DEFYING GRAVITY
Tensile architectural structures delight the eye and capture the imagination. They often cover very long spans, rising and arching without inhibition, appearing to defy gravity.

Only tensile structural engineering, materials and construction methods offer such freedom of form to the architect. With that freedom comes the opportunity to achieve great architecture – sometimes startling, but always intriguing.

Birdair is the world’s foremost tensile architecture specialty contractor. More than 1,200 Birdair-built tensile structures can be found in over 30 countries – in every climate – from arctic cold, to arid desert, to steamy tropics.

But the versatility of tensile architecture is best demonstrated through the infinite variety of uses in which it’s employed. These extraordinary and often famous structures include stadiums, arenas, convention centers, amphitheaters, airports, shopping malls, entertainment centers, museums, science centers, hospitals, schools, offices and more.

Birdair was founded in 1956 by engineering pioneer Walter Bird. In 1992, the company became part of Japan’s Taiyo Kogyo Group.
Throughout its history, Birdair has continually advanced the art and science of architectural fabric membrane – innovating architectural applications for membrane; devising new, more effective and efficient methods of fabricating, installing, and maintaining membranes; and engineering entirely new membrane systems and materials such as insulated Tensotherm membrane and fully recyclable and remarkably sustainable Kenafine membrane.

Birdair is master of the widest selection of membrane to cover virtually any application, any size project, and any given budget.

PTFE, or polytetrafluoroethylene, is a durable, weather- and fire-resistant Teflon®-coated woven fiberglass membrane, with a project life cycle exceeding 30 years.

PTFE fiberglass coated with non-toxic and flame-resistant TiO₂ (titanium dioxide) produces a photocatalytic membrane that functions like the leaves of a tree, providing shade while actively neutralizing airborne pollutants.

Translucent PTFE fiberglass acoustical liner membrane is used in conjunction with the exterior PTFE fiberglass membrane in order to achieve significant sound attenuation and reduce reverberation for a more perfect listening experience.

Silicone-coated glass fiber fabric is a durable, weather resistant and fire-tested silicone-coated material offering a wide variety of translucency levels and unlimited color selection.

Kenafine is a translucent, moisture resistant, biomass roofing membrane that can be fully recycled into paper products at the end of its life cycle. The fabric is made with fibers of Kenaf, a type of annual hibiscus herb that absorbs more carbon dioxide and grows more rapidly than regular plants and trees.

PVC-coated (polyvinyl chloride) mesh is an exceptionally durable fabric membrane produced with polyester, fiberglass and other types of reinforcements. PVC-coated mesh is woven during fabrication, increasing tensile strength and design versatility while diminishing concerns about fabric compatibility and size.
Birdair tensile architectural structures are the most economical way to achieve clearspan roofing enclosures of 150’ (45m) or more, eliminating the need of interior columns, support foundations, and providing an overall light weight to support. Most tensile architecture projects are known for their signature rooflines made from millimeters thin membrane material. Flexible and smooth, Birdair membrane roofs are particularly well-suited for economically translating curvilinear designs into reality. Additionally, tensile architecture also offers other advantages:

- Provides the greatest degree of unobstructed interior space
- Optimizes sight lines and maximizes visibility – of utmost importance in stadiums and amphitheatres, for example
- Allows ample daylight to penetrate, reducing the need for artificial lighting and associated energy requirements for the space
- Permits usage in facade applications
- Produces an attractive soft glow through the roof membrane at night with interior lighting
- Membrane roofing system also double as interior ceiling
- Translucent insulated composite systems can provide daylighting while delivering insulation value consistent with built-up roofing.
- Membrane can be TiO2-coated to help maintain a like-new appearance even in dirty or polluted environments, reducing maintenance costs
- Membrane liner and insulated systems can also provide sound-absorbing acoustical benefits
- Birdair offers ENERGY STAR, Cradle to Cradle and Cool Roof certified products
SUSTAINABLE AND FUNCTIONAL BY NATURE AND DESIGN

MATERIAL REDUCTION
Simply put, efficient building is green building. One of the most effective ways for an architect to achieve green design is to use less material. When a structure requires fewer materials, it wastes fewer materials.

