IGS NEWS

NEWSLETTER OF THE INTERNATIONAL GEOSYNTHETICS SOCIETY

Dedicated to the scientific and engineering development of geotextiles, geomembranes, related products, and associated technologies

VOLUME 24, NO. 3 **November 2008**

25th Anniversary of IGS 1983 - 2008

Content

Deadline extended! - Call for Abstracts for 9th International Conference on Geosynthetics

For the 9th International Conference on Geosynthetics (9ICG, Brazil, 23 - 27 May 2010) the Call for Abstracts is extended.

Abstracts of individuals can be uploaded at www.9icg-brazil2010.info before January 15th 2009 (extended deadline)

Papers may cover any of the topics listed in the full announcement for 9ICG on page 15.

The abstracts are limited to 500 words. According to the regulations of the International Geosynthetics Society, an author can have only one paper with his name as the 1st author (no limit for papers as co-author).

In addition, chapters of the IGS can submit up to 10 papers on "Case Histories of Geosynthetics Engineering Practice" in addition to submissions from individuals.

Abstracts of IGS Chapters can be uploaded at www.9icg-brazil2010.info before February 28th 2009

President's Corner

Fumio Tatsuoka

I was invited by the German Geotechnical Society to make a keynote lecture at the latest German Geotechnical Conference (Baugrundtagung), which took place as a jubilee event (i.e., the 30th Baugrundtagung), 24 - 27 September 2008, in Dortmund. This conference takes place once every two years. I was invited in particular to introduce the Japanese state-of-the-art on geosynthetic reinforced earth structures. The title of my lecture, which was made in the morning of 26th, is "Recent developments in practice and research of geosynthetic-reinforced earth structures in Japan". The abstract is: *The construction of permanent geosynthetic-reinforced soil (GRS) retaining walls (RWs) with a full-height rigid facing for railways, including high-speed train lines, and also highways started about twenty years ago in Japan. The total wall length is now more than 100 km. Many RWs of this type were also constructed replacing traditional type RWs and embankments that collapsed during recent earthquakes and heavy rainfalls. Many bridge abutments with geosynthetic-reinforced backfill were constructed. The latest version, called the GRS integral bridge, comprises a continuous girder integrated to a pair of Reinforced Concrete (RC) facing with the backfill reinforced with geosynthetic reinforcement layers firmly connected to the back of the facing.* I hope that I could promote somehow Geosynthetics Engineering among the German Geotechnical Society.

I was very impressed by the large number of participants (nearly 1,000) and the large scale exhibition, and the fact that many of our German IGS colleagues are deeply involved in the organization; the technical sessions as well as the exhibition of the conference. One of our German IGS colleagues, Prof. Georg Heerten, is now Vice President of the German Geotechnical Society. I also visited Dr. Dimiter Alexiew of HUESKER Synthetic GmbH (one of our IGS corporate members) and several executive members of NAUE GmbH & Co. (another IGS corporate member) and Prof. Martin Ziegler at Institute for Geotechnical Engineering RWTH of Aachen University to discuss on a number of technical issues of the geosynthetic-reinforcing technology.

The last September was indeed one of the busiest months recent years for me by visiting Edinburgh, Atlanta (for the fourth International Conference on Deformation Characteristics of Geomaterials, organized by TC 29, ISSMGE) and then Dortmund.

Being invited by the Mexican Society for Soil Mechanics, I visited Aguascalientes, Mexico, to do the 19th Carrillo Lecture, which is the most prestigious geotechnical engineering lecture in Mexico, on 29th November 2008. The title of the lecture is "Geosynthetic-reinforced soil structures: A cost-effective solution combining two engineering disciplines." I did my best to promote Geosynthetics Engineering in the Mexican Geotechnical Society.

Fumio Tatsuoka
IGS President

The 25th Anniversary of IGS

Daniele Cazzuffi

It is really a pleasure for me to introduce this issue of IGS News, the first section of which is dedicated to the 25th anniversary of IGS, founded in Paris on November 10th, 1983.

