GIGSA NewsLetter
FEB 2012 EDITION

The South African Chapter of the International Geosynthetics Society

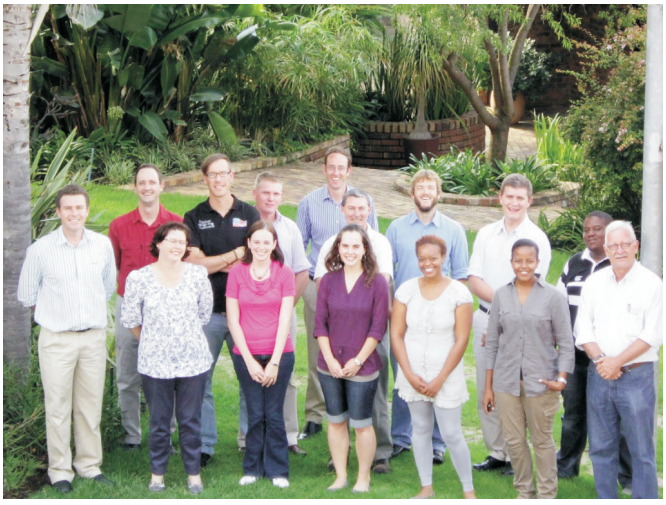
Established in 1994 and Dedicated to the Scientific and Engineering Development of Geosynthetics and Associated Technologies

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

PRODUCED BY GIGSA : www.gigsa.org

Some Implications of the New Waste Facility Regulations

South Africa has recently seen the publication of numerous new pieces of legislation and new regulations pertaining to the environmental engineering and management fields. These new regulations are generally more stringent than the legislation they replace, and if not considered, will result in an increased risk of falling foul of the law. Due to the nature and scope of the changes, at Jones & Wagener we have recognized the importance of having dedicated specialist teams in the Environmental Sciences and Environmental Engineering fields that are tasked with keeping abreast of the changes and then passing this information on to our clients as well as incorporating them in our designs.



The Jones & Wagener Waste and Tailings Team

Back row (L to R): Jonathan Shamrock, Shaun Devine, Pieter van der Smit, David Johns, Donovan Rowe, Mark Millar, Charl Cilliers, Mlungisi Motsa. Front row (L to R): Anton Bain, Riva Nortjé, Ina-Mari Prinsloo, Talia da Silva, Nondumiso Khumalo, Jabulile Msiza, Danie Brink

An example of particular interest to the GIGSA membership is the new landfill liner design standards. The liner designs included in the Department of Water Affairs & Forestry's Minimum Requirements for Waste Disposal by Landfill (Second Edition, 1998) will be replaced by those in the Draft National Standard for Disposal of Waste to Landfill issued for comment under the National Environmental Management: Waste Act (59/2008) (General notice 432, Government Gazette No 34414 of 1 July 2011), once finalized and promulgated. Key to the new philosophy is that the design must consider all the elements of the containment barrier system, as opposed to designing for individual elements in a recipe fashion. For municipal landfill sites there has been a significant increase in containment standards with the inclusion of a composite liner consisting of geomembrane and clay or geocomposite clay liner (GCL). This change is especially notable for sites that had previously been classified as being in water deficit areas. Hazardous waste landfills now require an additional secondary composite liner and a geotextile filtration layer above the primary leachate collection layer.

The inclusion of composite liners undoubtedly increases the environmental containment standards of these facilities. They do however introduce more potential interface failure planes, especially when applied to slopes, and increase the complexity of construction. Recent test work we have undertaken has demonstrated to us the importance of site specific friction interface testing on the actual geosynthetics to be used with the actual site soil. Basing a design on assumptions of interface friction angles, even if these were the results of previous test work on other sites, will increase the risk of a

BENEFACTOR MEMBERS (IN ORDER OF JOINING)
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Stefanutti Stocks Mining Services • Golder Associates • Rhino Geosynthetics • Total Terrain Lining Systems • AKS Lining Systems • Hefer Plant Hire cc

...continued

Some Implications of the New Waste Facility Regulations

Construction of a hazardous waste cell

lining system stability failure significantly unless extremely conservative data is used. The other implication is that designers need to communicate with clients the time and cost implications for undertaking this test work. There is currently a lack of suitable 300x300 mm interface shear box test equipment in South Africa, resulting in the tests being expensive as they have to be conducted overseas.

