

gigsa



The South African Chapter of the International Geosynthetic Society

Dedicated to the Scientific and Engineering Development of Geosynthetics and Associated Technologies

A newsletter of the Geosynthetics Interest Group of South Africa
In Association with the South African Institution of Civil Engineering

September 2002

President's Comment

This year started very well if controversy is a measure of excellence. From my position, viewing the activities in our geosynthetics industry during the first quarter of this year, it seems some of the aspects in the Zimbabwe elections and Australian Cricket Tour have at least something in common with our business.

"Sledging" as it is known, or the practice of criticising the opposition in an attempt to unsettle the opponent, is considered acceptable within limits. But what are the limits acceptable to us in our diverse industry? Not all players enjoy the same rules applied equally, and others are better at sledging! We have seen a geotextile supplier bringing complaints to committee over its opposition supplier's alleged misconduct with respect to statements on performance and equating materials. So too, have we heard a geomembrane contractor's complaints about its primary opposition using the SABS mark on imported materials that should have carried the ISO 9000 mark. There has been reaction and the transgression is being attended to.

But what of the second innings – already this year I have personally witnessed sledging being practised by the "big complainers". While one membrane contractor gladly shows an opposition's failure in its presentation to an engineering consulting firm, it objected to a co-presenter showing one of its installations having questionable installation performance. So too have I been "informed" by the geotextile supplier regarding claims that pure white polypropylene tapes in a woven geotextile have at least 1% carbon black.

Despite your committee's attempts at ensuring the game is played fairly, there are actions that just won't be seen by the umpires. New technology and independent observers may indeed add value but still will not resolve all incidents beyond doubt. So bear in mind, you as the third umpire specifying the product will have the responsibility and final say in judging the games play of

the day, no matter how much appealing and jeering is raised from the players or the crowd.

Best wishes!

Kelvin Legge
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GIGSA Awards – Call for Nominations

Gigsa implemented an award system to give due recognition to people in the industry. The awards may be made to individuals, or groups of individuals or companies who have made an outstanding contribution to the development or use of geotextiles, geomembranes, related products or associated technologies through their scientific and technological achievements in the following categories:

1. Development in Technology
2. Construction
3. Outstanding Service

The Awards recognise the achievements completed and/or the validity of which has been demonstrated during the year preceding the year of the Award (Categories 1 and 2). The awards will be presented at the GIGSA General Meeting to be held towards the end of this year.

At least one candidate must be a member of GIGSA. Each entry is restricted to a maximum of four persons. All GIGSA members are eligible with the exception of the members of the Awards Committee and the President of GIGSA.

Candidate nominations must be typed in English on plain paper (i.e., not letterhead paper) and submitted to the GIGSA Secretary (see address below) by 31 September 2002. The nomination should include:

- The category for which the candidate/s are nominated.
- A clear statement of the contribution of the candidate that is to be considered (e.g., if the contribution is a product, provide a clear definition of the product; if it is a paper(s) or book, provide a full reference for the paper(s)/book; if it is a report, provide a full reference for the report; if it is a construction method, provide a clear description of the method and any references, etc.).
- A statement indicating the originality and significance of the candidate's contribution to the discipline (i.e., in the field of geotextiles, geomembranes, related products and/or associated technologies).

Nominations may be made by any GIGSA member except for members of the Awards Committee. Any GIGSA member can nominate himself/herself for any award. Candidates who have been nominated will be contacted by the GIGSA Secretary. Candidates will be asked to agree to stand for an award and will be required to submit materials as directed by the Awards Committee. All nominations and award entries will be carried out in the strictest confidence by the GIGSA Secretary and the Awards Committee.

For further information contact:
Awards Committee Chairman
Liza du Preez
Tel 011 803 1455
liza@jaws.co.za

Submissions to be sent to:
GIGSA Secretary (Ms. K. Barnard)
P O Box 5930, Boksburg North, 1461
Tel 011 396-1975
geotexp@iafrica.co.za

No Gamble with Engineered Linings

The deployment of geosynthetic construction materials has become an accepted method for the construction of water features, lakes, biofilters, fountains, waterfalls and moats. **Engineered Linings'** activities at five major Casino complexes throughout South Africa confirm this.

At the five Casino complexes namely: **Grand West Casino in Cape Town, Boardwalk Casino in Port Elizabeth, Montecasino Entertainment World in Fourways, Carnival City Casino in Brakpan and the Lost City - Sun City complex**, geosynthetics were used for a wide range of applications to channel, filter, drain and to contain water.

The **Grand West Casino** moat is lined with a 1,5mm thick fPP "VITAFLEX" flexible polypropylene geoliner including detailed connections to the buildings and structures as well as the re-constructed "VICTORIA"

sailing boat so dominantly positioned at the Casino entrance. 10 000m² of geoliner was installed over a prepared sand bed and dressed to biofilter recesses in the moat floor. A 210g/m² of non-woven needle punched geotextile was installed as a liner protection before an assortment of different sized white river pebbles of 50mm diameter to 200mm diameter were carefully placed on top of the geoliner which is designed to accommodate the high multi-axial deformation requirements.