The membrane, steel substructure, cables and clamping systems used in tensile architecture amount to a small fraction of the material consumed in creating the structure and building.

LONG LIFE-CYCLE AND RECYCLABILITY
The elements in a Birdair system also contribute to sustainable design by virtue of their reuse and recyclability. Steel, of course, is 100-percent recyclable and the steel used in fabrications produced for Birdair has a high percentage of recycled content. One new membrane material, made entirely of the Kenaf plant, is converted into paper at the end of its useful life as a roof or facade.

Membranes also last longer than conventional roof materials. Many of the oldest Birdair installations, dating back more than three decades, continue to look and perform beautifully today. Many professionals view PTFE fiberglass as the industry’s next “forever” material.

Birdair roofs coated in TiO2 (titanium dioxide) function like leaves on trees, not only providing shade but also actively neutralizing airborne pollutants and odors. Once neutralized, pollutants are washed off the membrane by rainfall, keeping the fabric clean and extending its vibrancy.

ENERGY EFFICIENCY
A membrane roof fabricated to Birdair specifications can save energy two ways. First, through its translucency, the roof allows daylight to flow into the space, reducing the requirement for artificial electrical lighting. Additionally, white membrane reflects heat back into the atmosphere. Birdair offers PTFE composites that can qualify for ENERGY STAR, Cradle to Cradle and Cool Roof Certification.

Birdair has also been instrumental in the innovation of Tensotherm®, a pre-engineered, highly efficient insulated translucent composite roofing system. Insulating Nanogel® aerogel® is the world’s lightest solid material and the most efficient insulating material ever created. The result is a thin, translucent composite that delivers impressive insulation values.

* Nanogel® aerogel is a registered trademark of Cabot Corporation. Nanogel® aerogel is Cradle to Cradle certified. Cradle to Cradle (CM) is a certification mark of McDonough Braungart Design Chemistry (MBDC). Some PTFE membranes offered by Birdair have earned ENERGY STAR. Birdair roofs can achieve Cool Roof Rating Council certification.
COMPREHENSIVE DESIGN-BUILD CONTRACTING SERVICES FROM CONCEPT TO COMPLETION

The complexity of tensile architecture flows from its nature as a precise blend of art, science, engineering, computer modeling and construction know-how. If you’re considering tensile architecture, Birdair is the specialty contractor you want on your team from the start.

Birdair’s full range of project delivery services – from design assistance to construction – ensures your project will be designed, engineered and built more quickly, more efficiently and more economically.

Most importantly, with Birdair on your design-build team, you have peace of mind. You know you’ve hired the first name in specialty contracting for custom tensile architecture with the longest history of experience and success in the business.

Experience proves that, when choosing Birdair, you will successfully achieve your next tensile architecture masterpiece.

BIRD AIR IS STRUCTURED BY DEPARTMENT TO PROVIDE OUTSTANDING FULL-SERVICE SPECIALTY CONTRACTING SERVICES

- Business Development
- Engineering
- Design & Detailing
- Research & Development
- Estimating
- Finance

- Purchasing
- Construction
- Fabrication (Plant)
- Project Management
- Quality Assurance & Quality Control
DESIGN ASSIST

At the schematic design phase, Birdair Design Assist provides your design-build team with guidance and recommendations. Birdair helps you conceptualize form, geometry, scale, materials and structural support systems based on your design intent, budget and timeframe. Because tensile architecture is far more lightweight than traditional roof systems, a project’s overall structural requirements are often significantly reduced. With Birdair Design Assist, your design-build team identifies and capitalizes on these reductions from the start.

DELIVERABLES
Feasibility Study
Preliminary Analysis
Pre-construction Budgeting
Scope Delimitation
Schedule Feasibility

BIRDAIR RESOURCES
Business Development
Engineering

FEASIBILITY, ANALYSIS AND MODELING

Through Birdair Feasibility, Analysis and Modeling services, your project’s form, geometry and materials begin to crystallize. Now, Birdair can begin to calculate reaction loads, determine methods for construction, perform any required testing and establish a preliminary schedule.