The standards for capping of waste facilities are also being revised at present with an initial authority and industry workshop held in 2011. The new standards will undoubtedly contain geosynthetic elements. Again the containment barrier philosophy will have to be applied with particular emphasis on interface friction design and the drainage of pressures below and on top of the geosynthetic elements in the cap to mitigate the risk of veneer failures.

We are excited about the prospect of applying the new standards. Although they introduce more complexity in the design stage, as well as technical challenges in the construction phase, they also represent an opportunity to raise the standard of work done in the geosynthetics field in South Africa to that of international best practice. The new standards will also significantly reduce both the environmental risks of our clients and the risk of contaminating our precious natural resources.

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Jones & Wagener
Consulting Civil Engineers

Prez Sez

Dear Members,

I wish you a belated but prosperous 2012!

We have not had our first committee meeting yet so current news and our planning for 2012 is not yet formalized.

We however aim to continue with our past endeavors and that is to host a two or three day seminar on a specific geosynthetic subject with a key international lead speaker. We have to date in my opinion covered the topics of quality control as well as barrier systems in substantial detail with Kerry Rowe and Sam Allan as our speakers. We would like to shift our focus to reinforcement systems with other specialist topics such as filtration as an addition.

The topic of Specifications received significant committee attention late last year and will continue to do so in 2012. We are developing specifications on two fronts. Firstly, we are working in conjunction with the SABS sub-committees: the aim is to adopt a suite of specifications form ISO and ASTM for geotextiles and geogrids in line with international practice. Note that the ASTM and GRI suite of specifications for Geomembranes have been adopted in the recent past by SABS and no further development is currently envisaged. GIGSA has developed a GCL specification that is in line with SANS 101200 some time back. This specification is currently being developed further for adoption by SABS. These tasks are by no means small nor easy and are being carried out by a handful of predominantly GIGSA members. The sub-committees are by no means full and anyone that is interested or willing to assist is more than welcome to join.

From the international front the IGS has made a significant step forward by becoming a member of the Federation of the International Geo-Engineering Societies (FedIGS). The FedIGS consist of:-

- the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), -
- the International Society of Rock Mechanics (ISRM),
- the International Association for Engineering Geology and the Environment (IAEG), and
- the International Commission for Irrigation and Drainage (ICID)

More detail on this can be found in the November IGS newsletter.

Regards,

Anton

“Perfection (in design) is achieved not when there is nothing more to add, but rather when there is nothing more to take away.” - Antoine de Saint-Exupéry

Geosynthetic Greetings,

Anton Bain
President

bain@jaws.co.za

“scientia potentia est” (Attrib Sir Francis Bacon)

The Geo Engineering Centre
Depth Beyond Knowledge™

Collaborative Project on the Long-Term Performance of Barrier Systems

Those readers who were fortunate enough to attend the lining workshops presented by Prof. Kerry Rowe in Gauteng and Namibia in September last year will be pleased to know that the Geo-Engineering Centre based at Queen's University in Kingston, Canada has a website where many of Kerry's erudite papers on barrier systems may found (a rare opportunity to source information that would cost thousands of Rands to obtain at conferences and seminars where information of this quality is presented).

