Did you know…?

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An easy-to-use menu bar appears on
the bottom of your screen and helps
put you in control, allowing you to change the volume, stop, fast
forward, rewind and zoom.

We invite you to view our online movies and affiliated documentation at any time via the web address www.nauve.tv.

The year 2011 will go
don in history as an
extraordinary year –
for the world and also
for NAUE. Significant
revolutions in Tunisia, Egypt
and Libya oc
cured, while in several
nations protests and
riots challenged other
long-time rulers. These
events have left many
dead and injured.

In March, the massive
earthquake in Japan
and its subsequent
 tsunami led to the
meredown of a major
nuclear nuclear
power plant in Fu-
kushima. Thousands of
people were killed and
roughly 150,000 were
forced to leave their
homes due to radio-
active contamination.
These shocking events
have unfolded alongside pro-
tected economic concerns in the
United States (the world’s largest economy) and financial
bailouts in Greece that are now
prompting larger discussions
about the euro’s strength.

So we are well-positioned to
work with our products to meet
the application challenges of the
future, such as strengthening en-
vironmental protection systems,
developing better transport in-
frastructures, and providing
safer, more sustainable systems
for flood protection, coastal ero-
sion control, and offshore wind
turbine scour protection.

Questions remain, however, as
to what extent the current debt and
financial crises in various countries
and banks will have on global eco-
nomic stability. The uncertainty
affects more than just the con-
struction industry; in an intercon-
ected world, it affects everyone.
We can only hope that the recently
announced measures to combat
debt in Greece and to the rescue
of the euro will be successful.
We want to thank all our custom-
ers and suppliers for their coope-
ration and trust during what
has been for the world in general
a challenging year. And we want
to thank all of the NAUE Group’s
employees for their continued
dedication. We wish all readers
a Merry Christmas and a Happy
New Year, and we hope for a more
peaceful 2012.

Gigantic Terrafix® mats have
been combined with traditional
willow bundles (fascines) in
order to solve one of the most
urgent problems of the Elbe
River near Cuxhaven.

Between Cuxhaven and Otterndorf
is an area called “Altenbrucher Bogen”, literally the “Altenbruch bend”. Then, the Elbe River curves and the navigable water extends
especially far from the shore. The
strong currents in this area have
caused continuous erosion to the
shore. The natural mudflats have
receded significantly in recent years, threatening the dike.

Furthering this waterway chal-
lenge, plans have been set in
motion to deepen the navigable
water. Greater depth will enable
easy passage for large container
ships regardless of the tide and
improve access to Hamburg Har-
bour. This alternation of the wa-
terway, if not addressed in im-
proved shoaline engineering,
would further increase the flow
speed and cause additional prob-
lems for the dike and mudflats.

The solution for this dilemma has
been found through the utiliza-
tion of highly engineered, mod-
ern geotextiles and traditional
fascines. Ofﬁcials from Lower Saxony and
the Federal Water and Ship As-
sociation developed the concept
for this permanent and secure
shore protection plan. The core
of the idea consists of 24 groynes
extending into the Elbe River
along the Altenbrucher Bogen
for the dike from eroding
the ground further. The
groynes of this ongoing project are being
constructed up to 250m long
and are being placed along the
bend, covering an area of approx-
imately 3km.

Fascin mats for base protection
Above the water line, the groynes
appear to be the same as tradi-
tional stone breakwaters. The
special characteristics that de
define these groynes are hidden
underwater, beneath the foundation:
Large geosynthetic revetment
mats, in combination with wood
fascines, not only prevent tidal
erosion but promote sand depo-
sition.

Each of the special underwater
mats are assembled on site
and measure 30m x 70m. NAUE
Terrafix® geotextile panels are
unrolled next to one another.
Akkers, which tightly bind the woody
fascines to the geotextile, are
pulled through the loops. The
fascines consist of numerous
willow rods hound into long
round bundles several metres
long. The fascines are fastened
to the Terrafix® at a right angle,
lengthwise and crosswise, spaced
about 1m apart.

Tugboats, then, pull the fascine
mattresses into position. Small
rocks weight the fascines
as they are lowered. Next,
the actual groynes are built up using
larger breakwater stones.

The groynes and fascine mat-
tresses now provide mutual pro-
tection. The rocks hold the mat-
tresses in place. The nonwoven
fabric prevents erosion of the
waterway bed. The fascine pat-
tern promotes sedimentation.
This creates shallow water areas
with sand deposits between the
groynes. It also makes those areas
accessible and able to be used for
leisure activities. The project is
not yet complete, with a final
phase planned for 2012. In total,
it covers an area of 200,000sqm
and is considered one of the
largest water construction zones
in Germany. The executors,
“ARGE Buhnenbau Otterndorf”,
are comprised of the companies
Heinrich Hindele, Colcret von
Eisen, Johann Bautz and Van den
Herik. Essential support has also
been provided by the Cuxhaven
Water and Shipping Authority.

