Int'l Airport on their way to the nearby Holy City of Mecca.

Year of Construction:	1981
Architect:	Skidmore, Owings & Merrill (SOM)
Engineering:	SOM & Geiger-Berger Associates
Size/Material:	4.5 million ft² PTFE-coated fiberglass
Location:	Jeddah, Saudi Arabia

RETAIL

OUR MEMBRANE STRUCTURES BRING YOU
THE SOFISTICATED EXPERIENCE
YOU ARE LOOKING FOR



THE AVENUES - BAHRAIN

The Avenues-Bahrain is a shopping mall along the Manama sea front. Taiyo designed the steel and ETFE roof, as well as engineering, fabricating and installing 140,000 ft² of TensoSky four-layer ETFE cushion system. The structure comprises 130 cushions, creating the avenue shopping experience, and converging onto two fantastic ETFE flower-shaped domes.

Year of Construction:	2017
Architect:	MSCEB, Bahrain
Engineering:	Maffei Engineering SpA, Italy
Size/Material:	140,000 ft ² TensoSky ETFE four-layer
Location:	Manama, Bahrain



SCALO MILANO

Scalo Milano is the new city district in the south area of Milano, which highlights the great value of Italian food, fashion, design, and art. Covering all this experience is this integrated PTFE-glass central canopy. The full structure (steel structure, membrane and cables) was entirely designed and built by Taiyo.

Year of Construction: 2016	
Architect:	Metrogramma Srl, Italy
Engineering:	Maffei Engineering SpA, Italy
Size/Material:	25,000 ft ² PTFE-glass fabric, steel and cables
Location:	Locate di Triulzi (Mi), Italy

MON GRAND PLAISIR SHOPPING MALL

53 ETFE cushions along the shopping alley, coupled with the twisting aluminium Fettuccine, give casual shopping enthusiasts a vibrant feeling of openness and a real feeling of warmth from the sunlight.

Year of Construction: 2020	
Architect:	GR Design, France
Engineering:	MAP3, France; Taiyo Europe GmbH, Germany
Size/Material:	43,000 ft ² TensoSky double-layer ETFE cushions
Location:	Plaisir, France

ATHENS METRO MALL

As one of the most modern shopping centres in Athens, Athens Metro Mall is also unique because of its two retractable roofs. The main roof was fabricated using PVC and the extension using ePTFE. It was the winner of the 2011 IFAI Award of Excellence for tensile structures larger than 24,750 ft².

Year of Construction: 2007	
Architect:	Archicon Ltd., Greece
Engineering:	Maffei Engineering SpA, Italy
Size/Material:	30,150 ft ² retractable roof PTFE-PTFE fabric Silicon; Extension roof ePTFE
Location:	Talima, Greece

SONY CENTER

Innovative architecture, living and work spaces. A unique connection between historical and modern Berlin. With the Sony Center, its planners and architects have created an internationally respected masterpiece of contemporary architecture.

Year of Construction: 2011	
Architect:	Murphy/Jahn, Inc. Architects, USA
Engineering:	ARUP, Germany
Size/Material:	57,000 ft ² PTFE-glass fabric
Location:	Berlin, Germany

PLAZA LAS AMERICAS

One of the first malls in the area, the dramatic flying sail tensile membrane roof design provides shoppers with shade and protection from inclement weather while delivering natural daylighting for the space underneath.

Year of Construction: 2012	
Architect:	Interdisenos
Engineering:	Interdisenos
Size/Material:	18,840 ft ² PTFE-coated fiberglass
Location:	Morelia, Michoacan Mexico

WEST PALM BEACH OUTLETS

An outdoor shopping mall that features six areas around the retail center with PTFE conical shaped tensile membrane structures designed and built as walkway canopies protecting shoppers from the hot sun and daily precipitation.

Year of Construction: 2014	
Architect:	Dorsky Yue International LLC.
Engineering:	Mcnamara / Salvia Inc.
Size/Material:	48,000 ft ² PTFE-coated fiberglass
Location:	West Palm Beach, FL USA

ENTERTAINMENT

LARGE OR SMALL:
WE MAKE SURE THAT
ALL EYES LIGHT UP



THE O2

The O2, also referred to The Millenium Dome, is one of the largest dome-shaped buildings in the world. For this project, Birdair executed more than 1 Million sq. ft. of double-layer PTFE-glass fabric (external solid and internal accoustic fabric). The roof assembly is supported by a web of 2,600 cables suspended from a circle of 12 steel masts, inclined slightly from vertical, that rise nearly 328 feet, representing the role played by Greenwich Mean Time.