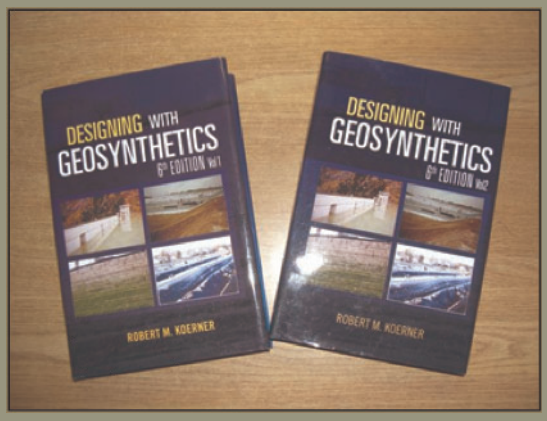
Designers who wish to keep up with the latest good-quality information on just about any aspect of barrier systems should visit http://www.geoeng.ca/BarrierSystemsPapers.html

If you are designing linings systems of any kind, you owe it to yourself to visit this site and arm yourself with the state-of-the-art knowledge to be found there. Don't be caught out - you can be sure that the regulator who will assess your designs for pollution control facilities is up to speed with what appears in these references.

Per GIGSA President Anton Bain's motto: "Scientia potential est ".

Peter Davies
GIGSA Representative
IGS Technical Committee on Barriers (TC-B)

Good News from Bob Koerner



The 6th edition of "Designing with Geosynthetics" is now available (two volumes), and the good news is that it's available electronically as a Kindle e-book from Amazon at around US$ 6.0 (currently about R 47) per volume (12 MB download per volume).

That's one heck of a difference to the hard cover cost of US$ 500 (before shipping from the USA) for the 5th edition !

For some important background info to all of this, See

http://www.geosynthetica.net/news/article/2012/Geosynthetics_NewEdition_013012.aspx

If you want it in hard cover, then the cost is around US$ 133 from Amazon (delivered in SA) for both volumes in library hardback. Bob Koerner has told us that the latest hard copy editions are cheaper than edition 5, because he has a new publisher who is less expensive than the previous organisation. It's cheaper in paperback but this is a book that gets used and I have doubts about how long that would last...

To order go to

http://www.amazon.com/s/ref=nb_sb_ss_i_2_28?url=search-alias%3Dstripbooks&field-keywords=designing+with+geosynthetics+6th+edition&sprefix=designing+with+geosynthetics%2Cstripbooks%2C850&rh=n%3A283155%2Ck%3Adesigning+with+geosynthetics+6th+edition&ajr=0

You can download a free Kindle reader for your PC or BlacKberry or iPad, or MAC etc. from

http://www.amazon.com/gp/feature.html/ref=sv_kstore_1?ie=UTF8&docId=1000493771

News Item by Peter Davies (with acknowledgements to Geosynthetica.Net)

Editorial Comment

Shale Gas Extraction

The proposed extraction of shale gas in the Karoo has (understandably) kicked up a hornet's nest of protest, inter alia about the contamination of water resources this activity can cause, and environmental groups have formed to prevent 'Fracking" exploration for this gas.

There are a number of sides to the story, and a lot of the reaction has been emotional rather than based on science. It would be a good idea to learn more about the process and the opportunities it presents in the field of geosynthetics if exploiting this resource ever does go ahead.

As usual, the Geosynthetics Institute think-tank has come up with some useful information that those interested in the environment (and geosynthetics) should study.

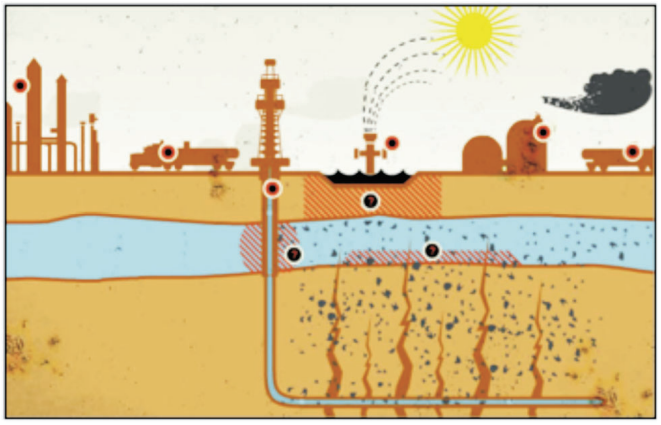
A GRI 26 page report "GRI White Paper #20 - Geosynthetic Opportunities Associated With Shale Gas Extraction" dated 8 August 2011 has been produced by Bob and George Koerner.