By the end of the project, approx.
220,000sqm of Terrafix® 773 G43
and approx. 30,000sqm Terrafix®
B113 will have been installed.

Terrafix® and willow bundles
stabilise groyne in the Elbe River
Elaborate coast protection efforts at Altenbrucher Bogen

The latest news magazine from the NAUE Group

Issue 38 · November 2011 · 15th year [22nd English translation]
Double Re-Design for the A1 near Didžiulio Lake, Lithuania

For the modernisation and extension of Lithuania’s busy A1 Vilnius-Klaipėda roadway project, a major embankment needed to be widened to accommodate larger vehicles and increased traffic volumes.

The project designer, Kelprojektas, identified the need for geogrid reinforcement of this embankment early on. Some geogrid reinforcement of this construction method was thought to be the best idea. However, the project directors initially selected the lowest cost design, which involved only the reinforcement in one area of the construction. The region receives a regularly high amount of precipitation.

With the slope being exposed to this precipitation during construction and the immediate post-construction period, more stringent erosion control was thought to be the best idea.

The project designer selected a very cost-effective and eco-friendly material during the pre-construction period, in order to reduce the environmental footprint immediately adjacent to the lake. Also, the embankment had to be built to 6m in height. Construction went as planned, with reinforcement layers installed horizontally every 0.8m. A wrap-around, or envelope, method of geogrid placement was used.

In the middle of this summer installation, shortly before the embankment was completed, a sudden intense rainfall brought about a change in the design. The precipitation caused significant washout of the clayey-sandy soils, affecting the newly laid roadway surface and some slope zones leading down to the water. The original design suggestions were revisited and this time the installation of erosion control matting was approved.

The project team chose SecuMat®, a robust, three-dimensional erosion control mat with a UV-stabilised polymer core, able to withstand environmental exposure. This complex, durable matrix controls surface erosion and helps to anchor and reinforce the root zone of plants.

After the erosion-affected soils were replaced and compacted and all SecuMat® soil wrappings were confirmed as secure, rolls of Secumat® were installed on the slopes and anchored to the top of the slope.

The erosion control matting was then pinned into place using steel pins. Soil and seed were then added on top of the Secumat®.

Before the next summer season arrived, the roadway was fully open and vegetation was sprouting along the waterside slopes. It’s hard to make a roadway blend into the natural environment, but the newly greened embankments along Vilnius’s beautiful Didžiulio Lake have succeeded making this revitalised, busy road pleasant to drive along.

How can tunnel construction be advanced safely? If the inner shell is being finished, when enormous amounts of material must be moved past the sensitive sealing locations? The solution: a “floor bridge.” This construction is used to carry off material during tunnel advancement. The floor is built up under the bridge layer by layer. Space is limited and it requires exact timing in the execution.

The Reitersberg Tunnel will be a 2975m long section of the new high-speed railway between Nuremberg and Erfurt in Germany. The tunnel is being built near Kiedental in Northern Bavaria and will cost approximately 100 million euros.

The double-shell tunnel requires sealing against pressurised water. A geosynthetic lining system is utilised here. Water must not penetrate and substances harmful to the environment must not trickle into the surrounding rock formations. The maximum water pressure is 45m above the tunnel floor. NAUE geosynthetics are being installed to form the multilayer sealing system, which consists of Carboplus® tunnel geomembrane, Carboplus® water-stops and Secutex® protection nonwoven geotextiles.

The greatest challenge of the Reitersberg project has been ensuring a flawless installation on a tight timeline. The welding of these critical waterproofing panels is a difficult operation due to the space constraints and site-specific tunnel geometry. But the geosynthetic system must be welded properly to ensure the materials provide the high level of function for which they have been engineered: a service life of at least 100 years. NAUE Sealing’s deeply experienced experts have brought in to guarantee the professional execution of the tunnel lining installation.

Exact timing under the floor bridge

The Reitersberg Tunnel has been opened from both sides by means of explosives and excavators. As work progresses, the rock is secured and sealed and the inner shell of reinforced concrete is installed. Allowing it all to happen efficiently is the tunnel’s “floor bridge.”

The floor bridge, a 100m long structure, allows the inner tunnel shell to be dug out under it. This is done separately by section. Under the floor bridge, three sections are staged and the complex inner shell is put up in six phases:

1. Bottom road bed excavation and massive material removal under the floor bridge.
2. Securing by means of steel support arches, mesh reinforcement, and anchors and shotcrete. The latter also serves as a capping layer for the sealing material.
3. Installation of the sealing system.
4. Reinforcement of the floor with bars and mesh.
5. Concreting the 60 to 90cm thick inner shell of reinforced concrete in the inverted arch.
6. Finishing of the full layer of the inverted arch / floor zone concrete.

