PROFILE
STRONGWELL NEWS & APPLICATIONS • FALL 2018

Case Study: COMPOSOLITE® & DURAGRID®

Composites Aid Next Generation Subsea Rock Installation Vessel

The recent boom in the global oil and natural gas production has led to a surge in demand for vessels related to energy production.

Critical support ships within this industry include subsea rock installation vessels. These support vessels are vital due to their ability to stabilize and protect pipelines, cables, and other offshore structures.

The Bravenes is a next generation subsea rock installation vessel owned by Netherlands-based Van Oord. This vessel stands out from its counterparts because it incorporates a new concept hull and bow allowing it to sail with minimal drag in normal or high sea conditions. In addition to forward and rear propulsion, the ship also offers dynamic positioning through the use of thrusters for horizontal movement, enabling precise movement around close offshore structures. Its ability to be precise also allows it to perform three different types of approximate subsea rock installations centered within the operational heart of the vessel.

In the midship area stands the automated fall pipe tower housing the moon pool access, the flexible fall pipe (capable of extending almost 1,500m or 4,900 ft), a remotely-operated underwater vehicle, and its main conveyor system. All of these are fed by two flanking cargo holds capable of holding a combined 15,500 tons of rock.

The mobile midship tower measures 20m x 20m x 20m (65' x 65' x 65') in length, width, and height. Since the ship's inception, corrosion and painting were main concerns, as this ship was designed for full automation. When at capacity, it only requires 40 individuals on board for up to 45 continuous days of operation. Composites were utilized not just in the tower, but most of the stair access and landings to the tower were also outfitted with DURAGRID® Phenolic stair treads and grating.

COMPOSOLITE® was outfitted throughout the mobile pipe tower due to its weight savings, particularly important in the lowering of the vessel's center of gravity. This is crucial, as the vessel can also transform into two additional rock installation functions known as the fall pipe launch via side and tremie pipe distribution. Both of these require a slight shift of the tower to gain closer proximity access to offshore structures.

With COMPOSOLITE® and DURAGRID® Phenolic grating, this vessel should provide years of protective fall pipe housing as it continues to stabilize and protect subsea pipelines, cables, and other structures at the bottom of the ocean. ●

STRONGWELL

Corporate Offices / Bristol
400 Commonwealth Ave.
Bristol, VA 24201 USA
(276) 645-8000

Chatfield
1610 Highway 52 South
Chatfield, MN 55923-9799 USA
(507) 867-3479

Highlands
26770 Newbanks Road
Abingdon, VA 24210 USA

Mexico
Avenida La Silla Apodaca #110
Fracc Parque Industrial La Silla Apodaca
Apodaca, NL 66648 MX

www.strongwell.com

Case Study: HS Armor

Ballistic Panels Provide Additional Levels of School Protection

School districts are taking proactive steps to ensure school safety and security. In addition to training, schools have begun to implement smart technology and materials to combat security threats.

Strongwell's HS Armor panels began as a military product application installed and tested throughout the world to protect high value assets. With successful expansion into both the building and vehicular markets, an educational institution in Tennessee with almost 1,200 students underwent a renovation during the summer break for securing entry points, bundled with an added level of ballistic protection.

The school district was able to procure over forty Strongwell HS Armor panels to provide UL Level 8 protection. Strongwell's panels are independently tested to ensure strict adherence to Universal Laboratories (UL 752) Levels 1 through 8 and the National Institute of Justice (NIJ) Levels 1, 2A, 2 and 3A.

Through the use of contractors, the panels were hung and installed just like drywall and finished with a layer of drywall and compound in a matter of days. The entire area was completed, including paint, trim, new entryways, and electrical wiring in under four weeks.

Both the contractor and school were surprised with the ease of installation, fabrication, and quality of the Made in USA product. ●

A. Vacant room located adjacent to main entrance before construction.

B. After demolition, two rooms were joined and an entry was made from the main lobby. Walls were constructed to house the new secure entrance.

C. Walls clad in HS Armor panels

D. Walls finished in drywall

E. Construction complete

Case Study: STRONGRAIL®

STRONGRAIL® Viable Option for Commercial and Residential Handrail

A private homeowner recently selected STRONGRAIL® to replace traditional porch railing at his multistoried beach residence near Pensacola, Florida. The homeowner, who had previous experience in the commercial performance of pultruded fiberglass, wanted a residential/commercial option for his porch railings. He chose STRONGRAIL® because of the fiberglass handrail's engineered wind-load strength, durability of finish, and attractive appeal to designers, architects, and builders.

In this particular instance, the homeowner chose the 3" rounded top rail with 1" square picket system to wrap around each of the two enclosed porches. This particular system can handle wind loads of 30psf (applied as a concentrated load to the top of the post).

The low-maintenance STRONGRAIL® handrail is a cost-competitive option compared with traditional materials in areas with high rates of exposure to ultraviolet rays and humidity. This is because STRONGRAIL® requires virtually no maintenance.