The paper's concluding remarks say "Natural gas projects (including actual drilling, the well pad, staging and parking areas, permanent and temporary roadways and access areas) are extremely large construction projects with enormous natural gas energy potential. They also have attracted considerable public and regulatory scrutiny.

That said, once permits are obtained, fast mobilization, deployment and operations are necessary. Within the entire activity a low profile and exposure is always an advantage. All of these aspects can capitalize on geosynthetics in a major way.

This White Paper has described many of these opportunities. Of course, and within acceptable environmental criteria, benefit/cost analyses are always required for alternative and competing systems. We feel that in so doing, geosynthetic materials will invariably be the obvious choice for many of these applications."

The paper (3.5 MB) is available here:
http://www.geosynthetic-institute.org/papers/paper20.pdf



Irene Nyirenda wins the IGS/GIGSA Student Award

In our last newsletter (November 2011) we called for entries for the IGS 2012 Student Award.

This award was established to disseminate knowledge and to improve communication and understanding of geotextiles, geomembranes, related products, and associated technologies among young geotechnical and geoenvironmental engineering students.

The award is made to one student per chapter (country) around the world. The student must be younger than 36 in the year of the award (i.e. 2012), and studying civil engineering in either the geotechnical or geo-environmental fields. The student must be or become a member of GIGSA, and the selected student must have been an undergraduate, M.Sc. or Ph.D. student during the period 2009 - 2012.

The award consists of a US$ 1 000 (worth around R 7 780) grant from the IGS that must be used to attend either the GeoAmericas 2012, EuroGeo5 or Geosynthetics Asia 2012 conferences on geosynthetics. In addition to this, GIGSA assists with payment of travel arrangements, typically up to an amount of R10 000. Three applications were received, and a special GIGSA selection panel was formed to ensure an unbiased selection process.

GIGSA's selection panel has announced that Irene Nyirende of Golder Associates Africa (who also happens to be GIGSA's committee member holding the Education & Events portfolio) has been declared the winner.

Congratulations Irene, and we look forward to publishing your report-back on the conference you attended!

Peter Davies

Geosynthetic Lining System Design versus Practical Installation: Lessons Learned

With the technical evolution of engineering design in conjunction with continuous advancement in materials technology, many projects are being stretched to new limits. This may involve impressive new theoretical designs, but does pose some minor, and sometimes major, practical implementation challenges during the construction phase. A liner design which may seem perfectly appropriate from purely a technical design perspective may prove to be un-constructible, or, at the very least, compromise other important aspects of the project eg. installed quality and durability, health and safety, or the system's integrity as a whole. Independent Construction Quality Assurance (CQA) personnel may be able assist in the elimination, or at least minimization, of construction delays and financial losses due to implementation constraints, as well as improving the overall installed quality and durability of the system through on-site problem solving activities.

Geosynthetic Liner Deployment Nearing Completion

The recent Kemapco Plant - Expansion of Waste Water Evaporation Ponds project illustrates this. The Kemapco plant, located in Aqaba, Jordan, already had in existence four geosynthetically lined waste water evaporation ponds, but required additional capacity to keep up with plant expansion. Two new identical ponds were constructed and commissioned, each designed with a waste water storage capacity of 900 000 m^3. Briefly, each pond design included:

- The pond perimeter was rectangular in shape, approximately 400m x 180m with a perimeter anchor trench 1m from the pond sides,
- Side slopes of 1:2,5 all approximately 75m in total length from top to bottom,
- Halfway up the slopes, a 6m wide bench was constructed to enable plant and vehicle access as well as the excavation of a ballasting trench for the geosynthetic lining system,
- Pond base (bottom) approximately 40m x 250m, with a total pond depth of approximately 30m.