Year of Construction:	1998
Architect:	Richard Rogers Partnership, UK
Engineering:	Buro Happold, UK
Size/Material:	1,075,000 ft ² of double-layer PTFE-glass fabric (inner accoustical liner)
Location:	London, UK



RIVER CULTURE PAVILION THE ARC

This architectonic masterpiece is constructed on the site where four rivers come together. The facade consists of a steel gridshell laterally supported by the primary structure. The gridshell is covered by specially-patterned ETFE cushions.

Year of Construction: 2012	
Architect:	Asymptote Architecture, Hani Rashid, USA
Engineering:	Withworks, South Korea; Konstruct AG, Germany
Size/Material:	21,500 ft² TensoSky ETFE four-layer
Location:	Daegu, South Korea



ARKANSAS MUSIC PAVILION

The AMP's three-cone shaped PTFE fiberglass membrane structure creates an open, inviting space that comes to life in the evenings with glowing lights and cheering fans.

Year of Construction: 2014	
Architects:	CORE
Engineering:	Tatum-Smith
Size/Material:	37,500 ft² PTFE-coated fiberglass
Location:	Rogers, Arkansas USA



MTV MUSIC AWARDS STAGE

Standing 40 feet high and 131 feet wide, the colossal unsupported tubular structure was created with 27,000 ft² of Eclipse Bright Nylon Lycra in white, with only minimal pocket sewing around the perimeter. Additional fabric sections were provided to create an entrance tunnel for the music acts & award winners.

Year of Construction: 2009	
Architect:	LAVA, Australia
Engineers:	MakMax Australia
Size/Material:	4,300 ft² Lycra
Location:	Sydney, Australia



EMPIRE CITY CASINO AT YONKERS

The transparency of the ETFE membrane cushions allows daylight to flow into the space below while providing cover and shade for people as they arrive at the casino. The Empire City Casino installation of ETFE incorporates custom-colored LED lighting, creating a truly energizing and exciting experience for guests.

Year of Construction: 2013	
Architect:	Studio V Architecture
Engineering:	FTL Design Engineering Studio
Size/Material:	11,000 ft² ETFE Film (double-layer cushions)
Location:	Yonkers, New York USA



CENTRE POMPIDOU

With its hat shape, the glued laminated wood frame is covered by the PTFE TiO₂ membrane (membrane with self-washing effect) with an area of 86,100 ft². The roof is presented as a vast structure of hexagonal panels, crossed by three galleries and supported by a hexagonal tower in the center and 4 tulips.

Year of Construction: 2009	
Architect:	Shigeru Ban Architects Europe, Jean de Gastines Architectes, France; Gumuchdjan Architects, England
Engineering:	Ove Arup & Partners, UK; Terrell Group, France
Size/Material:	86,000 ft² TiO ₂ PTFE-glass fabric
Location:	Metz, France



SUN VALLEY MUSIC PAVILION

Inspired by its natural setting, the Sun Valley Music Pavilion is a 3,000 square-foot stage is housed under a proscenium arch that supports the free-flowing PVC tensile canopy structure.

Year of Construction: 2008	
Architect:	Ruscitto/Latham/Blanton Architectura
Engineering:	FTL Design Engineering Studio
Size/Material:	18,000 ft² PVC
Location:	Sun Valley, Idaho USA

INSTITUTIONAL

CONNECTING PEOPLE AND
TECHNOLOGIES. ALWAYS.



EXPO-2015 CARDO E DECUMANO

In ancient Rome, the main street that crossed the villages from East to West was called "Decumano" and the perpendicular one from North to South was called "Cardo". These are also the names of the two main streets of the Expo exhibition area. These walkways, which are 5,600 ft long, with a covered surface close to 754,000 ft², represent the main walkway of the EXPO and one of the biggest PVC roof structures in Europe.

Year of Construction: 2015

Architect: Studio Tecnico Majowiecki, Italy

Engineering: Maffei Engineering S.p.A, Italy

Size/Material: 732,000 ft² PVC-polyester fabric

Location: Milan, Italy



FUJI PAVILION

One of the most popular and iconic pavilions, built for the Osaka Expo in 1970, Fuji Pavilion is a fair and trade center and air-inflated membrane structure. This type of structure converted the common style into a new, remarkable, air-inflated type, composed of small inflated structures inside and outside of the main structure. This architecture is still the largest of its type in the world.

