

STRONGWELL®



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FIBERGLASS STRUCTURES

CUSTOM STRUCTURAL FABRICATION



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Introduction



Strongwell is both the world's largest producer of pultruded parts and also the largest fabricator of structures utilizing pultruded components. Strongwell operates three ISO-9001:2000 certified pultrusion manufacturing facilities with more than 60 machines and 150 pultrusion lines. Two Strongwell locations specialize in fiberglass structural fabrication: Bristol Division (Bristol, Virginia) and Chatfield Division (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.

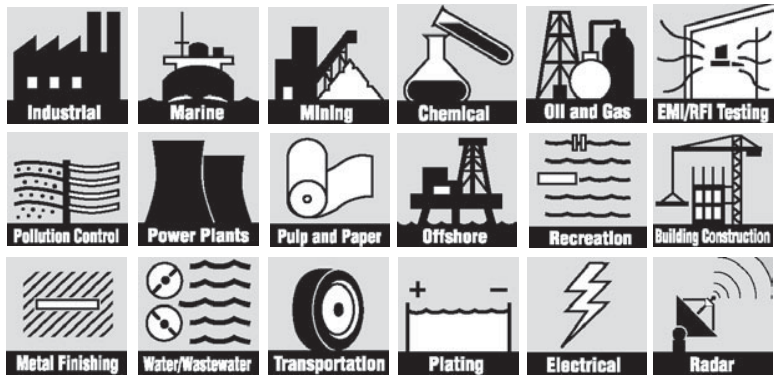
Engineering

Strongwell has on 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 80% less than steel
- Corrosion resistant
- Strong
- Dimensionally stable
- Low thermal and electrical conductivity
- Transparent to EMI/RFI waves
- Easy to fabricate and assemble
- Low in maintenance



Materials of Construction

Strongwell offers the broadest range of fiberglass structural materials and systems available from a single source. A brief description of some of the products typically used in fiberglass fabrications are given below.

EXTREN® fiberglass structural shapes and plate are produced in three different series and in more than 100 shapes and sizes:

- Series 500 — An all-purpose line utilizing an isophthalic polyester resin with a UV inhibitor.
- Series 525 — An all-purpose line utilizing a fire retardant isophthalic polyester resin with a UV inhibitor.
- Series 625 — A premium series, both fire retardant and highly corrosion resistant, utilizing a vinyl ester resin with a UV inhibitor.

High strength fiberglass grating manufactured by Strongwell includes:

- **DURADEK®** — a standard line of pultruded bar-type grating with either "I" or "T" bar shapes that can be designed and used like traditional metal grates.
- **DURAGRID®** — custom grating systems offering selections of open space, bar shape, cross-rod placement, resin, color and types of grit surfacing.
- **DURAGRATE®** — a molded fiberglass grating with one-piece grating panel construction preferred for many industrial applications.

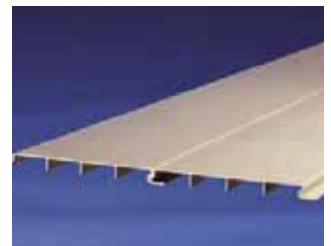
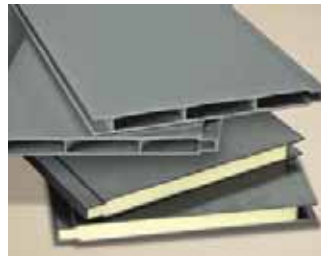
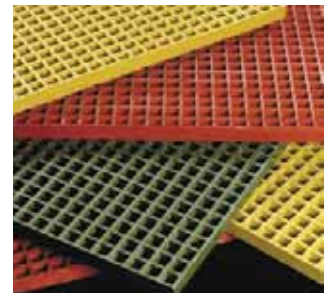
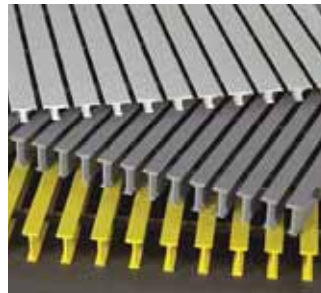
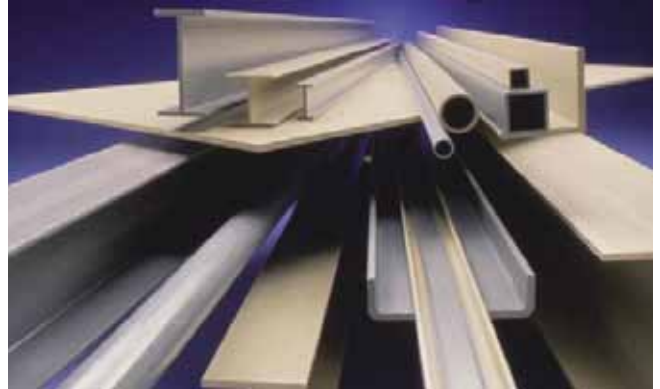
FIBREBOLT® fiberglass studs and nuts are ideal for applications requiring mechanical fasteners that must be strong, non-corrosive and/or nonconductive.