The geosynthetic lining (barrier) system comprised (from the base upwards):

- Geosynthetic Clay Liner - GCL (bentonite content >4 200g/m2),
- 1.0mm double-side textured Secondary HDPE Geomembrane,
- Drainage Layer comprising a 100mm sand layer on the pond base and a Geocomposite comprising a geonet drainage core covered with geotextile protection and filter layers on the pond slopes,
- A 1.5mm single-side textured Primary HDPE Geomembrane.

At face value the design looks pretty straightforward and uncomplicated, however, many construction complications and delays occurred during construction and installation, some directly as a result of practical considerations. An understanding of the function of the lining system (i.e. lining system for an evaporation pond compared to that of a landfill or a 'storage tank') as well as the nature of the materials to be used is vital for the successful design and construction of any geosynthetic lining system. Different applications have different requirements and result in different lining systems behaviour. Although the engineering design organisation had been involved in the design and construction of the original ponds, an entirely new technical team were involved on the new ponds. The new ponds were designed with a much larger capacity, and were significantly deeper and with steeper side slopes, however, the tender specifications and design were very similar to that for the previous ponds, and could not always deal with the differences in terms of material capabilities and behaviour. Some of the issues that caused major delays and conflict are briefly discussed:

- Subgrade preparation: soil samples had been collected some years back, showing the

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subgrade to contain a certain percentage of clay, and it was therefore assumed that normal compaction techniques would suffice for both the cut and fill sections. During construction the subgrade was found to have very little, if any, cohesion. This in itself would not have been a major cause for concern, if not for the pond side slopes which required a smooth, well-compacted subgrade prior to liner deployment. The lengths of the side slopes (38m from the top to the bench, and then another 38m to the slope toe) in conjunction with the slope inclination (1:2,5), in addition to the practically un-compactable soil-type, made the use of normal construction plant i.e. roller compactor, very difficult as well as introducing a safety risk. The subgrade preparation methodology had to be abandoned in search of another process that resulted in lengthy construction delays as well as increased financial costs.

- *Material roll lengths:* the manufacturer's material packaging norms for handling and transportation must be considered, but more importantly, practical deployment. For this project, the specification stipulated GCL rolls with minimum lengths of 45m. Considering the slope design, this meant that overlapping would take place on the upper section of the bottom slope. Cutting and ordering the rolls shorter, i.e. 40m, resulted in overlapping within the ballasting trench, a much more secure location. This deviation from the design was, however, only accepted after much deliberation and consultation with the on-site CQA Engineer.
- *Material deployment:* cognisance must be taken of the manufacturers' installation requirements eg. the preferred method for GCL deployment is generally through use of a loader with a spreader bar attachment, however, the steepness, length and un-cohesiveness of the slope subgrade made this method too risky. Another less-satisfactory method was finally implemented, though not ideal.
- *Selection and changes of/to material types:* understanding the function and application of the complete lining system is crucial to selecting the correct layers, liner types and specifications eg. Carbon Black Content within exposed HDPE Geomembranes, selection of Non-woven versus Woven geotextile layers for GCLs, all play an important role in ensuring that the lining system functions optimally as a complete system.
- *Weather conditions:* timing of the construction phase of a project should be considered. In particular, large areas of HDPE geomembranes were installed and left exposed at times. Deployment in extreme, hot conditions, will result in bridging (with resultant stresses) during colder periods, and conversely, deploying during extreme, cold weather conditions, will result in excessive wrinkling during warmer periods (covering the geomembrane at that time would cause weak spots where wrinkles are folded over, thereby reducing durability).
- *Positioning of the ballast trench:* the position of the ballast trench on the bench (halfway up the slope) was revised in consultation with the CQA Engineer. Initially a box shaped trench, 60cm wide, 1m from the top of the bottom slope, was included in the design. This was changed to a trapezoidal shaped trench at the base (toe) of the upper slope, thereby reducing sharp bends on the lining materials, as well as completely eliminating potential bridging at the upper slope toe.
- *Natural drainage material:* again highlighting the need for adaptation in design when considering the lining system functionality, a 100mm thick layer of coarse gravel (fines removed) was specified for the pond base – to be placed directly on top of the secondary 1.0mm HDPE and directly underneath the primary 1.5mm HDPE geomembrane. The coarse material posed a definite puncturing risk to the geomembranes which would have resulted in the complete failure of the barrier system. A screened sand was finally approved for the drainage/protection layer in consultation with the CQA Engineer. Another point to consider is the type of material used in relation to the drainage/protection layer thickness. Certain material types will result in heavy plant used to place the material getting stuck, resulting in extensive damage to the underlying lining materials.