DELIVERABLES
Formal Analysis
Model Generation
Preliminary Reaction Loads
Construction Feasibility
Preliminary Construction Method Development
Materials Recommendations and Applicability Testing
Preliminary Schedule Development

BIRDAIR RESOURCES
Business Development
Engineering
Research & Development
Estimating
Purchasing
Construction
BUDGET DEVELOPMENT, COST ANALYSIS AND VALUE ENGINEERING

With 50-plus years of proven experience, Birdair is able to offer you Guaranteed Maximum Pricing contracts for complete construction of the largest tensile architectural projects worldwide.

**DELIVERABLES**
- Proposal Development
- GMP Proposals
- Engineering Take-Off
- Materials Confirmations
- Supply Chain Engagement
- Construction Methodology Confirmed
- Proposal Schedule Confirmed

**BIRDAIR RESOURCES**
- Pre-construction
- Engineering
- Estimating
- Purchasing
- Fabrication (Plant)
- Project Management
- Research & Development
- Quality Assurance
- Construction

**FINAL ENGINEERING**

Birdair details each component to be fabricated in-house or by a Birdair supplier. For a given project, these components may include steel support masts or compression rings, as well as an outside element barrier – be it fabric membrane, glass, or metal. Birdair also recommends all manufactured components such as cables, rods, fittings and clampings, and develops detailed methodologies for exactly how and when each component is to be installed on site.

**DELIVERABLES**
- Formalize Submittal Drawings and Patterning Details
- Develop Final Reactions and Calculations
- Construction Methodology and Engineering Confirmed
- Material Orders Confirmed
- Finalize Fabrication and Associated Scheduling
- Project Schedule Finalized

**BIRDAIR RESOURCES**
- Engineering
- Design & Detailing
- Construction
- Fabrication (Shop)
- Project Management
Fabrication & Supply Chain Management

Birdair Fabrication and Supply Chain Management assures that all materials required for your project are fabricated, manufactured, shipped and delivered to your job site according to precise specifications and timetables. Your project’s membrane components are fabricated in the controlled environment of a Birdair 9001: 2008 ISO-certified facility. Here, fabric membrane is patterned, cut, welded, packaged, shipped, and many of the structural components, such as steel rods and cable, are pre-assembled. Birdair also maintains excellent relationships with qualified suppliers of tensile architecture building components, including fabric membrane, metal roofing, architectural mesh, and glass curtain wall, as well as structural steel masts and rings, cables, rods, fittings and clamps.

**Deliverables**

- Supply Chain Established and Coordinated
- Material Schedules Confirmed
- Final Detailing Completed and Released
- Third-party Quality Assurance Testing
- Fabrication Schedules Confirmed
- Delivery Schedule Finalized

**Birdair Resources**

- Engineering
- Design & Detailing
- Project Management
- Purchasing
- Fabrication (Shop)
- Quality Assurance
- Transportation & Logistics Coordination

**Supply Chain Management**

- Project Executive
- Purchasing
- Project Manager
- Engineering
- In-House Construction Manager
- Plant Manager
- Subcontract Supply Fabrication
- Subcontract Cable Fabrication
- Subcontract Clamping Fabrication

- Project Executive
Established Experience

Birdair – the original mega tension design-builders – founded many of the tensioning techniques used in modern tensile construction. For more than 50 years, Birdair has developed the art of tensile architecture, including hydraulics and tensioning equipment as well as specialty rigging.

More than 1,200 projects worldwide exemplify Birdair’s custom engineering, craftsmanship and quality of work.

Deliverables

Mobilization of Manpower and Equipment
Site Offices Established
Erection and Site Coordination Begins
CONSTRUCTION

INNOVATIVE EXPERTISE
From the initial concept to project completion, Birdair is fluent in the science of construction. This versatility transcends blueprints, allowing execution of creative design using methods unique to each application. Birdair’s scalable services can accommodate any project demands, no matter what size or scale.