As highlighted in this list, the floor area requires numerous installation steps. Each step involves coordinating workers from a variety of disciplines in tight spaces, all the while carrying off large amounts of material along side other critical tunnel work.

This method of construction avoids a significant amount of the idle time that is normally required in tunnel construction, but it requires extraordinary cooperation and communication by the project team.

Strong planning before the project for safety and coordination has resulted in a successful project. As work progressed, the project’s diverse teams test each seam for tightness by means of pressurised air. The Carboplus® tunnel liner is coated white on the side facing into the tunnel, which makes any potential installation damage more easily visible. It also allows more light to the working area, as the light reflects off the surface of the white liner. This increased visibility further helps increase the quality of the panel sealing.

150,000qm have been installed. Secutex® is a needle-punched geotextile that protects the tunnel waterproofing liner from mechanical damage. The Carboplus® tunnel geomembrane has a thickness of 3mm. The roughly 150,000qm of geotextile must be placed by experienced professionals because the overlapping seams must be 100% waterproof. Sealing experts and construction supervision teams test each seam for tightness with a needle-punching machine. The nonwoven geotextile Securtex® has a site-specific minimum mass of 500g/m². Approximately 13,000 running metres of water stops are being used. In the floor zone, a second 3mm thick Carboplus® layer (as protection geomembrane) of approximately 50,000qm have been placed above the primary sealing tunnel geomembrane.

Construction began in 2009. The tunnel breakthrough was celebrated on 21 July 2011, and the goal is to complete the inner shell by mid 2012. By 2017, the first trains will be able to use the new track. DB Netz AG is the builder responsible for this project. The joint venture ARGE Kiedental-Reitersbergtunnel, consisting of the construction firms Alfred Kunz Unterbezirks- und Schwertschlay Tunnelbau, is leading the construction.

NAUE is proud to have its products utilized in the work, and NAUE Sealing is proud to be part of the expert installation crew on site.
Road Building over Peat in Canada

Ontario’s Highway 62 runs through numerous swampy areas. Significant stretches of the road, like the province itself, overlie peaty soils. Properly maintaining roads in these areas has historically been difficult due to issues of settlement, which have led to subgrade breakdowns and roadway cracking and failures.

For a stretch of Hwy 62 south of Bancroft, the Ontario Ministry of Transportation, working with design engineering firm Golden Associates, sought a separation, reinforcement and drainage/erosion solution that would address and counter the typical problems of road building over the area’s peat.

Project engineers selected Combigrid® 30/30 Q1 151-1 composite geogrids for roadway reinforcement. This unique product from NAUE is composed of not just a high-strength geogrid (Secugrid®) but a needle-punched nonwoven geotextile (Secutex®) – all in a single material.

This is the only composite product of its type in the market. Rather than installing an individual geotextile and a geogrid, the project team used one integral product. Combigrid® allowed for a shallower excavation (to the peat depth) and easy reconstruction. The reinforcing element reduced the need for excessive aggregate and the geotextile component ensured no mixing of disparate subgrade material. Ultimately, the pavement structure was able to be constructed as thin and lightweight and economically as possible without sacrificing roadway integrity. The risk of differential settlement was dramatically reduced. Also of note: the wide Combi-grid® rolls helped reduce waste on site and expedite construction. Only two rolls of product were needed to cover the entire roadway reinforcement width as well as provide a 12in. overlap for maximum assured drainage coverage and long-term strength.

During construction, one lane was reinforced at a time while the other was left open to traffic. The composite geogrid rolls were unrolled in place and covered quickly to reopen the lane as soon as possible.

Roughly 10,000sqm (107,600 sq. ft.) of Combigrid® 30/30 Q1 151-1 were installed. For Highway 62’s commuters, a smoother ride has been provided, and it’ll be there for a long time.

Safety for sand bunkers and ponds

Golf courses have high requirements

Sand bunkers and ponds are not the most inviting sections of a course for golfers, but for course designers, club pros and maintenance crews, these obstacles demand a great degree of care and attention. Geosynthetics play an important role in keeping these expected but unpopu-lar hazards “in play.”

Golfing has grown significantly as a global sport in the past 25 years, and this has led to many new courses being constructed. The increased number of courses has meant that many are now built atop sites with difficult soils. Bunkers and ponds present special challenges on these courses, and not just for the players.

NAUE’s portfolio contains solutions that are uncomplicated, quick and easy to install. These products and systems help modern course construction meet their needs for stable, dependable play. Of note, Bentofix® geosynthetic clay liners (GCLs) provide ideal containment for ponds and combined with other materials to create a multi-layer system. The filters and drainage components help provide sufficient vertical and horizontal drainage, while the geosynthetic liner provides impermeability and separates layers of soil.