This issue of IGS News should not be viewed as a self-celebrative report of our Society, but on the contrary it should communicate to the younger generation, in particular through an historical overview, the key-factors of the success of our discipline: personal enthusiasm, technical competence and professional dedication.

The personal enthusiasm, in fact, is a key issue to explain the success of a discipline, but it would be not enough, if not accompanied by technical competence and professional dedication.

To give evidence of it, two "champions" of IGS declared their availability to contribute to this special issue: thus, in the following articles, J.P. Giroud, Past President and founder of IGS, is illustrating the historical origins of our society and is also presenting a challenge for its future developments, while Peter Stevenson, present Secretary and Officer in service for the past 24 years, is giving us a wonderful "spectrum" of the extraordinary people he has known in that period.

From my personal perspective, I have to say that I have learned a lot from both of them in my 18 years in the IGS Council: J.P. and Pete were and are always available to give suggestions for the proper manner to run the society and, in particular, to motivate the membership, both individual and corporate.

As I wrote in my article in occasion of the 20th anniversary of IGS (see "IGS News" of November 2003), it was in fact not easy to maintain the same enthusiasm during the "service life" of our society : economical constraints, companies merging and aggressive markets on the commercial side, reluctance to adopt a novel technologies, concerns on durability and lack of consistent international standards on the technical side, are only few examples of the main difficulties encountered by geosynthetics professionals all around the world in these 25 years. But the answers, mainly given by the same IGS membership, were always positive: to realise it, it is enough to think how many new categories of products and/or technologies of application have been successfully developed by the geosynthetics manufacturers and contractors , or how many new design and/or test methods have been proposed and used , really all around the world.

In celebrating the 25th anniversary of our society, we need to realise that it is mandatory, for a bright future of IGS, to look forward to helping and assisting young generations to pursue, develop and expand the present reputation of the IGS, as a respected professional international society, recognised all around the world, also thanks to the achievements described in the following historical articles on the "fabulous" first quarter of the century of IGS.

And finally, a last provocative suggestion: why not a gathering of "pioneers" and young generations, manufacturers and academics, geotechnical engineers and polymer scientists, etc., for a huge party in Paris on November 10th, 2013, on the occasion of the 30th anniversary of our society?

Let's start the organisation: "la ville lumière" is waiting for us!

by Daniele Cazzuffi , IGS Immediate Past President

The origins of the IGS and a challenge for the future

J. P. Giroud

Introduction

In 1993, on the tenth anniversary of the IGS, I was told: "You started the IGS 10 years ago, but today, even if you wanted to stop it, you could not." In a nutshell, it was the best measure of the success of the IGS: we cannot stop it.

How could we stop the thousands who attend conferences and meetings sponsored by the IGS or its chapters? How could we stop the thousands who read IGS News and the two official journals of the IGS? How could we stop the many thousands who use geosynthetics and benefit — directly or indirectly — from the IGS? Certainly, hard work by a few is necessary to keep the society running, but, clearly, the IGS is beyond the point of no return because it has reached the critical mass: there are volunteers to accomplish the essential tasks required by the management of the society, there are volunteers to participate in the committees emanating from the IGS, there are volunteers to organize regional and local activities under the auspices of the IGS, there are volunteers to organize international conferences, etc.

Clearly, the IGS plays an essential role in the geosynthetics discipline. And, since the geosynthetics discipline is an essential component of civil and environmental engineering,

the IGS is now recognized as one of the main professional societies in these fields. However, the IGS is more than "another" professional society. As shown herein, the IGS meets the specific needs of a very original engineering discipline, a discipline focused on a material - the geosynthetics - which results in multiple interrelationships such as: users-suppliers, design-testing, specifiers-manufacturers, geotechnical engineers-polymer scientists, etc.