Year of Construction:	1970
Architect:	Yutaka Murata
Engineering:	Mamoru Kawaguchi
Size/Material:	36,600 ft ² Vynolon
Location:	Osaka, Japan

STRONG NATIONAL MUSEUM OF PLAY

More than 4,000 sq. ft. of PTFE tensile membrane stretches 30 feet high and 50 feet in diameter to form the architectural equivalent of a butterfly's wings, allowing an abundance of natural daylight into the space below.

Year of Construction:	2006
Architects:	Macon Chaintreuil Jensen & Stark
Engineering:	Jensen Engineeering, PC
Size/Material:	4,000 ft ² PTFE-coated fiberglass
Location:	Rochester, New York USA

UNIVERSITY OF LA VERNE

Since 1972, the world's first permanent tensioned membrane roofing system has topped the Sports Science and Athletics Pavilion at the University of La Verne, La Verne, CA. Today, the design and functionality of the Birdair structure remains as innovative as it was 50 years ago.

Year of Construction:	1972
Architect:	John Shaver, Shaver Partnership
Engineers:	Bob Campbell, Campbell & Co.
Size/Material:	47,500 ft ² PTFE glass fabric
Location:	La Verne, California USA

AMBAR INTERACTIVE CENTER

This iconic structure was inspired by the human brain and serves as a drug educational center for the youth of Mexico. The left and right "hemispheres" of the structure match the asymmetry of the brain and pay homage to the different functions of each side.

Year of Construction:	2012
Architect:	Pedro Ramierz, Gerardo Gallo & Modulo 7
Engineering:	Pedro Ramierz, Gerardo Gallo & Modulo 7
Size/Material:	35,000 ft ² of PTFE glass fabric
Location:	Tijuana, Baja California Mexico

FLORIDA HOSPITAL WATERMAN

From the onset, Birdair's design goals were to create a warm, casual, and relaxed environment that did not look like a traditional hospital, while achieving a tranquil setting encouraging healing and alleviating anxieties. PTFE folded plate membrane roof design was used to cover the lobby, as well as extending out over the driveway of the hospital's main entrance.

Year of Construction:	2003
Architect:	RTKL Associates, Inc.
Engineering:	Zinser Engineering
Size/Material:	31,715 ft ² PTFE glass fabric
Location:	Tavares, Florida USA

COCA-COLA BEATBOX

A pavilion designed for the Olympic Games that could be played like a musical instrument. The "work of art", consisting of 230 mutually stabilizing cushions, combines architectural design with the latest sound technology and invites visitors on a tour of discovery.

Year of Construction:	2012
Architect:	Pernilla Ohrstedt & Asif Khan, UK
Engineers:	AKT II, UK, Leicht, Germany
Size/Material:	16,800 ft ² TensoSky ETFE double-layer, with incorporated sound system
Location:	London, UK

COMMERCIAL

ECONOMY, FUNCTION AND FLEXIBILITY
FOR YOUR DAILY ROUTINE



SWATCH HEADQUARTERS

The roof of Swatch Headquarters (Swatch and Omega Campus) consists of timber frames in 3D grids. Almost 1,000 ETFE film cushions which form parts of the grid structure were engineered, fabricated, and delivered for this project. The total area of the ETFE cushions is 39,900 ft². The three kinds of ETFE cushions were fabricated to accurately fit the 3D curvature timber frames, which required high precision from both engineering and fabrication.