The powder of power: bentonite, GCLs, and ponds

Golfers commonly lose strokes and golf balls in course ponds, but for the site owner those ponds can be the source of aesthetically unpleasant water loss and high maintenance costs. To ensure the proper function of ponds as both visually attractive and money on installation while ensuring the long-term strength and performance desired in the project. Combigrid® allowed for a shallower excavation (to the peat depth) and easy reconstruction. The reinforcing element reduced the need for excessive aggregate and the geotextile component ensured no mixing of disparate subgrade material. Ultimately, the pavement structure was able to be constructed as thin and lightweight and economically as possible without sacrificing roadway integrity. The risk of differential settlement was dramatically reduced. Also of note: the wide Combi-grid® rolls helped reduce waste on site and expedite construction. Only two rolls of product were needed to cover the entire roadway reinforcement width as well as provide a 12in. overlap for maximum assured drainage coverage and long-term strength.

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Capping and Revegetating a Class II MSW Landfill in Langenlonsheim, Germany

Up until 2003, residential waste was disposed of in the municipal solid waste (MSW) landfill in the district of Langenlonsheim. With the site needing to be capped as part of waste cell closure operations, NAUE Sealing has been retained to provide single-source support. The company is delivering and installing the essential geosynthetic components: NAUE Bentofix®, Carbofol®, Secugrid® and, where the slopes are steep, Secugrid®.

The overall task of sealing the 50,000sqm waste area and reveting the surface is in the hands of the Langenlonsheim Landfill Working Group (Arbeitgemeinschaft Depontie), which consists of the construction companies Hermanns HTI Bau GmbH & Co. KG and the Bickhardt Bau AG. The construction will take more than two years.

Success vs. Sinking in Brunei

As the crow flies, this MSW site is located 1.5km southwest of the Walldorfaderhems exit of the A-41 motorway. The waste disposal organisation (Abfallwirtschaftsgemeinschaft ABW) of the district of Bad Kreuznach must complete the municipal waste cell capping in accordance with the regulations covering Class II landfills and revet the entire surface of the former landfill.

A part of the measure consists of the controlled catching and draining of stormwater and leachate from the landfill mass and, in connection with the sealing, capture of landfill gases.

Above an equalization and drainage layer, the landfill cap consists mainly of:
- NAUE Bentofix® NSP 4900 geosynthetic clay liner with the German LAGA suitability assessment.
- NAUE Carbofol® 507 2.5mm Megafriction/Megafriction high-density polyethylene (HDPE) geomembrane with BAM certification.
- NAUE Secugrid® R201Z WD601Z R201Z geocomposite drainage layer with BAM certification.
- Vegetation.

Installed as the bottom-most layer, Bentofix® NSP 4900 is, at its core, a barrier layer of powdered sodium bentonite that swells immediately when it comes into contact with water and thereby seals against gases and liquids. The bentonite is encapsulated between two high-strength, highly durable, needle-punched geotextiles.

In accordance with the regulations for Class II landfills, MSW landfills must also have a second liner. For Langenlonsheim, the second liner consists of the 2.5mm thick HDPE Carbofol® 507 geomembrane. The surface of the membrane is textured on both sides.

To expedite construction, the Carbofol® panels are welded together on-site directly after unrolling and positioning. Atop the geomembrane, NAUE Securain® geocomposites are installed for protection and drainage/gas venting management.

The Securain® R201Z WD601Z R201Z is a compound material made of filtering geotextiles that are linked to each other in a shear-proof manner and around polymeric drainage core. Landfill capping is a typical application of use for the Securain® line of products. The product is a protection mat, a filtering mat and a drainage mat all in one, which makes it possible to install it quickly and economically.

In sections that are steeper, the landfill embankments will be reinforced additionally with Secugrid® 80/20 R 6. The geogrid will be installed directly on Securain® and will secure the topsoil that is brought in.

For the project site that experienced the collapse of one of its cranes due to weakened soils, a unique geosynthetic had been specified. Manufactured by NAUE GmbH & Co. KG, the Combigrid® product provides both a separation geotextile and a reinforcement geogrid in a single-layer product that can simply be unrolled into position.

The needlepunched nonwoven layer is secured in the material during the manufacturing process and is sandwiched between the transverse and longitudinal high-strength geogrid monolithic bars. This allows the product to provide reinforcement, as well as filtration, separation and drainage functions.

On site, the geosynthetic-supported zone experienced some erosion, but the base modulus was held in tact by the geotextile, which also provided separation to prevent mixing. The cranes were supported.

With one storm and one photograph, we find an essential lesson about geosynthetic utilization depicted clearly. Not only can separation and reinforcement geosynthetics provide more durable and more economical roadways, but the construction process itself can be made more efficient and less subject to disruption.