



NEWS

The latest news magazine from the Naue Fasertechnik Group

Issue 22 - September 2004

Introduction

If only for a few days, summer has finally arrived in Germany.

Many of us were able to enjoy an annual vacation in the best of the weather - even along the North Sea and Baltic Sea coasts.

Summer could well have begun a few months earlier for our welding crews. They have been under pressure to complete orders for landfill construction before the end of this year. For Naue Fasertechnik, the most important initiatives this year were created in the export business. Under the direction of Dipl.-Ing. Karsten Johannßen it has been possible to gather important contracts in the eastern European markets, thereby expanding our market share in that area.

In the foreword to our last Naue News we mentioned that innovative ideas require a certain amount of time to gain market approval and acceptance. We learned this lesson years ago when we invented and patented Bentofix®. This year about 35 million square metres of this clay liner are produced and sold around the world. Our patented Secugrid® product, a technically-superior reinforcing geogrid, is also showing signs of market acceptance on a scale that gives rise to expectations for a success story similar to that experienced with Bentofix®. This is why our management has given the green light for construction of a second geogrid manufacturing plant; a measure that will double production capacity in 2005 to satisfy the next construction season's demand. Even in this current year, Mr. Volkhard Müller and his team have been able to successfully complete a project to expand capacity for the Secudrän® drainage product range. Effective immediately, Secudrän® can be delivered in a 3.90 m width. Furthermore, the nonwoven filter geotextile is full-surface fastened to the drain core to improve drainage capacity and the internal friction angle. We recently received a letter from the Bundesanstalt für Materialprüfung (BAM) [federal agency for materials testing] that its assessment of our Secudrän® product currently shows every indication of

positive results for a certification. This would mean that Secudrän® could subsequently receive BAM approval for landfill construction similar to those BAM approvals already issued for our Carbofol® HDPE geomembrane sealing liners.

Not only are we going full steam on the production side, even the construction of our new administration building is on schedule. The groundbreaking has already taken place. Beginning in March 2005 offices will start becoming ready for occupation at our Fiestel location. In the future, most of the company's business activities will be operating under one roof at the Fiestel location. The relocation of production facilities from Lemförde to Fiestel has already been successfully implemented. This has eliminated cost-intensive transport of pre-processed materials between the Fiestel and Lemförde works. Even more efficiency results from shortened communication and administration channels. When the new administration building is finished, it will give us the opportunity to gather the entire sales force under one roof. This is why company management has decided to place the sales department under "tandem" management. Effective 1 January 2005, Dipl.-Ing. Karsten Johannßen and Dipl.-Ing. Martin Driever, will be jointly responsible for the management of the three sales sectors: VI (sales infrastructure), VU (sales environmental protection) and VE (sales export). Mr. Driever, who began his employment with Naue Fasertechnik on 1 September 2004, is a graduate hydraulic engineer and was formerly business manager for Sika-Trocac GmbH in Troisdorf as well as executive board chairman for Sika-Trocac AG in Zurich. We wish our new team every success.

Our observation of developments on the raw materials markets gives cause for concern. Per barrel oil prices have currently risen to an all-time record high of \$44. Since oil is a primary component in our polyolefin raw materials, we too are confronted by our suppliers' price increases that must be passed on to our customers, at least in part.

Ongoing demand for geosynthetics proves that the continuous effort made over past years is paying off - not only at Naue Fasertechnik - but also for planners, governmental entities, construction firms, dealers and universities. The willingness to use geosynthetics has risen markedly. One important factor for this willingness is functional service life, e.g. Bentofix® B 4000 as a landfill cap seal that will last for at least 200 years (according to BAM testing). Such positive results help spread the awareness that geosynthetics are an equivalent alternative to conventional building materials.

Naue Fasertechnik will continue its efforts to document the safety and economics of geosynthetics so that their use and fields of application expands. In the second half of this year, as always, we will stand by our customers with ideas, service, advice, and our products to promote ecological and economical methods of construction.

Company Management ■

Did you know ...?

... that the trade journal "tis", published by the Bertelsmann publishing group, ran an interesting article about Naue Fasertechnik in its May issue? Under the title "Geosynthetic Vertical Drainage for Accelerated Consolidation of Soils" readers of this well-known magazine were able to inform themselves about the outstanding characteristics of the Naue Fasertechnik product Secudrän® V.

