



Case Study: EXTREN®

Composite Shapes Bring Industrial Aesthetic to Residential Complex

Near Glendale, California, sits a brand new multi-story housing complex which blends outdoor living with industrial style. The complex provides studio, one-, two-, and three-bedroom floorplans to those interested in urban living.

Porter FRP was recently hired to outfit this new development with high-profile materials possessing architectural flair with low maintenance requirements.

Porter selected Strongwell's EXTREN® 525 series not only because of its light weight, corrosion resistance, and UV performance, but also because of its natural industrial look, which fit well with the desired fascia aesthetics and structural



support needs. To welcome new renters with an industrial motif, the leasing office requested an exposed subtle beam threshold. Three EXTREN® I-Beams (12" x 6" x 1/2") were utilized for this application.

For the exterior application, the fabricator was able to utilize EXTREN® wide flanges with channels as side supports for awnings and balconies.

As with many newer housing developments, the separation between interior and exterior settings is blurring due to the introduction of more communal areas with views and amenities. This complex embraces that shift, offering multiple workspaces, workout areas, aquatic resources, and spas.

On the top floor of this housing complex is the "Skydeck". Residents are treated to a communal area, which houses an entertainment venue complete with kegerator, foosball, table tennis, and well-equipped bar. The Skydeck is supported with a series of connections of wide flanges and channels.

Upon the project's completion, the end user was pleased to report that construction, fabrication, and delivery were all on schedule. ●



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Case Study: DURAGRID® & EXTREN®

FRP Grating Aids in Refurbishment of Victorian-Era Swing Bridge

The Selby Swing Railway Bridge has been in operation for well over 100 years, connecting a railway line from Leeds to Hull in the United Kingdom, over the Ouse River. The swing span of this bridge extends 130 feet, where the span is supported by 24 cast steel rollers. The pivot point is also engineered with two unequal arms to support a 92-ton balance weight as the bridge swings over the canal to allow boats to pass.



This railway bridge is unique, as it was built during the Victorian era, and was well in need of a refurbishment for steelwork, hydraulics, beams, and paint. With a budget of over \$10 MM dollars, the owner and operator of this bridge had to consider factors such as weight, historical preservation, durability, electrical conductivity, and corrosion resistance in all of its materials.

Pipex px® supplied and fabricated almost 426 square meters (4,600 sq. ft.) of DURAGRID® T-3300 and I-6000 pultruded grating with medium epoxy grit. To support the fiberglass grating, EXTREN® wide flange beams were used.

Within the access structures, Pipex px® utilized DURAGRID® T-5000 PE for stairwell landings and DURAGRID® I-6000 1.5" thick stair treads in lengths from 2' to 4'.

It is expected that these FRP components will provide over 60 years of maintenance-free service to the Victorian-era bridge as it approaches its next centennial birthday. ●



5 Tips for FRP Grating Selection

Commentary by: Gregory R. Bond, P.E.

Strongwell produces more than 100 different FRP grating series to meet a variety of customer needs. Applicable to DURAGRID® and DURADEK® pultruded, and DURAGRATE® molded grating, the following advice will help select the most appropriate grating series for an application.

1. DETERMINE DESIGN CRITERIA

Find FRP grating design criteria in the project specifications under Section 06 74 13 "Fiberglass Reinforced Gratings". If unavailable, refer to ASCE 7-16, Table 4.3-1 for minimum live loads.

Allowable deflection for FRP grating is usually limited to 1/4" (6mm) for pedestrian comfort. Larger deflections may be permissible for heavy, temporary loads. Deflection greater than 1/2" (12mm) is not advisable due to prying action on hold down clips and potential loosening of fasteners. Long panels utilizing multispan conditions reduce panel deflection.

Compare design loads to the grating Safe Load and you will find high Factors of Safety. Serviceability (not strength) generally controls FRP design.

2. IDENTIFY CONSTRAINTS

Bearing bar height and/or spacing may determine grating series selection. Issues

such as existing supports, ADA compliance, high heels, dropped objects, drainage, sunlight penetration, ventilation, and even vehicular traffic could be a requirement for a particular installation.

With all these situations to consider, DURAGRID® I-6000 1", I-6000 1.5", and T-5000 2" remain the most common pultruded series selected. DURAGRATE® 1.5" thick x 1.5" square mesh is the most common molded grating series.