At the **Boardwalk Casino** the Boating, Retail and Chinese lakes totaling 17 000m² were lined with the well proven 1,5mm thick fPP "VITAFLEX" flexible polypropylene geoliner over a composite layer of 75mm compacted fill and 75mm of clean sand. The liner was securely fastened to the vertical walls, embankments and bridge support structures. The gunited walls and embankment, display a rockcraft finish and the edges of the Boating lake were protected with pre-cast concrete sleepers.

Within the **Montecasino Entertainment World complex** a river runs through sections of the Casino separating the gaming section from the retail areas. A double layer geolining system was chosen to waterproof the river bed, consisting of 4mm thick A.P.P modified membrane (secondary liner), covered with a woven 210g/m² drainage layer and a 2mm thick fPP "VITAFLEX" flexible polypropylene geoliner (primary liner). The primary liner is separated from the artificial rock finish by a 400g/m² needle punched polypropylene, alkaline resistant, geotextile liner protection layer. The same method of sealing was also used at four large fountains within the Casino complex.



Photo 1: Carnival City - Aerial View

A double lining system incorporating draining and filter layers was installed at the 10 000m² elevated lake areas above the double story M.V.G garage at the **Carnival City Casino complex** in Brakpan. The highly technical nature of this project required the deployment of cusped HDPE sheets, Flownet layers, PP AKS (anchor knob sheet), reinforced and unreinforced geoliners, biofilter liners, protective layers, woven and non-woven geotextiles. The water from the lake area

cascades over a 5 meter high and 160 meter wide waterfall into the biofilter moat below from where nine powerful pumps circulate the water back to the lakes above the parking garage. Dry and wetland islands as well as palm tree planters were incorporated into the entire system, and here again geosynthetic materials found their valuable uses. Geonets were installed to keep water birds and fish away from the waterfall area.



Photo 2: Carnival City - Lining of Water feature

At the **Lost City - Sun City complex** five hectares of ponds, rivers and wetlands were lined with a 1mm thick EVA geoliner underlaid with a 360g/m² non-woven needle punched geotextile, protection layer. This successful project having been in operation for so many years demonstrates once more the suitability of geosynthetics for construction projects of this nature. The success of this project led to the award of the other four contracts described above, to the same geosynthetics supplier and installer, **Engineered Linings (Pty) Ltd.**

Designers and Engineers should forget the perception that geosynthetics are a commodity solely used on the basis of price. Once Engineers use geosynthetics and utilise their properties correctly, it shows that geosynthetics are very reliable for a wide range of applications, as so clearly outlined on the projects mentioned above.

Materials Utilised:

Geoliner	:	100 000 m ²
Geotextile, Woven	:	3 000 m ²
Geotextile, Non-woven	:	57 000 m ²
Flownet (HDPE)	:	8 000 m ²

ACKNOWLEDGEMENTS:

Sun International Development , Tsogo Sun Holdings, SIP Project Managers, Mirage Leisure and Development, McIntosh Latilla Carrier and Laing, Ridler Shepherd Low, KAYP Consulting Engineers, North Point Architects, Llale Kekama Partnership, WBHO / Rainbow Construction, Bentel Abramson and Partners, Grinaker Taylor Woodrow, Bonnet Freeman Holley, Morgado and Associates, Stocks Construction, Walmsly Environmental Consultants, Chard Environmental

Consultants, Patrick Watson and Associates, Sibakhulu / Power Consortium, Emfuleni Resorts (Pty) Ltd, Rock and Waterscapes of California, Murray and Roberts / Inkamva / Metro JV.

Credit must be given to all parties concerned and to the **Engineered Linings'** construction teams for completing all these contracts on time and to the high standard of requirements.

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Visco-elastic Creep

Creep is defined as time dependent and permanent deformation of materials when subjected to a constant load or stress. Creep is normally an undesirable phenomena and is often one of the limiting factors in the lifetime of an engineered fabric reinforced retaining structure. It is observed in all types of materials. Generally, in polymeric structures, the presence of a crystalline structure within an amorphous matrix will reinforce the material, potentially reducing the tendency to creep. Therefore molecular structures influence the creep characteristics of different polymers.

When a constant load is applied to a polymer sample, deformation in the chain structure occurs. Different polymers have different chain structures. Polyethylene terephthalate (PET, a polyester) chain structure has a relatively complex, bulky chemical compositional structure relative to the polyolefin polymers such as polypropylene, LLDPE etc. An aromatic hydrocarbon group is part of the polyester polymer structure. This means that the polymer chains experience resistance to movement between themselves during alignment under a constant load. Creep safety factors between 2 and 2.5 is considered sufficient when designing polyester reinforcement systems. Polypropylene (PP) on the other hand has a linear chain structure. The monomer units are joined together end to end to form long single chains. Realignment of these chains under a constant load will continue more readily when compared to PET, prior to break. PP safety factors considered to compensate for a higher tendency for creep, should range from 4 to 5.