COMPOSOLITE® fiberglass building panel system is an advanced composite building panel system for structural applications. Interlocking components make it possible to design fiberglass structures at significantly lower costs for a broad range of construction applications such as bridge decks and enclosure systems, platforms and walkways, tank covers, and cellular enclosures.

(NOTE: COMPOSOLITE® is a registered trademark of Maunsell Structural Plastics, Ltd. and used by Strongwell Corporation pursuant to license.)

DURASHIELD® fiberglass foam core panel is a tongue-and-groove fiberglass pultruded panel comprised of a pultruded skin over foam core. The panel sizes are: 1" x 12" (R Factor 7) and 3" x 24" (R Factor 21). **DURASHIELD HC®** are hollow core panels that can be used in many of the same applications as DURASHIELD® when projects do not require insulation.

Fiberglass decking systems are designed to provide a continuous solid surface for applications such as temporary flooring, covers and decking. **SAFPLANK®** panels interlock and **SAFDECK®** panels overlap. **STRONGDEK™** is architectural decking with hidden fasteners. The systems are intended to replace wood, aluminum or steel in corrosive environments.



Fiberglass Platforms and Walkways



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

Left: After more than a decade, the system of FRP spiral stairs and landings continue to be structurally sound at the Cordova Park Observation Tower near Des Moines, Iowa.

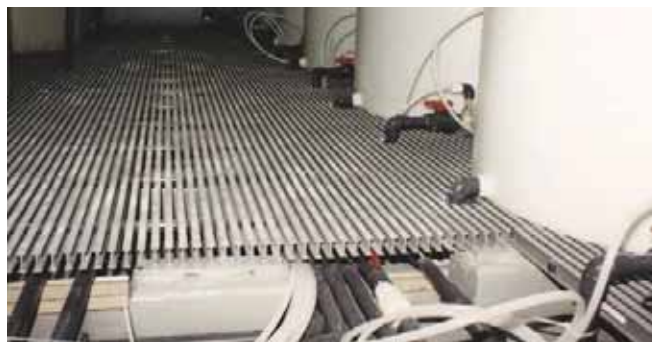
Below: Expansion of the Fajardo Waste Water Treatment Plant in Puerto Rico included designing fiberglass platforms and walkways over the facility's piping.



Raised Floor Systems, Custom Designed Platforms



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



Above: A raised floor in the processing room of a California film development laboratory surrounds existing equipment, provides access above and below the floor, withstands the corrosive environment, and provides a 200 lbs/sq.ft. load capacity to support heavy machinery.



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



Above: 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



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

Industrial Ladders, Ladder Cages, Handrail Systems

Fiberglass handrail, ladder and ladder cage systems have existed since the 1950's and are in use 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 handrail systems are manufactured by Strongwell. SAFRAIL™ fiberglass handrail is a standard system that is available for customer fabrication on site or it can be prefabricated by Strongwell. Custom handrail can also be designed and fabricated to suit specific customer needs.

Strongwell ladders meet the requirements of OSHA 1910.27. Ladders and ladder 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.



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



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



Above: These tanks are surrounded by SAFRAIL™ and DURADEK® walkways and covered with COMPOSOLITE® covers for odor control.



Below: Stairway/walkway structures using EXTREN® structural shapes, DURADEK® pultruded grating and SAFRAIL™ handrail solve corrosion problems in chemical processing environments.

Water/Wastewater Products - 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.



Above: Lightweight, corrosion resistant 24" fiberglass I-beams span 45' to bridge clarifiers at a wastewater treatment plant in Las Rusias, Texas.

Left: 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 more than 5 years, the FRP panel system is still exceeding expectations (see inset).



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



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

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.



Left: EXTREN® fiberglass plate and structural shapes were used for cellular antenna enclosures. The enclosures were designed to match the style and appearance of the Santa Ana Historical building.



Above: This car wash is constructed using COMPOSOLITE® 3-way connectors, toggles and panels. Low maintenance, ease of construction and an attractive appearance were the primary benefits to the customer.



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



Above: This all-fiberglass facility for Amador Corp. assures RFI/EMI compliance in testing computers as well as other manufactured equipment.