Although a prevalent residential fencing material, the more traditional option of PVC lacks strength and durability within marine environments. In many coastal applications, lumber is prescribed as the material of choice. The exposure to saltwater and direct sunlight creates splints, warps, and even requires users to adopt a preventative maintenance regimen of repainting/staining on a regular basis. Even steel and aluminum systems succumb to oxidation, discoloration, and pitting with constant exposure to humidity, heat, and brackish air.

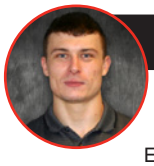
Since its installation in 2017, the homeowner has been extremely pleased with the performance and overall aesthetics of STRONGRAIL® at his coastal residence. ●

Literature Updates:

- *Infrastructure Market Flyer*
- *Corrosion Resistance Guide*
- *Company Portfolio*
- *Why Strongwell Flyer*
- *DURATREAD™ Flyer*

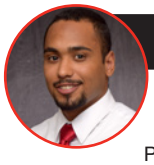
Visit www.strongwell.com for the latest resources.

Spotlight on Strongwell Talent



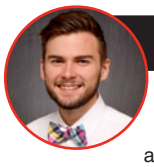
Joe Sorensen | *Process Engineer - Chatfield*

Joe Sorensen has joined Strongwell in the position of Process Engineer. Joe graduated from Winona State University in 2018, majoring in Composite Materials Engineering. Joe was born and raised in the small town of Mazeppa, Minnesota, where he currently resides. During his childhood, Joe was active in the Boy Scouts of America, where he achieved the rank of Eagle Scout. In high school, Joe participated in football, wrestling, and track and field at Zumbrota-Mazeppa High School and while attending WSU, he partook in rugby.



John Thompson | *Accounting Manager - Bristol*

John Thompson has been promoted to the position of Accounting Manager. In his new role, John will be responsible for managing the Virginia Operations Accounts Payable Administrator and Staff Accountant positions, as well as all aspects of Strongwell's Virginia Operations Cost Accounting. He will report to the Chief Financial Officer. John began his career with Strongwell in March 2015 as a pultrusion operator at the Highlands Location. In June of 2015, he was promoted to 2nd Shift Supervisor and then accepted the position of Virginia Operations Cost Accountant in July 2016. John graduated from the University of Virginia's College at Wise in 2014 with a Bachelor's Degree in Accounting. While there, John was a member of the football team and the fraternal organization Kappa Sigma.



Justin Suggs | *Staff Accountant - Bristol*

Justin Suggs accepted the position of Staff Accountant. In his new role, Justin will report to the Accounting Manager. Justin began his career with Strongwell in 2017 as the Virginia Operations Accounts Payable Administrator. Justin graduated with his Bachelor's Degree from East Tennessee State University in 2017 with a double major in Accounting and Finance.

Kendall Goines | *Estimator - Bristol*

Kendall Goines has joined Strongwell as an Estimator in the Bristol Fabrication Sales Department, reporting to the Bristol Chief Estimator. Kendall has been working for Strongwell as a contract employee for the past seven months. Kendall graduated from East Tennessee State University with a Bachelor's degree in Engineering Technology/Construction Management. Kendall previously worked as a project manager/estimator for local general contractors for the past several years.

STRONGWELL - CORPORATE OFFICES
400 COMMONWEALTH AVE.
BRISTOL, VA 24201 USA

What's in this Issue:

Case Study: EXTREN® & DURAGRID®

Fiberglass Structure Extends Zoological Exhibit

The Cleveland Metroparks Zoo is a 183-acre destination in northeast Ohio. The zoo houses over 3,000 animals, divided into multiple sections to symbolize a trek of wildlife around the world.

This zoo houses one of the largest primate collections in North America, including the Western Lowland Gorilla. The zoo recently announced the addition of new gorillas into its exhibit. In an effort to renovate the Gorilla Exhibit for additional space, the zoo approached Advantic, LLC, regarding best practice modifications to its existing structure. The zoo requested that an interconnected chute be fabricated to provide additional space for movement and observation for these territorial creatures. With over one million visitors annually, the zoo also wanted to create the least amount of disruption to both primates and other neighboring habitats.

Advantic, LLC, recommended an elevated tunnel design outfitted with FRP (fiber reinforced polymers) which provided the gorillas with a 360-degree view of their habitat. The elevated tunnel was constructed with EXTREN® wide flange beams, angles, plate, I-beams, and channels. 1.5" DURAGRID® HD-7000 was also used as the chute's flooring, which can easily support the 450-lb. weight of a typical male Western Lowland Gorilla.

Initially designed out of stainless steel, Advantic's value engineered FRP design met all structural requirements and reduced the need for costly and restrictive rigging, lifts, and cranes required to move and install heavy steel components. All FRP beams were hand carried into the exhibit through the only available access point - a single personnel door. The FRP structure was installed with four craft workers in seven days, 50% faster than the steel estimate. This reduced interruptions, loud noises, welding hazards and intrusive movement to the gorillas, zookeepers, and the public. ●

*The **Profile Newsletter*** is published by the Strongwell Corporate Marketing Department. To subscribe to the e-newsletter, please visit **www.strongwell.com/godigital**. Previous editions of *The Profile Newsletter* may also be found online at **www.strongwell.com**. | Editor: Barry Myers Production/Reporting: Brian Godwin & Te-Kai Shu