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Fully Geocomposite Liner installed for Walvis Bay Municipality

Walvis Bay Municipality in Namibia recently completed the construction of a "state-of-the art" waste disposal facility at its existing landfill site. The project comprised of upgrading the existing landfill to receive general waste, the construction of an entrance facility complex with provision for public dumping and recycling, the construction of fleet storage and maintenance facilities for the Municipality's waste management vehicles, the installation of a medical waste incinerator, and the construction of a hazardous waste disposal cell. The investigation and design of the new facility was carried out by Jarrod Ball & Associates in a joint venture with Africon Namibia, and the construction supervision was done by local consultant, WML Consulting. The main contractor was Namibia Construction, while the lining system was installed by Aquatan in terms of a nominated sub-contract agreement.

The hazardous waste disposal facility comprises of a 64m x 64m x 3m deep lined cell, which drains into a 16m x 16m x 1m deep leachate evaporation pond. Since Walvis Bay has an average annual rainfall of only 20mm, and an average annual evaporation of approximately 4000mm, the only leachate expected is from moisture contained within the wastes. The majority of the hazardous wastes are oil sludges and oily waters resulting from recycling of old oils from the shipping industry, as well as paint residues from ship shot blasting operations.



Photo 3: Walvis Bay Hazardous Cell Secondary Liner

Because of the absence of suitable clay in the area for use in a compacted clay liner, it was decided to install a fully geocomposite liner for the hazardous waste cell and the leachate pond. The liner was developed to comply with H:H liner design requirements in accordance with the Minimum Requirements. The layers of the landfill liner, working from the top downwards are as follows:

- Leachate drainage of 19mm stone, 250mm thick
- Protection layer of non woven geofabric (Belgotex BG300)

- Primary liner of 1.5mm thick HDPE geomembrane (Hi-Driline HDPE)
- Geosynthetic clay liner (Bentomat ST)
- Woven polypropylene geofabric filter (110g)
- Leakage detection layer (DN3 Flownet)
- Protection layer of non woven geofabric (Belgotex)
- Secondary liner of 1.0mm thick LLDPE (SD-VFPE)
- Base preparation layer of fine sand, 100mm thick



Photo 4: Testing of Double Wedge Weld

The leachate pond liner design is similar to the landfill liner, except that the primary geomembrane liner is 2mm thick, and the leachate drainage layer is replaced with a 100mm thick layer of stabilised sand that acts a ballast layer on the liner.

Because of the extremely dry climate and the fact that the GCL is sandwiched between two geomembranes and therefore isolated from any outside moisture, the consultant required the GCL to be prehydrated with potable water prior to installation of the overlying primary liner. This interesting challenge to Aquatan was achieved by means of spraying a measured amount of water lightly over the GCL. One of the benefits of using Bentomat ST for the GCL was that the granulated bentonite used in Bentomat made prehydration relatively easy.

The new hazardous waste facility was completed last year, however to date it has not yet been put into operation.

For further information contact:

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SABS

In June 2002 the SABS again held a meeting, to which role players on the geosynthetics industry were invited to discuss the fate of the current SABS 1526 specification for geomembranes. During this meeting it was agreed that a SABS specification is required for the industry but that the current version needed revision. A new working

group was therefore established to produce the revised specification. The working group consists of:

- ♦ Sandy Paterson (SABS)
- ♦ Du Toit Viljoen (Engineered Linings)
- ♦ Piet Meyer (Aquatana)
- ♦ Anton Bain (GIGSA)
- ♦ Peter Rappard (Ciba)
- ♦ Kelvin Legge (DWAF)

A need was also identified for a Code of Practice for the installation of geomembranes. In order to address this need a second working group was established to produce the Code of Practice for the Selection Criteria and Installation of Geomembranes – SABS 0409. The working group consists of:

- ♦ Sandy Paterson (SABS)
- ♦ Stan Jewaskiewitz (Knight Piesold)
- ♦ Liza du Preez (Jones & Wagener)
- ♦ Du Toit Viljoen (Engineered Linings)
- ♦ Piet Meyer (Aquatana)

The next meeting is to take place in October 2002. At the moment it is still early days, but watch this space for any updates on our progress.

Maccafferri (African Gabions): Marikana Platinum Mine – Site Visit

1 October 2002

Site visit to Marikana Platinum Mine organised by the SAICE Geotechnical Division for the construction of a 22,5m high Terramesh Reinforced Soil Wall.

For more information contact:

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Upcoming Events

GIGSA AGM and Reportback

27 November 2002

Development Bank of South Africa, Midrand, Gauteng

Details to follow

Wastecon 2002

30 September 2002 – 4 October 2002

ICC, Durban, Kwazulu-Natal, South Africa

Website: <http://www.wastecon.co.za>

E-mail: wastecon2002@iafrica.com

IGS 7th International Conference on Geosynthetics

22 – 27 September 2002

Nice, France

Tel: 0933 1 45 18 55 00

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Website: <http://7icg-nice2002.com>

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First African Young Geotechnical Engineers Conference

14 – 16 April 2003

Swakopmund, Namibia

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