All of the above are examples of design specifications that had to be modified during the construction phase in order to enable the practical execution of the design and/or to ensure that the overall integrity of the project was not compromised. The use of independent CQA services can assist in verifying the design, whilst ensuring the construction of a geosynthetic lining system of optimum quality and workmanship.

For more information contact:

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Envitech Solutions (Pty) Ltd

e-mail: brendon@envitech.co.za
web address: envitech.co.za

Geosynthetic Standards and the Tower of Babel

International Organization for Standardization

""Behold, they are one people, and they have all one language, and this is only the beginning of what they will do. And nothing that they propose to do will now be impossible for them. Come, let us go down and there confuse their language, so that they may not understand one another's speech."" (Genesis 11:5-8)

Nowadays there are many languages around the world, creating a barrier in communication and understanding, as it is difficult to work together and strive for a common result without talking the same language (I know it personally!) If we extend this situation to the world of geosynthetics we can understand why in Italy, a geotextile is specified differently to in Brazil or South Africa.

ISO was officially founded in 1947 and a principal objective was "*to facilitate the international coordination and unification of industrial standards*". ISO stands for "International Standard Organization". However in different languages the acronym might change, therefore they found a worldwide meaning: "ISO", is derived from the Greek isos, which means "equal". Whatever the country, whatever the language, the short form of the organization's name is always ISO[1].

The aim of ISO is to facilitate one world language where, in an industry we speak the same language. For many years the ISO 9000 series (now 9001) has been promoted throughout the world as the quality management standard to follow. Every industry that is registered ISO 9001 means that a manufacturer in Mexico follows the same quality procedures as a manufacturer in Australia or South Africa.

In geosynthetics, ISO is active through Technical Committee 221 (TC 221). Since inception in 2000, TC221 has developed 32 geosynthetic standards and currently there are 4 working groups for the implementation / review of main topics such as durability and mechanical properties.

In South Africa the ISO partner is the South Africa Bureau of Standards (SABS) and its Technical Committee 59J holds the responsibility of developing geosynthetics standards in liaison with organizations such as GIGSA and IGS.

Currently there are few SANS geosynthetic standards available and most of them are out of date. If you search the SABS for a definition of geosynthetics you will not find one. In contrast, of the first ISO standards developed was *ISO 10318: Geosynthetics – Terms and Definitions*, issued in 1990.

The scope of ISO 10318 includes: *"… defines terms related to functions, products, properties and other terms, as well as symbols applying to geosynthetics. Definitions of terms not included in this standard may be found in the standards describing appropriate test methods"*, and the first definition is geosynthetics!

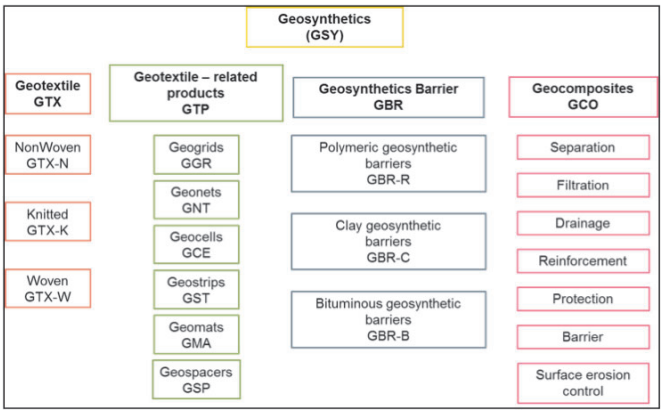
The implementation of ISO standards will assist South African designers to work in harmony with the Eurocode 7 design codes, developed by the European Committee for Standardization (CEN). These are already harmonized in SANS 10160, with references to ISO standards.