The great application flexibility and simple handling not only convinced the editorial staff - as numerous reader enquiries have demonstrated.

Have we aroused your interest?

Contact Ms. Rux (arux@naue.com) at the telephone number +49 57 41 / 40 08-32 or by fax under the number +49 57 41 / 40 08-84 and you will receive further information right away. ■



national projects

Secugrid® reinforced preliminary bottoming Autobahn A7 Füssen, Wasenmoos, [Andy Post]

In the construction area for the autobahn access point AS Füssen, between construction km 124+500 and 122+950, a preliminary subgrade for a stretch of autobahn was needed where subsoil exhibited little load-bearing capacity.



Reinforced preliminary bottoming on very soft subsoil

Thick peat layers and limnic chalk deposits as well as basin sediments of differing thickness called for innovative road base solutions. Because these low load-bearing capacity subsoils extended to great depths, it was necessary to stabilise embankments and minimise settling. The Naue solution: a geo-synthetic reinforced floating foundation. The subsoil was improved with Secugrid® geogrid and crushed rock having a grain size of 2/150 mm.

The general structure for the selected floating foundation looked like this:

- The lowest reinforcing layer for the embankment's floating foundation consisted of high-tensile PET monofilament fabric and Secutex® 301 GRK 5 matting (as a protective layer over the fabric). These materials were put down continuously over the slope surfaces and floor surfaces.
- After the forward-motion installation and compacting of the first 0.5 m thick layer of replacement material, the second reinforcing layer, made of single-axis Secugrid® 180/20 R6 geogrid, was installed (pre-stressed).
- Thereafter, another layer of replacement material was put down over the entire width of the project up to the height of the final road level.

Because of special requirements, it was decided to put down the Secugrid® as follows. All reinforcing layers on the site would be pre-stressed with a tensioning beam and covered with bulk material while still in this stressed state. The tensioning beam was designed so that all bars (longitudinal and traverse) would be fixed in place by tensioning. The rolled out Secugrid® geogrid was covered at one end with road base material. Then the laid Secugrid® geogrid was tensioned with a tensioning mechanism. Another load was dumped on the end with the

tensioning beam while still maintaining tension. The tackle was removed and the Secugrid® geogrid was covered completely. An excavator was used to achieve optimal tension in the Secugrid® geogrid, sometimes despite very uneven road level and long strip lengths. Through skilful, conscientious handling of the "tensioning-excavator", a uniform tension was ensured for all bars.

The BBG (Bauberatung Geokunststoffe [construction advisory for geosynthetics]) calculated the necessary proofs for anchor lengths, thus complementing the Naue Fasertechnik reinforcement solution to the full satisfaction of the planners.

In summary it can be said that the decision for Secugrid® R geogrids in the embankment bottoming was based on facts that this Secugrid® geogrid type:

- exhibits a particularly low long-term creep behaviour,
- develops a very good meshing effect with the bulk material,
- is capable of absorbing very large amounts of force with little elongation and
- represents a particularly cost-effective alternative to other solution proposals. ■

Top Tool for Designing Load-bearing Layers -

With Secugrid® you won't be driving resources into the ground! [Johann Horstmann]

As simple as a parking disk but as powerful as a small computer. The Naue Fasertechnik "Top Tool". This design-tool disk performs calculations for designing load-bearing layers with a "twist of the wrist". It is applicable for both road-building as well as for classified load-bearing structures on low load-bearing subsoils.

And how does this work "on site"? Frequently the ground conditions encountered at construction sites are different than were anticipated. Particularly for small projects, advance soil sampling for load-bearing capacity is rather seldom. Weather influences also make a contribution to changing ground conditions. Quick decisions and alternative solutions are needed right away so as not to delay construction work and incur unnecessary costs. This is where the Naue Fasertechnik "Top Tool" comes into play. This design-tool disk provides the on-site decision-maker with safe calculations for geosynthetic alternative solutions. Secugrid® and Combigrid® geogrids can be used as an alternative to conservative construction techniques (costly earth replacement).