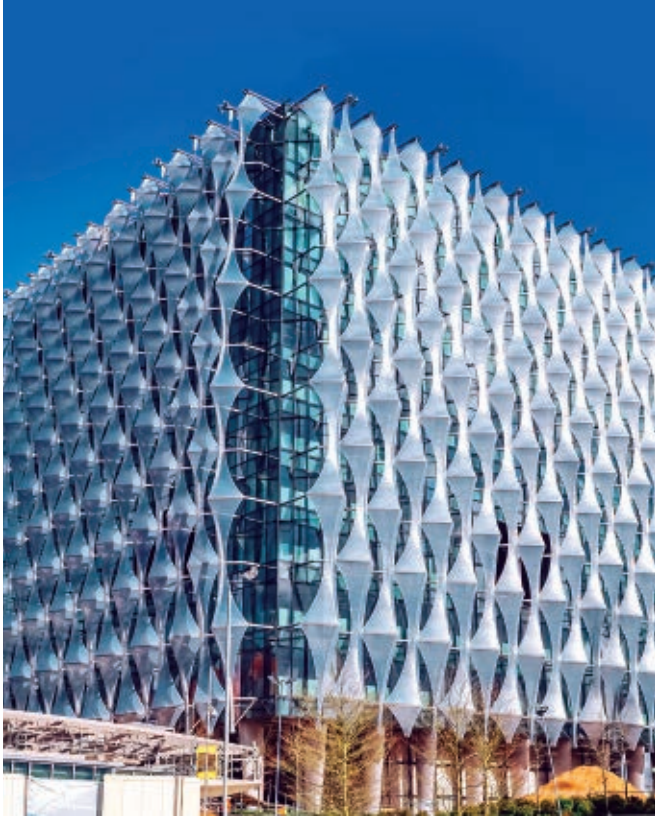
Year of Construction:	2018
Architect:	Shigeru Ban Architects, Japan
Engineering:	LEICHT GmbH, Germany
Size/Material:	39,900 ft ² TensoSky ETFE multi-layer composed system incorporating movable shading and polycarbonate panels
Location:	Biel, Switzerland



THYSSENKRUPP TEST TOWER

One of the tallest buildings in Germany (2,807 ft) and the world's tallest building with a textile facade. The spiral arrangement of the facade consists of an extremely long-lasting PTFE coated, glass-fiber fabric. The tower is primarily used to test and certify next-gen elevators.

Year of Construction: 2017	
Architect:	JAHN Architects, Germany
Engineering:	Werner Sobek, Maffei Engineering SpA, Italy; Taiyo Europe GmbH, Germany
Size/Material:	183,000 ft ² PTFE-glass fabric, supporting steel and cable
Location:	Rottweil, Germany



US EMBASSY

The US Embassy in London is a project which stretches the boundaries of single-layer ETFE. The tensile facade is composed of 399 pre-tensioned panels, installed on an articulated structure. The ETFE facade limits excessive solar gain and glare while allowing uniform distribution of natural light.

Year of Construction: 2017	
Architects:	Kieran Timberlake, USA
Engineering:	Birdair, USA; ARUP, USA; Taiyo Europe GmbH, Germany
Size/Material:	87,500 ft ² TensoSky ETFE single-layer, cable and aluminium skeleton
Location:	London, UK



LAKHTA CENTER

This Multifunctional Building consists of two parallel buildings, fluidly united by a continuous 4-Layer TensoSky Skylight. The flexibility of TensoSky along with its transparency and resistency ensures the harmony of geometry and sunlight, while resisting the demanding snow loads.

Year of Construction: 2019	
Architect:	RMJM Architects, UK, Gorproject, Russia
Engineers:	Maffei Engineering SpA, Italy; Taiyo Europe GmbH, Germany
Size/Material:	43,000 ft ² TensoSky ETFE four-layer, main steel structure
Location:	St. Petersburg, Russia



AWM CARPORT

Aesthetics and sustainability: the ETFE roof of Munich's municipal waste management building with its integrated photovoltaic cells fulfils all requirements of a functionally & ecologically advanced structure.

Year of Construction: 2011	
Architect:	Ackermann und Partner Architekten BDA, Germany
Engineering:	Ackermann Ingenieure, Germany; Konstruct AG, Germany
Size/Material:	86,120 ft ² TensoSky ETFE triple-layer with incorporated photovoltaic system
Location:	Munich, Germany



SAN DIEGO CONVENTION CENTER

Originally constructed in 1989, the iconic PTFE Sails Pavilion roof of the San Diego Convention Center was recently renovated and replaced with a new PTFE tensile membrane roof. The white sails roof atop of the exhibit space has made the convention center one of the most recognizable venues worldwide.

Year of Construction: 2018	
Architects:	Arthur Erickson Architects (original)
Engineering:	Thorton Tomasetti
Size/Material:	106,000 ft ² PTFE-coated fiberglass
Location:	San Diego, California USA



NISSAN PAVILION

Enclosed by an ETFE film cushion facade, Nissan Pavilion is an interactive experience facility for future vehicles, technology, and the vision for the future of mobility. The soft form of the facade creates a distinctive atmosphere with the combined use of LED lighting.