BIRDAIR RESOURCES
Project Management
Construction
Engineering
POST-INSTALLATION AND SERVICE

Birdair boasts of an impressive roster of satisfied architects and owners who have achieved results surpassing the ordinary, both aesthetically and functionally. To keep their investments looking beautiful and functioning perfectly, Birdair offers service contracts for routine inspection, cleaning, and service if required.

We wanted a material that would require simple periodic maintenance without time-intensive cleaning or repair. Birdair provided us with a structural fabric that meets those goals.”
- John Dunn, vice president of stadium operations for the Arizona Cardinals

Our current Birdair roof has performed well beyond its expectations and has exceeded its lifespan. We made the decision to go with Birdair again a couple years ago when we foresaw that the roof would need to be replaced soon.”
- Roy Saville, Radford University’s director of facilities planning and construction

“I’ve been told by people that I broke the mold in U.S. sports architectural design. Working with Birdair’s technical staff of design engineers helped me accomplish that.”
- World-renowned architect Peter Eisenman regarding the University of Phoenix Stadium

Birdair looks forward to working with you.

BIRD AIR CLIENTS INCLUDE

Alston + Porter Architects
Anschutz Entertainment Group
Arizona Sports & Tourism Authority
Arquitectonica
Arthur Erickson
Arup
Balfour Beatty Construction
Banca Mifel
Barton Malow Co.
Bay Area Rapid Transit District (BART)
BBP International
Bermello Ajani & Partners
Bilbao & Noyatay, Inc.
Blues Land Lease
Brandfield & Garrie LLC
Buro Happold
Cambridge Seven Associates, Inc.
Cannew Design
Carter & Burgess, Inc.
City and County of Denver (CO)
City of Calgary (AB)
City of Palm Springs (CA)
Dar Al-Handasah
De Castilla Marquez y Asociados
Dearchlucht Macheflute and Partners Inc.
E. Wemhi Johnson and Associates, Inc.
Eiseman Architects
Elerise Becket
EnVision Corp.
Enventure Architects
Foster & Partners
FTL Design Engineering Studio
Geiger Engineers, PC
General Growth Properties, Inc.
Gensler
Georgia World Congress Center Authority
Georgia, Mary and Partner
Gilbane Building Co.
Greater Orlando Aviation Authority
Gruppo Arquitect.
Gruppo Atah
Gruppo Franco
Gruppo GP
H-E-B
HDR, Inc.
Heery International
Hensel Phelps Construction Co.
Hiller
HKS, Inc.
HNTB Corp.
Hochtief AG
HOK
HOK Sport
Hormberger + Voostell, Inc.
Horst Berger
Hunt Construction Group
Interstices
Jacksonville Port Authority
Jerd Partnership International, Inc.
Kajima International
KME Architects
KPF Consulting Engineers
Leverpool
LVM Architects
Magnusson Klemencic Associates
Manhattan Construction Company
Martin & Martin
Metropolitan Transit Authority (Houston)
Metrosport
Miami Dade Aviation Department
Michael Hopkins + Partners
Murphy/Laing Inc
National Football League
National Park Service
NBAA
New Jersey Sports & Exhibition Authority
Nuovo Molecon Cancan
Palm Beach
Palacio De Hierro
PCL Construction
Pelli, C. Fried & Partners Architects
Perkins Corp.
Pittsburgh Sports & Exhibition Authority
Port Authority of New York & New Jersey
Radford University
Rafael Vinoly Architects PC
Racines En Promocion, Sa De Cv
Raleigh Durham Airport Authority
Richard Rogers Partnership
Rissenti International, Inc.
Rossetti Associates
Rovian Williams Davies & Irwin
Royal Caribbean International
RTKL Associates, Inc.
San Diego Unified Port District
Schlaich Bergermann and Partner
Shenandoah Associates
Simon Property Group
Skanska USA Building
Skidmore Owings & Merryl
SmithGroup, Inc.
Skanska USA Building
Swinerton, Inc.
 Syracuse University
The Clark Construction Group, Inc.
The Cordish Company
The Denver Company
The Irvine Company
The Princeton Companies
The Whitney - Turner Contracting Co
Thompson, Ventuleit, Stainback and Associates
Thomtan Tommasetti
Tolman Sayer Properties
Turner Construction Company
U.S. Department of Defense
U.S. General Services Administration
Unisystems, LLC
VGA Associates Inc.
Walker Parking Consultants
Walt Disney Imagineering
Walker P. Asioe and Associates, Inc.
Welshling Associates, Inc.
Wernet Sokob
Zedler Architects
Zimmer Balskus France Partnership