The design-tool disk is laid out to show required load-bearing capacity for sub-bases compliant CBR 12.5, 15, 35 and 50 % at the upper edge of the bulk material. Settings can be made for the estimated, or actual, prevailing subsoil conditions of individual areas with respect to load-bearing capacity as expressed by a CBR value from 2 - 11 %. By setting these characteristics and a knowledge of the bulk material to be spread, the layer thickness of bulk material can be determined for Secugrid® reinforced structures or structures without reinforcement. The use of a Secugrid® geogrid may allow as much as 45 cm of earth material to be saved! Solution approaches, e.g. for very soft subsoils where in addition to reinforcement a separating and filter function is necessary, will also be indicated. The Combigrid® product is fundamentally recommended for subsoils to and including CBR 3 %. Combigrid® is a composite material of Secugrid® geogrid and a needlepunched Secutex® nonwoven geotextile.

We would be glad to send you our Top Tool, the Secugrid® design-tool disk, and explain to you its simple, safe application so that you too can realise your projects in an economical and ecological manner. Simply send an email to arux@naue.com with the subject line "Design-tool Disk" or contact Ms. Rux at the telephone number +49 57 41 / 40 08-32 or per fax at +49 57 41 / 40 08-84. You want to use the Top Tool directly online? Just call up the Secugrid® Internet page www.secugrid.com! ■



"EuroGeo3" in Munich...

... a complete success for the Naue Fasertechnik company group!

As mentioned in our last issue, the big European geosynthetics conference "EuroGeo 3" took place in Munich between the 1st and 3rd of March this year. Naue Fasertechnik was represented by three show stands and numerous lectures. Among other subjects covered, the production sequence for Bentofix® geosynthetic clay liner and applications for Secugrid® geogrid columns were illustrated in



The "set" offered at EuroGeo

a manner that caught the public's interest. Consistently positive feed back was obtained; the well-attended stands were indeed able to raise the level of interest in Naue Fasertechnik geosyn-

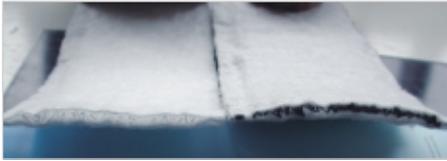
thetic materials. As an incentive under the motto "Get the Set", each Naue Fasertechnik stand offered one component of a 3-piece - pencil, sharpener and eraser - set. This was thought appropriate because the set's anti-slip studs are reminiscent of the pattern in Carbofol® geomembranes.

Summary: Head for the next EuroGeo to be held in Edinburgh, Scotland during 2006. ■

international projects

Vertical Drain in Malaga, Spain, [Raquel Ribera]

There was adjoining property available to expand the airport in Malaga (Andalusia, in southern Spain) but the grounds exhibited very little load-bearing capacity. The fine-grained earth was not suitable, in its original state, as a foundation for traffic areas because of its high level of water



Geo-synthetic vertical drain system Secudrän® V

saturation. It was necessary to dehydrate this soft, unconsolidated subsoil in order to increase its load-bearing capacity. Consolidation was accelerated or anticipated by inserting Secudrän® V

vertical drain. Secudrän® V shortens the flow path for interstitial water in subsoil such that short horizontal paths are created from long, slow vertical paths. Special equipment (see photo) punched 10 cm wide drain strips of Secudrän® V about 8 - 10 m deep into the subsoil in a 1.5 m wide honeycomb pattern. This was done by feeding the Secudrän® V into a punching lance where it was clamped at the tip by an anchor plate. The anchor plate secures the drain strip in the ground at its target depth. The anchor plate also ensures that the punching lance remains closed as it is forced down into the ground. This prevents dirt from getting into the lance as it is forced downward. After the punching lance reaches the necessary depth, it is retracted from the ground again. The anchor plate, along with the Secudrän® V clamped into it, remains in the ground. The upper ends of the vertical drain open into a 30 cm thick gravel layer that is separated from the fine-grain



Excavator inserting Secudrän® V through the load-bearing layer

earth mixture by a 200 g/m² nonwoven geotextile. Secudrän® V is delivered to the construction site as a 100 m long drain strip in the form of a 1.0 m diameter roll. During the first phase of the airport expansion 220,000 running metres of vertical drain strip were used. ■

Products

Performance Test: "Secudrän® geosynthetic drain systems are markedly more effective than gravel drainage".