3. SELECT RESIN

Generally, polyester (PE) is suitable for most conditions; vinyl ester (VE) for harsh chemical exposure and additional corrosion protection; phenolic where fire / smoke / toxicity are of primary concern.

Most Strongwell load tables are based upon PE since VE resin has only slightly greater mechanical properties. Phenolic grating does have unique properties and separate load tables.

As a visual indicator for grating resin, Strongwell cross rods are a light gray color for PE and black for VE.

Refer to the Strongwell Corrosion Resistance Guide for specific chemical environments and select the appropriate resin.

4. MAXIMIZE SPAN

With your initial grating selection chosen, review load tables to determine the maximum span to meet load(s) and allowable deflection. Compare this to plan dimensions and determine support configuration.

Selecting a taller bar allows longer grating spans and reduces the frequency of beams. This increases the load on each support beam, but fewer slightly larger beams is often more economical than additional smaller beams.

If the beam spacing is considerably more/less than the maximum span, review load tables to see if other grating meets the design criteria.

5. CHOOSE APPEARANCE

A variety of bearing bar colors, surface grit and topcoat treatments are available for FRP grating. Yellow and light gray are standard bar colors. Fine grit is suitable for bare feet; standard medium grit for industrial uses; or coarse grit, if lubricants or debris collection are expected. A urethane top coat adds greater UV protection or custom colors.

CONCLUSION

With many geometric, material, assembly, and finishing options, FRP grating is able to meet the needs of nearly any application. ●



Spotlight on Strongwell Talent



Bhyrav Mutnuri

*Product Development Engineer
- Bristol*

Bhyrav Mutnuri has joined Strongwell as Product Development Engineer, reporting to the Vice President of Sales and Engineering. In this role, he will work with customers and potential clients to commercialize new custom products for Strongwell. Bhyrav has a Bachelor of Technology in Mechanical Engineering from Jawaharlal Nehru Technological University in India, and a Master of Science in Mechanical Engineering from West Virginia University. Bhyrav comes to Strongwell with years of experience in the composites industry, with an emphasis on manufacturing using pultrusion, testing, and mechanical characterization. Bhyrav is a member of several industry and standard committees, including: Load and Resistance Factor Design, ASTM International, Cooling Tower Institute, Pultrusion Industry Council, and Fiberglass Grating Manufacturers Council.



Rudy Hess

Process Engineer II - VA Operations

Rudy Hess has accepted the position of Process Engineer II for Virginia Operations. Rudy will work from the Bristol Location and will report to the Process Engineering Manager. Rudy began his career with Strongwell in September 2007 as a machine operator at the Highlands Location. He was then promoted to supervisor in March 2013, and then to shift facilitator in April 2014. Most recently, Rudy was Operations Coordinator at the Highlands facility.



Mark Haynes

*Corporate Sales Account Manager
and Senior Pricing Specialist*

Mark Haynes has accepted the position of Corporate Sales Account Manager and Senior Pricing Specialist, providing pricing assistance to the Customer Service department. Mark began his career with Strongwell in 1995 and has held several positions within the company. After assuming roles at the Highlands facility as Shift Facilitator and Manufacturing & Quality Administrator, Mark moved to the Bristol Location where he served as Production Materials Planner, Shipping and Receiving Manager, Special Projects Account Manager, and Customer Logistics Manager. Prior to his current role as Customer Service Account Manager, Mark led the efforts at the Highlands Location as Manager, Highlands Manufacturing.



Rich Mansfield

Estimator - Chatfield

Rich Mansfield has joined Strongwell as an Estimator, reporting to the Manager of Industrial Products, Structural Sales-Estimating. Rich will help the estimating team with fabrication project quoting and aid in processing customer orders. Rich has spent much of his career in Estimating and Inventory Control in a variety of industries, as well as sales positions with a focus in client building. Most recently, Rich worked in Alabama, estimating kitchen equipment for schools, universities, prisons and commercial restaurant spaces all across the Southeast.



Kevin Hammell

Purchasing Agent - Chatfield

Kevin Hammell has joined Strongwell in the position of Purchasing Agent. Kevin will report to the Vice President of Minnesota and Mexico Operations. Kevin received his Bachelor's Degree in Industrial Technology, with a minor in Physics, and a Master's Degree in Business Administration from Winona State University in Winona, MN.