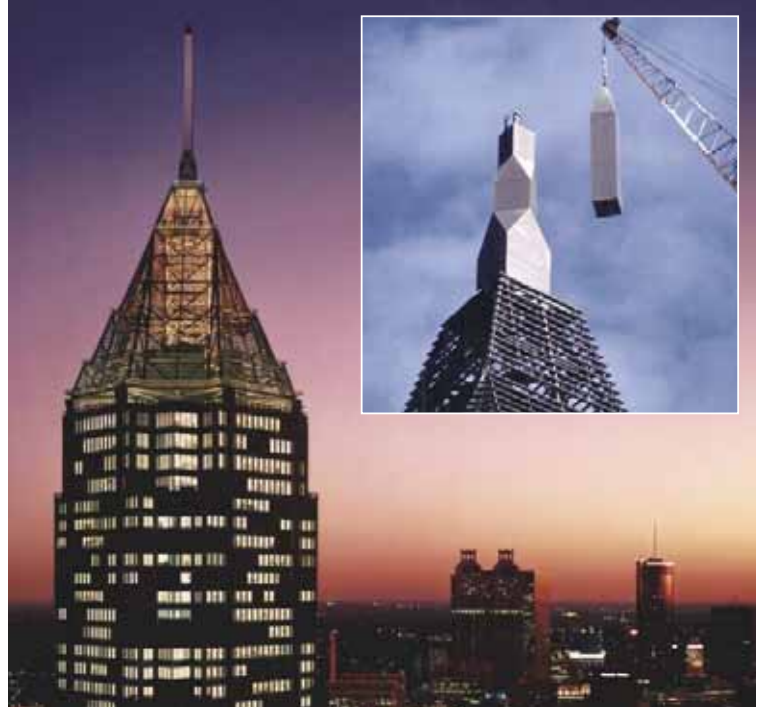


Above: DURASHIELD® foam core building panels and EXTREN® Series 525 fiberglass shapes were used to fabricate this fiberglass building in Alaska. DURASHIELD® was selected for this project for its durability, light weight and thermal properties.

Architectural Structures and Applications

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

Right: 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 antennae. 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.



Above: A fiberglass waterpark platform in Cypress, Texas was fabricated using EXTREN® structural shapes, DURAGRID® pultruded grating and STRONGRAIL™ fiberglass architectural handrail.



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



Above: DURADEK® pultruded fiberglass grating was installed as visually appealing louvers, concealing the air conditioning units of a school in Hong Kong.



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

FRP Structures

Corrosion resistant, easy to fabricate, and lower costs, 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.



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



Above: A 62" tall weather tower at Vandenberg Air Force Base near Santa Barbara, California, is composed of EXTREN® structural shapes, ladders and DURADEK® pultruded grating.



Above: The Craig Brook National Fish Hatchery in East Orland Maine used corrosive-resistant EXTREN® structural shapes to frame roofing structures over moisture rich crowding pools.



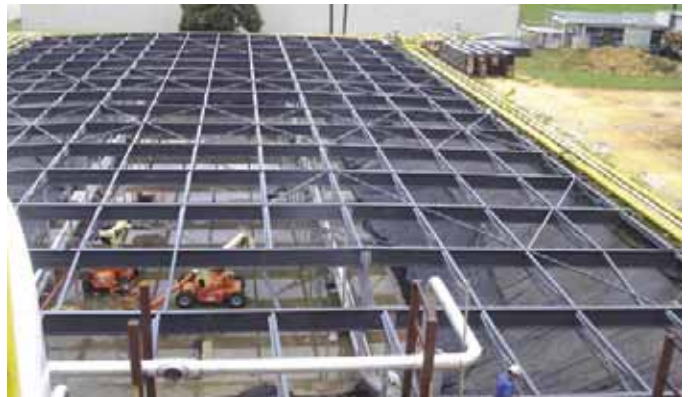
Above: An Ohio based exhibit company constructed this trade show booth using EXTREN® structural shapes.

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®, COMPOSOLITE® and EXTREN® 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® 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.



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.



Above: A COMPOSOLITE® fiberglass building panel system functions as a clarifier cover in East Helena, Montana. The composite building panels were selected to prevent freezing during the winter and reduce algae growth in the summer months.



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

Other Market Applications



A tank stand was fabricated with EXTREN® structural shapes, SAFRAIL™ handrail system and DURADEK® pultruded fiberglass grating for an industrial plant.



Strongwell's pultruded grating replaced rusted grating in a catwalk system for a California winery.



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



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

Please contact:

Pipex px®, Devon Enterprise Facility, 1 Belliver Way, Roborough, Plymouth, PL6 7BP

Email: sales@pipexp.com Web: pipexp.com

Tel: +44 (0)1752 581200 Fax: +44 (0)1752 581209