Today, the IGS is so well established that many of its members take it for granted and do not properly appreciate the many benefits provided by the society. Therefore, a history of the origin of the IGS may help members of the geosynthetics discipline (not only IGS members) understand how fortunate they are to have the IGS, a professional society that meets the needs of an original discipline and provides benefits that have become so natural that they are too easy to forget. The 25th anniversary of the IGS provides a timely opportunity to remember its origins.

The Concept

The organization of the second international conference on geotextiles, held in 1982, prompted discussions on the formation of an international society. On 23 June 1980, in Chicago (USA), I was chairing a meeting of the organizing committee appointed a few weeks before at a meeting of the American Society for Testing and Materials (ASTM) to organize "an" international conference on geotextiles. An important item on the agenda was the selection of the name of the conference. We considered the name "Second International Conference on Geotextiles", thereby recognizing the precedent set by the International Conference on the Use of Fabrics in Geotechnics held in Paris in 1977 and setting a trend for future conferences. However, one member of the committee objected that, since the conference held in Paris was not called the "first" conference, it was not appropriate to call our conference the "second". To which I replied that a good husband would not call his wife "my first wife" while he is married to her. In other words, it makes sense to start numbering with the second. The name of the conference was adopted and the minutes of the meeting read:

"The official name will be Second International Conference on Geotextiles. This name implies that the conference held in Paris in 1977 is recognized as the first one and that a third conference could be organized in 1986 or 1987. Also implied is that an International Society on Geotextiles should be created."

Clearly, the concept of an International Society on Geotextiles is closely associated with the organization of international conferences. Also, the above anecdotes and the anecdotes that follow show that the concept of the IGS emanated from people actively involved in this new discipline. As a result, the society was formed with a deep understanding of the needs of the new discipline. This explains in great part the remarkable success of the IGS. In contrast, if the IGS had been created as a sub-division of an existing professional society in the field of civil engineering, the specific needs of our discipline could have been marginalized, and this kind of IGS may not have survived.

A preliminary Step

An essential first step in any international activity is to generate interest in as many countries as possible. The first opportunity came with the Swiss Symposium on Geotextiles scheduled for March 1982. On 30 January 1982, I called from the United States Professor Charles Schaerer (Switzerland), the organizer of this one-day symposium, and suggested that a meeting be held to discuss the "creation of an international society on geotextiles", as stated in the letter of confirmation sent the next day. Professor Schaerer, always enthusiastic, agreed to organize the meeting, and both of us invited key geotextile specialists from European countries. The meeting held in Zurich on 4 March 1982 (on the eve of the Swiss Symposium) was attended by 25 participants from 7 countries. I started the meeting by presenting what could be the goals and the organization of an international society and, after discussion, all agreed that an international society on geotextiles should be formed. Professor Schaerer prepared the minutes of this historic meeting.

Having secured the support of key European professionals, I presented the concept to North American professionals at a meeting held in conjunction with a meeting of the ASTM in Toronto (Canada) on 25 June 1982. The participants of the Zurich and Toronto meetings were invited to attend a meeting to be held in Las Vegas (USA) in conjunction with the Second International Conference on Geotextiles.

Clearly, from the very beginning, the formation of the IGS was carefully prepared on the basis of international consensus. This gives the IGS an authority that is recognized world-wide. Also, this international consensus paved the way for the success of the Las Vegas meeting.

The Decision

The meeting held on 4 August 1982 in Las Vegas was an impressive success with 150 participants from 34 countries, according to the minutes prepared by Professor Ara Arman (USA). After I presented the concept of an international society on geotextiles, a couple of participants asked if there was really a need for such a society. Their questions turned out to be extremely useful, because they gave me an opportunity to reiterate some key points in favor of a society and call for a vote at an early stage of the meeting. This crucial moment in the infancy of the IGS is recorded as follows in the minutes:

"Dr. Giroud asked that the assembly vote on the desirability of such a society, and he asked for a show of hands. The majority of approximately 150 participants voted for the formation of such an organization. There were a few abstaining votes and no opposition."