The need for standardization in geosynthetics is clear. To promote quality products, certified installations and correct testing procedures SABS TC59J has formed the following working groups:

- WG3: Geomembranes
- WG4: Clay Geosynthetic Barriers
- WG5: Geotextiles
- WG6: Geogrids

The Chair of the working groups intends to accomplish the required tasks involved in updating geosynthetic standards in South Africa within the next 6 months, as recommended by the SABS.

Once accomplished, South African geosynthetic industries not already ISO 9001 - accredited will be able to produce products in line with worldwide standards, South African designers to design in accordance with the latest design philosophies based on ISO standards; and worldwide clients to trust South African geosynthetics.



ISO 10318:2006 – Geosynthetics terms and definitions

References:

(1) www.iso.org

(2) ISO 10318:2005 Geosynthetics – Terms and definitions.

(3) SANS 10160: Basis of structural design and actions for buildings and industrial structures

Submitted by Edoardo Zannoni

Chair: GIGSA Specifications Subcommittee

edoardo.zannoni@maccaferri.co.za

A Familiar Face in a New Place

Paul Pratt joined the Kaytech Engineered Fabrics team as Technical Manager in January this year.

After completing his BSc Geology degree at UKZN, Paul worked for 3 years in the Civil Engineering Department of Transnet. During this time, he was involved in various geotechnical investigations for structures, tunnels and rail routes.

Since leaving the railways, Paul has acquired more than 18 years experience in the promotion, sales and marketing of geosynthetics in Sub-Saharan Africa, including technical aspects relating to their use in civil engineering applications.

Paul also has previous experience in geosynthetic product development and has a good knowledge of textile manufacturing processes, gained from an 8 year involvement in the sale of textile machinery.

His experience in Geosynthetics, product development and his knowledge of textile manufacturing processes will stand him in good stead as Technical Manager at Kaytech, where his main focus will be on product development.

Paul@kaytech.co.za
083 281 0078

Everyone needs to believe in something. I believe I'll have another beer
Editor

The Editor

Peter Davies
GIGSA Newsletter Editor

The GIGSA Newsletter is published on a sort-of-quarterly basis. Contributions and compliments eagerly received. Criticism may take some time to respond to…

Send your contributions, comments and suggestions for the GIGSA newsletter to the Editor at: peter@kaytech.co.za

CONFERENCE CALENDER 2012

some important Geosynthetic Seminars and Conferences in 2012

PIANC – COPEDEC VIII

EIGHTH INTERNATIONAL CONFERENCE ON COASTAL AND PORT ENGINEERING IN DEVELOPING COUNTRIES

IIT MADRAS, CHENNAI, INDIA, 20-24 FEBRUARY 2012

http://www.pianc-copedec2012.in/

The Indian Institute of Technology Madras (IITM) is pleased to host PIANC-COPEDEC VIII on the IITM campus, Chennai from 20 to 24 February 2012. The conference has already made an enormous global contribution towards empowering coastal and port engineering communities in developing countries to take charge of their own development. The merger of PIANC and COPEDEC has greatly enhanced world-wide professional interest and participation in the Conference now under the banner of PIANC-COPEDEC.

The leading role India is playing in contributing to and catalysing the global post-recession recovery, with massive investments in transport infrastructure including ports, makes it the right time for us to host PIANC-COPEDEC VIII at IIT Madras, India's Centre of Excellence in Coastal and Ocean Engineering.