Year of Construction: 2020	
Architect:	Nissan Global Design HQ, TBWA/HAKUHODO, Archiccept city, CBRE, Japan
Engineers:	Taiyo Kogyo Corporation, Japan
Size/Material:	10,800 ft ² TensoSky ETFE 37,700 ft ² PVC-polyester fabric
Location:	Yokohama, Japan



MEMBRANE CEILING SOLUTIONS

A SAFE SOLUTION FOR AESTHETIC, THERMAL AND ACOUSTIC IMPROVEMENTS

Function and aesthetics go hand in hand for ceiling membrane solutions. The lightweight nature of tensile membranes gives unique expression to various spaces.

Very flexible and light, membrane liners can take a wide variety of shapes without creating high additional loads on the main supporting structure. For this reason, textile ceilings are frequently attached to existing roofs, in order to improve overall indoor comfort.

Textile liners also enhance acoustic performance, improving sound absorption and reducing reverberations and echo effect. This makes a

membrane ceiling the perfect solution for auditoriums, sport halls, swimming pools, open-air theaters and many other applications.

Birdair's lightweight systems are also safe solutions in seismic areas, drastically reducing the risk of injuries to the building users compared to heavier modular elements for ceiling applications. Moreover, thanks to their high fire resistance rate, membrane interior ceilings also keep users safe in the event of fire.

A flexible membrane ceiling design gives a perfect form and function combination for various spaces.

- LIGHTWEIGHT & FLEXIBLE IN FORM
- SOPHISTICATED ARCHITECTURAL FINISHING
- ACOUSTIC EFFICIENCY
- IMPROVED INDOOR COMFORT
- LOW MAINTENANCE
- FIRE RESISTANCE
- SEISMIC PROTECTION

Tensile Membrane facade solutions offer the remarkable benefits of low-weight structures, exceptional durability, reduced maintenance and energy-efficient systems that can be applied to any building shape.

Whether you aim to modernize an aging office building or create an innovative design, tensile membrane facades give a flexible and economical solution that can also help solar heat gain issues.

All buildings can benefit from membrane facades. Birdair tensile membrane facade solutions are ideal for realizing intricate designs, creating stylish

TENSILE MEMBRANE FACADE SOLUTIONS

THE ECONOMICAL ALTERNATIVE TO STANDARD FACADE SYSTEMS

separations, and staying on budget. Parking garages can also greatly benefit from Birdair tensile membrane facades, by creating an innovative cladding for any structure. Solutions for this application provide the ventilation necessary for the garage space, along with light transmission and a lightweight economical option that will create a lasting impression.

The materials adopted for these applications show extremely high resistance to external weather conditions and vary from single or multi-layered ETFE systems to tensioned PVC-polyester or PTFE-coated fiberglass membrane, frequently employed as mesh panels.

- CREATIVE LIGHTWEIGHT PROTECTION
- COST-EFFECTIVE
- REDUCTION OF SOLAR GAINS
- IMPROVED BUILDING THERMAL PERFORMANCE
- SURFACE FOR SCREENS, BRANDING, & GRAPHIC DESIGN
- TRANSLUCENCY & RETRO-ILLUMINATION
- DURABLE WITH EASY MAINTENANCE



CONSTRUCTION CAPABILITIES

OUR GOAL IS TO MAKE YOUR DESIGN REALITY

The custom tensile membrane structures designed and executed by Birdair require experts in specialty construction in order to achieve the ultimate results. Our Group offers many of the most experienced, well-trained and dedicated construction professionals available in our industry. Our global construction capabilities lead Birdair to build a plethora of outstanding projects which have resulted in lasting partnerships with our customers. Throughout the years, we had the chance to work in many different geographical climates and conditions, working at temperatures ranging from -25° F to +130° F,

heights of 850 ft and more. We also develop methodologies to best fit the project, from installing from simple scaffoldings and manlifts, to adopting hydraulic jacking systems, rampant platforms and helicopters. Birdair currently employs construction managers, site supervisors and a global network of experienced technicians, climbers, H&S personal and installers of steel, cables, and tensile membranes. Our portfolio speaks for us: as a leader and pioneer specialty contactor, we efficiently install tensile membrane projects ranging in size, from small entrance or curbside canopies to large stadium roofs

- DESIGN AND BUILD
- PIONEER IN MEMBRANE STRUCTURES
- SPECIALIST IN STEEL & CABLE STRUCTURES
- COMMITMENT TO HEALTH & SAFETY
- INNOVATIVE INSTALLATION METHODS TO MEET EVERY ENVIRONMENT
- SOLUTIONS FOR NEW & OPERATING BUILDINGS
- SPECIALIST ROPE ACCESS TEAMS

We recognize the importance of achieving global quality standards through the implementation of excellence in the processes that permeate our business, from early-stage design all the way to installation and maintenance. We also believe in a greener future, where high-performance building membranes can be the front line of a world with higher energy savings and reduced environmental impact. Birdair's solutions can support clients aiming to achieve LEED®, BREEAM® and DGNB certifications, as well as requiring our TensoSky ETFE Environmental Product Declaration.

