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# **FIBERGLASS STRUCTURES**

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**CUSTOM STRUCTURAL FABRICATION** 

**EXTREN® Structural Shapes & Plate** 

DURADEK<sup>®</sup> / DURAGRID<sup>®</sup> Pultruded Grating

DURAGRATE® Molded Grating

SAFRAIL<sup>™</sup> Industrial Railing and Ladder and Cage Systems

**FIBREBOLT®** Studs & Nuts

**COMPOSOLITE® Building Panel System** 

DURASHIELD® / DURASHIELD HC® Fiberglass Foam & Hollow Core Building Panels

SAFPLANK<sup>®</sup>, SAFPLANK HD<sup>®</sup>, and SAFDECK<sup>®</sup> Decking Systems

**SAFPLATE®** Fiberglass Gritted Plate



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# INTRODUCTION







Strongwell is the world's leading producer of pultruded parts and the largest fabricator of structures utilizing pultruded components. Strongwell operates three ISO 9001 certified pultrusion manufacturing facilities in the U.S.A. with more than 60 machines and 150 pultrusion lines. Two Strongwell locations specialize in fiberglass structural fabrication: Bristol (Virginia) and Chatfield (Minnesota).

### Fabrication

Fiberglass materials can be used in place of or in conjunction with aluminum, steel, or stainless steel in fabricated structures. Typical fabrications include beam, column, and plate structures, all-fiberglass buildings, platforms, and other custom fabrications involving grating and handrail. Specialized OEM-type structures such as flue gas desulfurization components, computer testing facilities, and water/wastewater treatment structures can also be accommodated.

# Engineering

Strongwell has on its staff registered professional engineers experienced in the design of fiberglass structures and systems for custom design requirements. Strongwell's extensive experience in fabrication procedures, joint design, and stress analysis of the composite assemblies, combined with the use of Strongwell's fiberglass products, result in structures of superior, cost-effective design and structural integrity. Clear, straightforward drawings of structures are provided to the customer for approval before fabrication begins (unless customer drawings are provided).

#### **Benefits**

The many inherent benefits of fiberglass can be used to an engineer's advantage in fabricated structures. Today, fiberglass fabricated structures are solving problems in a wide variety of markets and applications. Some of these benefits include:

- · Lightweight weighs up to 80% less than steel
- · Corrosion resistant
- Strong
- Dimensionally stable
- Low thermal and electrical conductivity
- Virtually transparent to EMI/RFI waves
- Easy to fabricate and assemble
- · Low maintenance



Fiberglass

# **AVAILABLE PRODUCTS**

Strongwell offers the broadest range of fiberglass structural materials, systems, and fabricated structures available from a single source. The following is a brief description of the main products in the Strongwell industrial product line. Complete full-color brochures are also available for each individual product.



# **EXTREN®**

EXTREN<sup>®</sup> fiberglass structural shapes and plate are produced and stocked in multiple resin series and in more than 100 shapes and sizes for various applications and environments. All EXTREN<sup>®</sup> shapes have a surfacing veil to increase corrosion and UV resistance and prevent fiber exposure while in service. FIBREBOLT<sup>®</sup> fiberglass studs and nuts are available to use with EXTREN<sup>®</sup> as an alternative to metal fasteners in applications that must be strong, noncorrosive, low in conductivity, and/or transparent to electromagnetic waves. **EXTREN<sup>®</sup> Series: 500** (premium polyester resin, UV inhibitor added - olive green), **525** (premium polyester resin, UV inhibitor and flame retardant added - slate gray), **600** (premium vinyl ester resin, UV inhibitor and flame retardant added - beige).



# **DURADEK®/DURAGRID®**

DURADEK<sup>®</sup> is high strength pultruded bar grating that can be used like traditional metal grates or fiberglass molded grating but offers the inherent benefits of pultrusion. The individual bearing bars are either "I" bar or "T" bar shapes. DURADEK<sup>®</sup> is lightweight, easy to install, and often lasts up to 20 times longer than steel in corrosive industrial environments. Like DURADEK<sup>®</sup>, DURAGRID<sup>®</sup> is high strength pultruded bar grating. Any of Strongwell's 100+ pultruded gratings not part of the DURADEK<sup>®</sup> line are considered DURAGRID<sup>®</sup>. DURAGRID<sup>®</sup> offers customers the selection of bar spacing (which creates varying open space in the grating or grid), bar shape, cross-rod placement, custom fabrication, custom resin, and/or color.