The proof of this statement cropped up in an investigation performed at the Munich polytechnic university. On behalf of the university, the Dr.-Ing. Steffen Engineering company investigated filter and drain effectiveness in landfill cover-systems. Included in this study were investigations of geotextiles on the Kienberg landfill. The results from two test fields were compared with one another.

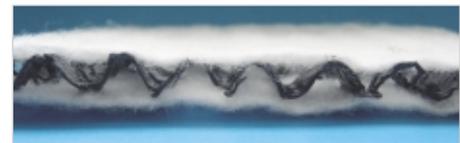
A Secudrän® geosynthetic drainage mat was installed in test field I. It consisted of a three-dimensional 600 g/m² drainage core encased with a 300 g/m² filter nonwoven layer on each side. The drainage layer in test field IV consisted of a 30 cm thick gravel layer (8/32 mm grain with $k = 1 \times 10^{-2}$ m/s). A needlepunched Secutex® nonwoven (300 g/m²) from Naue Fasertechnik ensured a filter-technically permanent separation between the gravel layer and the top soil. The incurred seepage volume that came through the 1 m thick top soil layer in the aftermath of precipitation events was continuously retained. One goal of this investigation was

to make a comparison, under practical conditions, of the effectiveness of drainage provided by a geosynthetic drain system with a conventional mineral seal. Furthermore, findings were to be made about the extent to which Secudrän® products were able to fulfil the standing requirements set forth in recommendations and regulations.

The following data were measured continuously over a period of two years in both test fields:

Delay of entry into the drainage layer after precipitation begin, peak drain volume values, drainage duration and capacity utilisation of the given drainage system from manufacturer specification or calculation.

A summary report written by Prof. Dr.-Ing. Heinz Steffen documented that the Secudrän® drainage system was hydraulically much more effective than the 30 cm gravel drain. Subsequent calculations showed that the Secudrän® drainage system had been utilised only to a maximum of 28 % of manufacturer's specification at the peak value of measured actual drainage (for all measurements taken). It turned out that the tested Secudrän® drainage system exhibited a very high reserve capacity that far exceeds the GDA measurement recommendation,



Secudrän® with a full-surface bonded, nonwoven mat

even during extremely short-term hydraulic loading. Development of the Secudrän® drainage system was advanced in recent years to make it even more capable. For example, the well-known Secudrän® DS drainage system has evolved into Secudrän® WD, a wave-shaped drainage system which is statically even more stable. This not only permanently increases pressure stability but, in particular, the water removal capabilities too. Secudrän® can now be employed for even higher loads. Additionally, the nonwoven filter geotextile is no longer spot-fastened to the drainage core but now has full-surface bonding. This enhances drainage performance and the internal friction angle.

You can obtain additional information about the Kienberg experiments (in German) or about our products under the keyword "Kienberg", Tel: +49 57 41 / 40 08-32, Fax: +49 57 41 / 40 08-84, or email: info@naue.com ■

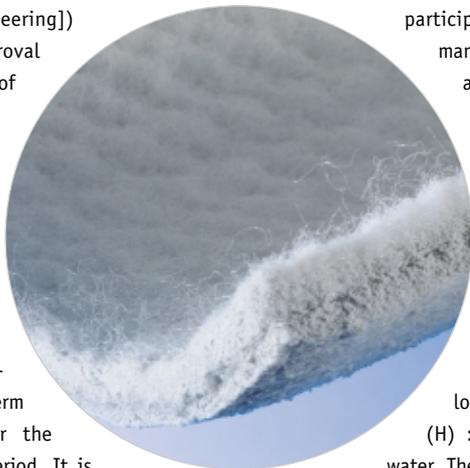


Products

Bentofix® B 4000

200 year functional lifetime confirmed!

