Engineers Benefit from Geotube® Stacking Technology & Analysis

Stacking Geobag® units makes projects previously thought impossible, possible.

Since 1962, Geotube® technology has protected countless shorelines and provided low cost, high volume dewatering solutions to companies all over the world. Starting off as a single layer unit designed for shoreline erosion protection, Geotube® structures have been developed and improved for more than 40 years to help engineers tackle previously unsolvable projects. One of the most prominent advancements is the TenCate™ Geotube® stacking technology.

TenCate™ develops and produces materials that function to increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions.

Stacking History
In the 1990s, Geotube® technology was routinely being used for marine structure and shoreline erosion protection, and TenCate™ was developing ways to put Geotube® units to work for containment and dewatering projects. Around the same time, shorelines started to require higher and higher erosion structures, and many dewatering applications faced limited on-site workspace with greater volumes of materials to be dewatered. Both application technologies required that the Geotube® units be stacked to achieve a proper design and maximize capabilities.

TenCate™ began designing and installing projects with multiple layers of Geotube® units. One of the first Geotube® dewatering stacking installations was the Badger Army Ammunition cleanup of Gruber Bay in Wisconsin. With a limited dewatering cell, more than 100 GT500 woven polypropylene Geotube® containers were stacked three layers high, effectively containing and dewatering contaminant sediment.

Technology and Analyses
Based on the success of Gruber Bay and other initial stacking projects, TenCate™ embarked on a systematic program developing multiple analytical tools to aid in the design of stacked Geotube® structures. The company conducted many tests and studied the best stacking methods. This effort generated four proprietary software programs to better insure the safety, stability, and durability of the Geotube® structures.

The first program, the Geotube® Simulator, produces a scale dimensional cross-section image for each combination of circumference and height. It determines the material volume and calculates the stresses that will be exerted on the textile, ports, and seams of the Geotube® design.

The Geotube® Bearing Capacity and Settlement Analysis calculates the stacked Geotube® structure’s force that is exerted on the surface upon which it is built. It also determines if there will be any settlement during and after the installation on soft soils.

The third program is the Stacked Geotube® Stability Analysis. It conducts a number of side slope analyses including rotational, two-part, transitional, and three-part wedge analysis. This program predicts the stability and soundness of the planned Geotube® structure.

The final program, the Geotube® Installation Illustrator, demonstrates the stacked layers of a project within a defined project footprint. The software calculates the quantity of Geotube® units required, the number of stacked layers, the quantity of filtration fabric, the amount of impermeable liner material, and the area required to dewater any volume of material.

Geotube® Stacking Technology addresses multiple challenges for dewatering projects (left) and shoreline erosion protection projects (right). Beachfronts have been rebuilt and gradual beach slopes restored using Geotube® geocontainment technology.

Geotube® containers stacked in a dredging operation at Fox River (Wisconsin, U.S.) The layering increases dewatering volume and capacity for the space allotted.
Support and Solutions
TenCate™ offers support for Geotube® marine and dewatering projects with these four proprietary software programs. The company works closely with project engineers to provide preliminary output data for their review and analysis. This effort insures proper groundwork and establishes a solid foundation for shoreline erosion protection and dewatering projects.

“TenCate” pioneered stacking technology,” said Tom Stephens, Director of South American Operations. “We are the only company that offers a complete package of information so that engineers and owners have the confidence that their Geotube® project is safe, stable, and secure. They know that the project can be constructed in the timeframe that is allotted and at the cost that is budgeted.

“Whether stacking to save space in a dewatering application, or to create a higher, more effective marine structure, engineers are now able to build projects that were not possible in the past.”

Successful Applications
Geotube® technology provides innovative geosynthetic solutions for dewatering and containment projects, as well as for marine structures and shoreline erosion protection plans. It handles shoreline restoration, marine contaminated sediments, paper mill discharge, coal mining slurry waste, and other applications. Several Geotube® projects involving stacked containers are pictured below. These were successfully installed worldwide using the Geotube® software programs.

Preparation is key in any Geotube® application. For each individual project, geotechnical information is required to conduct a proper analysis. Contact your TenCate™ Geotube® market manager to insure all necessary data is collected so that a complete design analysis can be performed.

To learn more, call 1-888-795-0808 or visit www.geotube.com.

How Geotube® Dewatering Technology Works
3-Step Dewatering Process

Step 1: Filling

Step 2: Dewatering

Step 3: Consolidation

3-Step Marine Structures Process

Step 1: Filling

Step 2: Containment

Step 3: Structural

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