### **DURAGRATE®**

DURAGRATE<sup>®</sup> molded fiberglass grating is a strong square- or rectangular-mesh grating that allows efficient on-site cutting to minimize grating waste. Molded in one piece with a plain, concave, non-slip walking surface, DURAGRATE<sup>®</sup> is the chemical resistant flooring choice for many industrial applications. Load bearing bars in both directions allow for use without continuous side support.

# SAFRAIL™

SAFRAIL<sup>™</sup> industrial fiberglass railing systems are for use as stair rails, platform/walkway handrails, and guardrails. SAFRAIL<sup>™</sup> is specially designed to be prefabricated or easily fabricated on-site and is engineered to provide years of low maintenance service. OSHA-approved SAFRAIL<sup>™</sup> handrail can be easily adapted to customer design requirements. A SAFRAIL<sup>™</sup> round handrail system and SAFRAIL<sup>™</sup> ladders and ladder cages are also available.

### **FIBREBOLT®**

Fiberglass Studs and Nuts are ideal for applications requiring mechanical fasteners that must be strong, non-corrosive, nonconductive, and/or where metal fasteners are not permitted (antenna housings, computer equipment testing structures, etc.)

# **AVAILABLE PRODUCTS**



### COMPOSOLITE® / COMPOSOLITE® HD

COMPOSOLITE<sup>®</sup> is a patented advanced composite building panel system suitable for major load bearing structural applications. Interlocking components make it possible to design fiberglass structures at significantly lower costs for a broad range of construction applications including FRP buildings, bridge enclosure systems, pedestrian bridge decks, platforms and walkways, tank covers, cellular enclosures, and secondary containment systems. COMPOSOLITE<sup>®</sup> HD is a heavy duty version of COMPOSOLITE<sup>®</sup> intended to support larger loads and cover longer spans.



### **SAFPLATE®**

SAFPLATE<sup>®</sup> fiberglass gritted plate is a tough, corrosion- and slip-resistant floor plate composed of EXTREN<sup>®</sup> fiberglass plate with an anti-skid grit surface. Designed for use where open floor grating is not suitable, SAFPLATE<sup>®</sup> is a long-lasting, low-maintenance alternative to steel plate for solid surfaces. Used in a variety of applications such as trench covers to contain vapors and fumes or pedestrian bridge walkways for sure footing.



#### **DURASHIELD®**

DURASHIELD® fiberglass foam core panels are tongue-and-groove pultruded panels composed of a fiberglass skin over a foam core. The fiberglass skin is available in a premium polyester or vinyl ester resin, both of which are fire retardant. Panel sizes include 1" x 12" (R factor 5) panels and 3" x 24" (R factor 17) panels. DURASHIELD® panels can be produced in any shippable length.



#### **DURASHIELD HC®**

DURASHIELD HC<sup>®</sup> is an alternative to standard DURASHIELD<sup>®</sup> with a unique hollow core design and internal stiffeners. The panel is a sensible choice for any type of roofing, flooring, enclosures, decking or screening that does not require insulation. It is a custom designed tongue-and-groove building panel for quick assembly and easy installation in various applications.



# **SAFDECK®**

Strongwell's SAFDECK<sup>®</sup> is a specially designed system of 24" wide, slip-resistant fiberglass panels that overlap for a continuous solid surface. SAFDECK<sup>®</sup> is intended to replace wood, aluminum, or steel decking in environments where corrosion or rotting creates costly maintenance problems or unsafe conditions. Typical applications for SAFDECK<sup>®</sup> include cooling tower decking, temporary flooring, odor control covers, windwalls, roofing walkways, and cellular wall panels.



# SAFPLANK® / SAFPLANK HD®

SAFPLANK<sup>®</sup> is a high strength system of fiberalass planks designed to interlock to form a continuous solid surface. SAFPLANK® provides safe, long-lasting walkways, cellular antenna screening panels, temporary flooring, covers, and decking in environments where corrosion and water could create costly maintenance problems or unsafe conditions with other materials. When turned upside down, SAFPLANK® also functions as an excellent stav-in-place concrete forming system in applications where corrosion and weight are concerns. SAFPLANK HD® is a heavy duty version of SAFPLANK<sup>®</sup> intended to support larger loads and cover longer spans.

# **FRP STRUCTURES**

Corrosion resistant, easy to fabricate, and lower life-cycle cost, fiberglass can be a cost effective, reliable problem solver in structure refurbishment and new build projects. Fiberglass is ideal for a broad range of construction applications. Increased service life and reduced maintenance costs are inherent advantages of using fiberglass systems.





#### Clockwise from Above:

Fiberglass has become the material of choice in the cooling tower industry because of the many advantages it has over wood.

A 62' tall weather tower at Vandenberg Air Force Base near Santa Barbara, CA, is composed of EXTREN® structural shapes, ladders, and DURAGRID® pultruded grating.