Marie Younce

*Accounts Payable Administrator
- VA Operations*

Marie Younce has joined Strongwell in the position of Virginia Operations Accounts Payable Administrator. Marie will report to the Accounting Manager. Marie graduated from Bristol College with her Bachelor's Degree in Business Administration and she has over 12 years of experience as an Accounts Payable Manager.



Jeff Sheridan

*Machine Build Controls Lead
- Bristol*

Jeff Sheridan has joined Strongwell as Machine Build Controls Lead, reporting to the Mechanical Engineering & Machinery Manager. Jeff has been with Strongwell as a contract employee since June 2018. Jeff comes to Strongwell with many years of valuable experience including controls engineering, equipment and facilities support, and machine installation, and he is a US Marine Corps veteran. Jeff's duties include machine programming and planning machine build jobs.



Case Study: EXTREN®

Fiberglass Support Self-Reflective Art Installation



Nine and Two Thirds, a fabricator in Rhode Island, recently completed a temporary nouveau art project using Strongwell's fiber reinforced plastics. The project, titled "Temple of Mnemon," was a concept designed and imagined by Anne Lilly. The kinetic artist defines "mnemon" as a measurement of memory. Upon entry into the temple, that unit of memory is measured through self-reflection. An individual lies down on one of the benches while the structure's eight moving mirrors slide back and forth to create voids in the view of both ground and sky.

The interactive structure was constructed with tempered glass mirrors, composites, aluminum, steel, a motor and controller, and hardwood benches.

Strongwell's EXTREN® 525 Series angle, 4", and 6" tubes served as the structural segments which were mechanically joined by steel corner connectors. The structure had to be lightweight for delivery and installation, yet durable enough to resist weather conditions, as it was a dedicated outdoor exhibition.

The structure was funded by the Rose Kennedy Greenway Conservancy, and erected and installed for public view on the Greenway, located in Central Boston, Massachusetts. The greenway is a continuous 17-acre rooftop garden, which follows the path of the demolished John F. Fitzgerald Expressway.

The fabricator had previous experience using FRP and was pleased with the service, delivery, and fabrication of the completed products. ●



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What's in this Issue:



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Spotlight on Strongwell Talent



Fiberglass Support Self-Reflective Art Installation



FRP Goes Cross-Country with Mountain Bike Bridges



Literature Updates



Case Study: **EXTREN®**

FRP Goes Cross-Country with Mountain Bike Bridges

Deep within Northeast Georgia is a 21-mile, “cross-country” mountain biking area known as the Chicopee Woods Mountain Bike Park. Each year, the park draws in generations of riders ranging from novice to advanced skill levels.

The owners of the park recently needed to replace two pedestrian bridges, as the previous ones had outlived their service lifespan.

With the design assistance of Areté Structures, LLC, and NHM Constructors, a proposal was presented to the owners of the trail which included two truss-style bridges. The designed spans were 27' and 30'. Both measured 6' in width to accommodate pedestrians and two-way bike traffic.



The owner of the trail encouraged the designers to incorporate opportunities for design freedom. However, the material choices were limited due to the remote location of the trails and space of worksites. Limited on-site fabrication access and materials delivery made Strongwell's fiber reinforced plastics a tough material to beat.

With Areté's extensive design knowledge with FRP and Strongwell's Design Manual, pieces were pre-fabricated

offsite and delivered onsite for ease of final assembly. Concerns regarding the impact and presence of heavy machinery on the trail were also immediately subdued.

The superstructure truss network of the bridges was designed and fabricated with FRP along with their barriers. These designs incorporated the use of EXTREN® 6" channels and 2" x 2" x 1/4" tubes.

Within four days, work crews hand-carried each segment of the bridge and hand-bolted the segments onto existing abutments. The customer and end-user have received high praise on the new bridges from trail visitors. ●



Literature Updates:

- *Availability List (I+M)*
- *Decking Systems Brochure*
- *STRONGDEK™ Flyer*
- *DURAGRATE® Brochure (I+M)*
- *DURADEK® vs. DURAGRATE® Comparison Flyer*
- *Design Manual Sections:*
 - 11 (I+M), 12 (I+M), 16 (I+M)
- *FIBREBOLT® Flyer*

Visit www.strongwell.com for the latest resources.