FEBRUARY

Geosynthetic Institute

A Number of One-day Courses on Geosynthetics

To be held in March 2012 in Folsom, Pennsylvania, USA

Instructors: Bob Koerner and George Koerner

http://www.geosynthetic-institute.org/courses.htm

MARCH

International Erosion Control Association

The South African chapter of the International Erosion Control Association (IECA-SA) is pleased to present a Training Workshop on the management of Erosion and Sediment movement, including slope stability problems specifically related to roads. The Workshop will be held at the Didima Conference Facility of Ezemvelo KZN Wildlife in the Cathedral Peak region of the Ukhahlamba Drakensburg Park. Dates: 15-19 April 2012

For more informationplease use the contact details below:

Phone: 083 453 0600, Fax: +27 (0)12 323 1157
E-mail: ieca.safrica@gmail.com Website: www.ieca.co.za

APRIL

GEOAMERICAS 2012

Second Pan American Congress

Geosynthetics

Lima - Perú 1st - 4th of May

Organizes: IGS Perú

http://www.geoamericas2012.com/inicio_eng.html *The premier geosynthetics event for 2012.*

MAY

ASTM INTERNATIONAL

Standards Worldwide

http://www.astm.org/SYMPOSIA/filtrexx40.cgi?+-P+EVENT_ID+2081+/usr6/htdocs/astm.org/SYMPOSIA/callforpapers.frm

Third Symposium on Current and Future Practices for the Testing of Multi-Component Geosynthetic Clay Liners – 29 June 2012

JUNE

euro GEO 5

www.eurogeo5.org

EuroGeo 5 – Valencia Spain – 16-19 September 2012

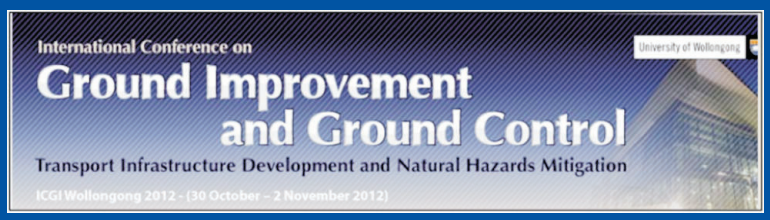
http://www.eurogeo5.org/index_i.php

The International Geosynthetics Society (IGS) has organized the "EuroGeo" European Congress for the past 15 years via the respective national chapters. The first Congress was held in Maastricht, followed by EuroGeo2 in Bologna, EuroGeo3 in Munich, and EuroGeo4 in Edinburgh in 2008. The next EuroGeo, EuroGeo5, is being organized by the Spanish IGS Chapter, which has set the City of Valencia as the venue.

SEPTEMBER

CONFERENCE CALENDER 2012

some important Geosynthetic Seminars and Conferences in 2012



http://www.icgiwollongong.com/index.cfm

"This Conference will act as a platform to disseminate the most recent research and field advances to the geotechnical community around the globe and is expected to be the biggest Ground Improvement conference to be held in Australia. Outstanding keynote lectures, State of Art (SOA) presentations, heritage lectures and numerous technical discussions will contribute three days of scientific and technical discourse followed by attractive excursion encompassing the natural landscape of the south coast of New South Wales."

OCTOBER

GA2012

GEOSYNTHETICS ASIA 2012

5th Asian Regional Conference on Geosynthetics

10 to 14 December 2012 Bangkok, Thailand

Deadline for Submission of Abstracts to GA2012: 31 May 2011

http://geosynthetics-asia2012.com/

DECEMBER

APRIL 2013

http://www.geosynthetics2013.com/index.cfm

GRI-25: A 25-Year Retrospective of Geosynthetics and Glimpses Into the Future. Geosynthetics 2013 is honoured to host the annual GSI Conference (GRI-25). Speakers will address the history and background of environmental and transportation regulations; resin and additive developments; manufacturing of all of the different types of geosynthetics; ASTM, ISO and GRI standards developments; development of generic specifications; progression of design methods; trends in contracting; and institutional developments like IGS, NAGS, GSI, GMA, etc... etc.

International Symposium on Design and Practice of Geosynthetic-Reinforced Soil Structures

Faculty of Engineering, Bologna University, Bologna, Italy: 14-16 October, 2013

http://www.civil.columbia.edu/bologna2013/

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