The Craig Brook National Fish Hatchery in East Orland, ME, used corrosion-resistant EXTREN® structural shapes to frame roofing structures over moisture-rich crowding pools.

The Avila Beach Pier in California was reconstructed using EXTREN® structural shapes for support, DURAGRID® pultruded grating, stair treads, and custom handrail.

An Ohio-based exhibit company constructed this trade show booth using EXTREN® structural shapes.







# FIBERGLASS PLATFORMS AND WALKWAYS





**Above:** Stairway/walkway structures using EXTREN<sup>®</sup> structural shapes, DURAGRID<sup>®</sup> pultruded grating, and SAFRAIL<sup>™</sup> handrail solve corrosion problems in chemical processing environments.

**Right:** After more than 20 years, the system of FRP spiral stairs and landings continue to be structurally sound at the Cordova Park Observation Tower near Des Moines, IA.

**Below-Left:** Expansion of the Fajardo Waste Water Treatment Plant in Puerto Rico included designing fiberglass platforms and walkways over the facility's piping.

**Below-Right:** Strongwell's pultruded grating replaced rusted grating in a catwalk system for a California winery.









# **RAISED FLOOR SYSTEMS, CUSTOM DESIGNED PLATFORMS**



#### Clockwise from Above:

FRP was chosen for this three-story fire escape because fiberglass would not require painting or maintenance.

A data center equipment yard in Santa Clara, CA, required a multi-story maintenance access platform. EXTREN® was chosen to construct this platform due to time constraints, high seismicity, and light weight.

Shown here is one of seven seal obervation towers erected on St. Paul Island, AK, out of EXTREN<sup>®</sup>, SAFRAIL<sup>™</sup>, and SAFPLANK<sup>®</sup>. All materials enabled an easy installation in extreme sub-zero temperatures and high winds.

DURAGRID<sup>®</sup> Phenolic grating was used on an offshore platform for fire integrity, weight savings, and low maintenance. DURAGRID<sup>®</sup> Phenolic grating is U.S. Coast Guard approved.

This corrosion-resistant fiberglass walk-over bridge platform allows the Oceanic Marine Institute in Hawaii to monitor large batches of shrimp under research.

A pair of platforms constructed using Strongwell's FRP products is used by the U.S. Army to help test the radar systems of its helicopters, troop transports, and tanks.







# **INDUSTRIAL RAILING AND LADDER AND CAGE SYSTEMS**

Fiberglass railing and ladder and cage systems have existed since the 1950s and are used in a wide variety of severe environments such as those found in chemical, water/wastewater, pulp and paper, mining, plating, oil and gas, marine, and general industries.

Both standard and custom railing systems are manufactured by Strongwell. SAFRAIL<sup>™</sup> fiberglass railing is a standard system that is available for customer fabrication on site or it can be prefabricated by Strongwell. Custom railing can also be designed and fabricated to suit specific customer needs.

Strongwell ladders meet the requirements of OSHA 1910.23 and 1926.1053. Ladders and cages manufactured from Strongwell are used in wet well applications, on the sides of chemical storage tanks, and in access and service areas throughout the world.





#### Counter-Clockwise from Above:

These tanks are surrounded by SAFRAIL<sup>™</sup> and DURAGRID<sup>®</sup> walkways and covered with COMPOSOLITE<sup>®</sup> covers for odor control.

A round SAFRAIL<sup>™</sup> handrail system and DURAGRATE<sup>®</sup> molded grating provides a safe, corrosion resistant walkway, and work platform for an extremely corrosive environment at this copper extraction facility in Mexico.

Fiberglass access ladders and walkways used throughout the service areas of Sea World in Orlando, FL, resist saltwater corrosion and reduce maintenance costs.

This SAFRAIL<sup>™</sup> ladder and cage system was installed on a dry bulk storage tank since the project required specific weight tolerances.

This FRP platform was designed to withstand sodium bisulfate using EXTREN®, SAFRAIL<sup>™</sup> railing, a walk-through ladder and cage system, and DURAGRATE<sup>®</sup> molded grating.







# WATER/WASTEWATER - BAFFLES, COVERS, WALKWAY STRUCTURES

Corrosion of metal structures in water/wastewater treatment plants is severe and requires constant maintenance, downtime and replacement. Low maintenance fiberglass structures are ideal for this environment because they are lightweight, corrosion resistant, and easy to install.





#### Clockwise from Above:

Low maintenance fiberglass grating, ladders, and handrail replaced steel to provide trouble-free operations for a wastewater treatment clarifier in Albert Lea, MN.