BIRD AIR CLIENTS INCLUDE

Alston + Porter Architects
Anschutz Entertainment Group
Arizona Sports & Tourism Authority
Arquitectonica
Arthur Erickson
Arup
Balfour Beatty Construction
Banca Mifel
Barton Malow Co.
Bay Area Rapid Transit District (BART)
BBP International
Bermello Ajani & Partners
Bilbao & Noyatay, Inc.
Blues Land Lease
Brandfield & Garrie LLC
Buro Happold
Cambridge Seven Associates, Inc.
Cannew Design
Carter & Burgess, Inc.
City and County of Denver (CO)
City of Calgary (AB)
City of Palm Springs (CA)
Dar Al-Handasah
De Castilla Marquez y Asociados
Dearchlucht Macheflute and Partners Inc.
E. Wemhi Johnson and Associates, Inc.
Eiseman Architects
Elerise Becket
EnVision Corp.
Enventure Architects
Foster & Partners
FTL Design Engineering Studio
Geiger Engineers, PC
General Growth Properties, Inc.
Gensler
Georgia World Congress Center Authority
Georgia, Mary and Partner
Gilbane Building Co.
Greater Orlando Aviation Authority
Gruppo Arquitect.
Gruppo Atah
Gruppo Franco
Gruppo GP
H-E-B
HDR, Inc.
Heery International
Hensel Phelps Construction Co.
Hiller
HKS, Inc.
HNTB Corp.
Hochtief AG
HOK
HOK Sport
Hormberger + Voostell, Inc.
Horst Berger
Hunt Construction Group
Interstices
Jacksonville Port Authority
Jerd Partnership International, Inc.
Kajima International
KME Architects
KPF Consulting Engineers
Leverpool
LVM Architects
Magnusson Klemencic Associates
Manhattan Construction Company
Martin & Martin
Metropolitan Transit Authority (Houston)
Metrosport
Miami Dade Aviation Department
Michael Hopkins + Partners
Murphy/Laing Inc
National Football League
National Park Service
NBAA
New Jersey Sports & Exhibition Authority
Nuovo Molecon Cancan
Palm Beach
Palacio De Hierro
PCL Construction
Pelli, C. Fried & Partners Architects
Perkins Corp.
Pittsburgh Sports & Exhibition Authority
Port Authority of New York & New Jersey
Radford University
Rafael Vinoly Architects PC
Racines En Promocion, Sa De Cv
Raleigh Durham Airport Authority
Richard Rogers Partnership
Rissenti International, Inc.
Rossetti Associates
Rovian Williams Davies & Irwin
Royal Caribbean International
RTKL Associates, Inc.
San Diego Unified Port District
Schlaich Bergermann and Partner
Shenandoah Associates
Simon Property Group
Skanska USA Building
Skidmore Owings & Merryl
SmithGroup, Inc.
Skanska USA Building
Swinerton, Inc.
 Syracuse University
The Clark Construction Group, Inc.
The Cordish Company
The Denver Company
The Irvine Company
The Princeton Companies
The Whitney - Turner Contracting Co
Thompson, Ventuleit, Stainback and Associates
Thomtan Tommasetti
Tolman Sayer Properties
Turner Construction Company
U.S. Department of Defense
U.S. General Services Administration
Unisystems, LLC
VGA Associates Inc.
Walker Parking Consultants
Walt Disney Imagineering
Walker P. Asioe and Associates, Inc.
Welshling Associates, Inc.
Wernet Sokob
Zedler Architects
Zimmer Balskus France Partnership