- QUALITY
Birdair's primary commitment is to quality. Our dedication to excellence follows our strict Quality Management Procedures. By implementing this system in every aspect of our business, we ensure that we deliver superiority in our product and services.
- HEALTH & SAFETY
Safety is our priority. Birdair is committed to upholding the highest safety standards across our business. Our attention to details is embedded in our values, organization culture, and operating systems with our OHS management system.

- RECYCLABILITY
Birdair's tensile membrane structure uses steel and aluminium materials, as well as different membrane materials that support improved environmental conditions. Moreover, ETFE films that compose Birdair's TensoSky ETFE system are 100% recyclable.
- ENVIRONMENT AND SUSTAINABILITY
Birdair believes that operating in a sustainable, responsible manner is an important business practice. We are conscious of our responsibility to the environment and we constantly raise environmental awareness throughout the projects.



FABRICATION

MANUFACTURING CUSTOMIZED AND INNOVATIVE STRUCTURES SINCE 1922

High quality membrane structures are the core of the architecturally innovative and aesthetically appealing custom tensile structures Birdair creates. Each material requires a specific fabrication process mastered by our team.

The Taiyo Group has six state-of-the-art production facilities located on three continents, making us the largest membrane fabricator in the world and assuring our capabilities in providing our clients with full customized design-to-build solutions.

Geographically located in strategic cities, our production facilities allow us to efficiently cater to

any project location with the shortest lead time, providing our customers with the assurance and unconditional commitment to their schedule.

We are dedicated to delivering projects to the highest standard of quality. Our ISO-90001 certified factories are capable of fabricating a wide array of fabric and foil structures, including PTFE-coated fiberglass and PVC, Tensotherm and TensoSky ETFE film systems.

During all stages of fabrication, Birdair adheres to a strict Quality Management Program, improved over decades of experience, and involving self and independent third-party monitoring. Additionally, our

facilities rely on the latest machinery and equipment, developed and optimized for each product application.

Birdair also supports a network of qualified fabrication partners, committed to Birdair's quality program, and which supports our technology and expertise in membrane systems reaching projects in every place.

Our years of experience are passed down through the generations of specialists in our team. Each process of production is strictly monitored, optimized and managed to ensure that our projects are aesthetically and functionally first-rate, not only at the time of completion, but also during their lifetime of use.

SERVICE & WARRANTY

BECAUSE MAINTENANCE IS THE FIRST STEP TOWARDS LONG-LASTING PERFORMANCE

With more than 65 years of worldwide experience, Birdair provides quality post-project resources and assistance - all under one roof. Our commitment to customer service extends far beyond project completion, delivering satisfaction to architects and owners who wish to achieve results surpassing the ordinary, both aesthetically and functionally.

Building owners may partner with our company to ensure their structures look as breathtaking years from now as they did the day the last piece of steel, cable, tensile fabric or ETFE film was put into place. These services can range from simple cleanings to comprehensive structural reviews and modifications.

Our site superintendents are on call 24/7, allowing Birdair to promptly respond to any service requests, along with our dedicated rope access teams, specially trained to maintain your tensile structure to the highest standard.

Moreover, Birdair's on-going commitment to training ensures we are able to provide advice on all aspects of the technology. Our vast technical knowledge and expertise provides clients with assurance and peace of mind that Birdair's tensile structures will perform over the course of the building's life, and beyond.

- 24/7 ON CALL SERVICE
- INSPECTION, SURVEY & MONITORING
- PREVENTIVE MAINTENANCE & REPAIR
- CLEANING OF MEMBRANE MATERIAL
- RE-TENSIONING AND TENSILE STRUCTURE ENHANCEMENTS
- COMPLETE MEMBRANE REPLACEMENT & RENOVATIONS
- REINFORCEMENTS, STEEL MODIFICATIONS, WATER & SNOW MANAGEMENT, & MORE



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BIRD AIR

Setting the **Global Standard** for Tensile Architecture