A baffle system using Strongwell's baffle panels and EXTREN® structural shapes was fabricated for this chlorine contact chamber. FRP was chosen for its low cost and high corrosion resistance. Even after many years, the FRP panel system is still exceeding expectations (see inset).

FRP odor control covers around the perimeter of wastewater treatment tanks in Grand Prairie, TX, were fabricated using COMPOSOLITE® and DURASHIELD® structural panels, EXTREN®, and several custom shapes.

This large UV basin was covered with a series of COMPOSOLITE® panels spanning 24" x 60". Each panel contained a lift handle for easy removal and replacement of the covers.

A diffuser aeration wall, made with baffle panels and EXTREN<sup>®</sup> shapes, was installed at this California water district system to play a vital role in the secondary treatment phase.







# **FIBERGLASS BUILDINGS AND ENCLOSURES**

All-fiberglass buildings are transparent to electromagnetic waves, have high dielectric strength, are structurally strong and have effective insulation properties. Shielding can also be accomplished utilizing different manufacturing techniques.







#### Counter-Clockwise from Above:

An aesthetically-pleasing structure was needed to encapsulate several cellular antennas near the San Deigo International Airport. LARR-approved EXTREN® structural shapes and plate were used on all four sides to ensure there was no unnecessary electromagnetic, radio, or cellular interference.

A fiberglass fabricated roof tops the Aerial Tram Station on Stone Mountain, GA (as seen on the cover). Concealing over 20 antennas, the fiberglass structure comprised of EXTREN® and DURASHIELD®, meets structural requirements while not interfering with the radio frequencies.

DURASHIELD® foam core building panels and EXTREN® shapes were used to construct this and other monitoring shelters to track flue gas emissions produced at a station in New Albany, IN.

DURASHIELD® foam core building panels and EXTREN® Series 525 fiberglass shapes were used to fabricate this fiberglass building in Alaska. DURASHIELD® was selected for this project for its durability, light weight, and thermal properties.

This test facility for Hewlett-Packard Corporation was constructed using EXTREN®, DURASHIELD®, and FIBREBOLT®.



# **ARCHITECTURAL STRUCTURES AND APPLICATIONS**

The features of Strongwell's fiberglass products can equally become significant benefits in many architectural applications..





#### Clockwise from Above:

A 37' tall, all-fiberglass, gold leaf-clad spire, installed in 1991 atop the 55-story C&S Building, is the golden high point on the Atlanta skyline. The fiberglass spire is transparent to electromagnetic waves and houses communications antenna. The fiberglass spire aesthetically enhances one of Atlanta's tallest buildings - making it the city's landmark skyscraper. In addition, the spire is extremely valuable real estate. Prime antennae rental space is scarce and expensive.

A custom fiberglass architectural handrail system is the ideal solution for corrosive coastal environments like this theme park pier in Galveston, TX.

These EXTREN<sup>®</sup> fabricated pyramids provide the perfect balance of aesthetics and function as architectural screening for air conditioning units at the Vintage Club in Indian Wells, CA.

A Carrollton, GA, restaurant reduced maintenance costs by installing durable fiberglass gates to screen waste disposal areas.

DURAGRID<sup>®</sup> pultruded fiberglass grating was installed as visually appealing louvers, concealing the air conditioning units of a school in Hong Kong.







# EQUIPMENT/FACILITIES, FIBERGLASS ROOFS, AND COVERS

To meet EPA and OSHA standards in severely corrosive environments such as pulp and paper plants, chemical plants, and oil refineries, DURASHIELD<sup>®</sup>, COMPOSOLITE<sup>®</sup>, and EXTREN<sup>®</sup> have been fabricated into enclosures to contain corrosive and toxic fumes and solutions. In many cases, all-fiberglass containment has

been the only solution to critical pollution problems that all other materials have failed to resolve.



**Above:** COMPOSOLITE<sup>®</sup> panels are ideal for use as odor control covers. The strong yet lightweight covers are easy to handle and can withstand the harsh environment for years. The panels also require little to no maintenance.

**Below:** A pulp plant in Canada replaced 70' x 120' corroded wooden covers over anaerobic digesters with fiberglass covers to satisfy government regulations. EXTREN<sup>®</sup> and DURASHIELD<sup>®</sup> were used to fabricate the covers. Design prefabrication and supervision of installation was completed by Strongwell.



**Above:** An odor control cover was constructed using EXTREN® structural shapes for a waste water treatment facility in Puerto Rico. The second photo also shows the COMPOSOLITE® cover installed.

**Below:** A COMPOSOLITE<sup>®</sup> fiberglass building panel system functions as a clarifier cover in East Helena, MT. The composite building panels were selected to prevent freezing during the winter and reduce algae growth in the summer months.







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