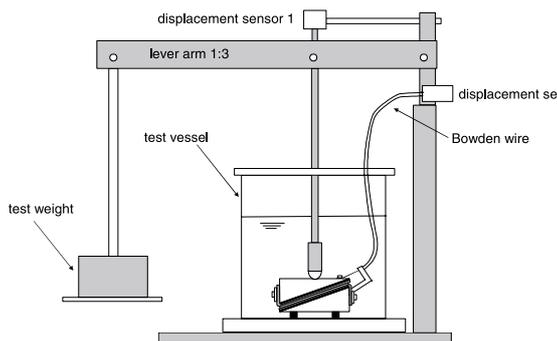
When the DIBt (Deutsches Institut für Bautechnik [German institute for construction engineering]) granted its approval for the use of Geosynthetic Clay Liners (GCLs) in class 1 landfills (1997/1998), it also ordered the manufacturers of these approved GCLs to submit proof of the continuous, internal, long-term shear strength over the five-year approval period. It is



tinuous long-term shear strength in a joint effort with BAM (Bundesanstalt für Materialforschung und -prüfung [federal agency for materials research and testing]). This joint research project (which was open to participation of other GCL manufacturers) developed a test procedure for GCLs that is based on existing experiment models from BAM approval procedures for structured geomembranes. Experiments were conducted with a 50 kPa superimposed load at an incline of 2.5 (H) : 1 (V) in 80 °C hot water. The GCLs must withstand

a test period of 365 days without shearing to ensure a minimum functional lifetime of 200 years. On 15 December 2003, Naue Fasertechnik received an appraisal from BAM about the long-term shear strength of the Bentofix® B 4000 GCLs. This appraisal certifies that Bentofix® B 4000 GCLs, based on the widely promulgated Arrhenius extrapolation, has met the minimum functional lifetime rating of 200 years at 15 °C ambient temperature. Further experiments on other Bentofix® types will be conducted so that our customers can be assured of the highest quality and safety in documented form.

If you would like to receive further information about the strong, durable, full-surface Bentofix® shear strength transfer, send an email to info@naue.com with the keyword "200 years" or just give us a call. Telephone: +49 57 41 / 40 08-28; fax +49 57 41 / 40 08-84. ■



known that this requirement was fulfilled by Naue Fasertechnik. However, in 1998 DIBt discontinued its activities related to GCLs in landfill applications. In order to be prepared for the time when the approval expires, we conducted an evaluation of Bentofix® for its con-

Have you heard? ...

The EBA (Eisenbahn-Bundesamt [federal office for railways]) has issued a new guideline "Test Conditions for Geosynthetics in Approval Procedures of the Eisenbahn-Bundesamt" that was effective on 31 May 2003. In Germany the EBA is responsible for construction releases, acceptance, testing, approvals, permits and monitoring of operational railway equipment. In short, Naue Fasertechnik has since received EBA approvals for the following products / applications:

Secutex® 151 GRK 3 as filter elements in formation drainage systems

Secutex® 251 GRK 4 as separation and filter elements beneath load-bearing layers

Secugrid® 40/40 Q6 as reinforcing elements in load-bearing layers (without explicit calculation)

Secugrid 60/60 Q6,
Secugrid 80/20 R6 and
Secugrid® 200/40 R6 as reinforcing elements in earthworks (with explicit calculation)

Secudrän® R151 WD 501 as drain elements with high alkali resistance for drainage of backfill areas.

Are you interested in further details?
Please address your requests to Ms. Möhring, telephone +49 57 41 / 40 08-15, fax +49 57 41 / 40 08-40 or to info@naue.com. ■

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Exhibition and Seminar Schedule

- 22/09/04 Forum of Young Geotechnical Engineers (Baugrundtagung), Leipzig (Germany)
- 22-25/09/04 28th Baugrundtagung, Leipzig (Germany)
- 25/09/04 Excursions to construction site seminar Wismut, Elbe Hochwasser Müglitztal (Germany)
- 06-07/10/04 14th Karlsruhe Landfill and Pollutants Seminar 2004, Karlsruhe (Germany)
- 13-15/10/04 Straße und Verkehr 2004, Berlin (Germany)
- 27-28/10/04 Wastex, Edinburgh (Scotland)
- 28-29/10/04 XV. Sächsisches Atlastenkolloquium, Dresden (Germany)
- 04/11/04 VSVI Event, Chemnitz (Germany)
- 10-11/11/04 IWWE, Irish Waste and Water Exhibition, Dublin (Ireland)
- 17.-21.01.05 Straßen-Tiefbau-Tage, Essen (Germany)
- 18-20/01/05 acqua alta, Munich (Germany)
- 27-28/01/05 NFT Colloquium, Garmisch-Partenkirchen (Germany)