At that moment, everybody in this international assembly knew that an international society on geotextiles would be formed. The rest of the meeting consisted of long discussions on the formation of an Interim Committee and the tasks of the committee. In particular a quasi-unanimous vote (one against, no abstention) indicated that, in addition to preparing the by-laws of the society, the interim committee would select the venue of the Third Inter-

national Conference (no discussion about the numbering!) and a vote was taken for the date of the Third Conference: 14 votes in favor of three years after the Second Conference, 19 votes in favor of five years, and the rest of the approximately 150 participants in favor of four years. This confirms the close link between the society to be formed and the organization of international conferences. Today, many tend to consider that the international conferences come automatically every four years. In reality, it was crucial to work hard to generate an international consensus around the concept of international conferences every four years. Also, the fact that the authority of the IGS is recognized world-wide has facilitated on several occasions the delicate selection between several good country-candidates for the venue of an international conference.

From the above narration, it is clear that the decision to form the IGS was truly international. The fact that 34 countries were represented in the decision to form the society is absolutely remarkable for a young discipline.

The Official Formation

In 1982-1983, the Interim Committee worked diligently under the chairmanship of Professor Schaerer. In particular, an important task was the preparation of the by-laws of the society. Most of us take these by-laws for granted or think that they are standard by-laws applicable to any professional society. In reality, the by-laws were carefully tailored to the needs of our emerging discipline and are in great part responsible for the rapid success of the IGS. To those who tell me “there would be no IGS without you” I always reply “the IGS would not be what it is without Guy Massenaux”. Indeed, he was the main author of the visionary by-laws that closely associate corporate and individual members. It is clear that the geosynthetics discipline would not exist without geosynthetics and geosynthetics would not exist without the manufacturers. Guy Massenaux (Belgium) devised the mechanism that associates the manufacturers to the functioning of the IGS, with the weight that is relevant to their essential role. In fact, the corporate membership masterfully devised by Guy Massenaux has attracted to the IGS, not only manufacturers, but also civil engineering contractors and other large organizations, which has been highly beneficial to the IGS and the geosynthetics discipline. Guy Massenaux should also be given credit for the excellent IGS logo.

On 10 November 1983, 14 of the members of the Interim Committee met in Paris (France) for the official founding of the International Geotextile Society - the IGS - which occurred at 16:08 according to the minutes of the meeting. The list of those present at the inaugural meeting may be found in IGS News, Vol.5, No.2, July 1989, page 2. A group of members had prepared nominations for officers. Professor Schaerer, who had played an active role in the original meeting in Zurich and who had chaired the Interim Committee was the logical choice for president to ensure continuity until the first General Assembly to be held in 1986 on the occasion of the Third International Conference. Guy Massenaux was the obvious choice as the secretary, and, to my great surprise, my name was on the slate as past-president! The group explained that their intent was to recognize what I had done for the formation of the society. However touching the intention was, I did not agree. I thought my role in IGS should be more in the future than in the past and was very honored in 1986 to be the first president elected by a General Assembly held at an international conference. Other presidents have followed - Kerry Rowe (Canada), Colin Jones (UK), Richard Bathurst (Canada), Daniele Cazzuffi (Italy), and now Fumio Tatsuoka (Japan) - and under their guidance (and with a variety of style that attests to the vitality of the IGS) the society has developed its activities and established its international reputation, while Pete Stevenson (USA) has ensured continuity, being the longest serving IGS officer, as treasurer then secretary for many years.

Extension

Until 1983, even though geomembranes were already used in many projects, they had somehow stood aside from the excitement caused by the great variety of applications of geotextiles. As a result, the focus in 1982-1983 had been on the formation of an International Geotextile Society and the organization of International Conference on Geotextiles.

However, it quickly became apparent that geomembranes and other synthetic materials belong to the same discipline as geotextiles. In fact, in the wake of the success of the Second International Conference on Geotextiles, an International Conference on Geomembranes was being organized. This conference was to be held in 1984 in Denver (USA). As I was chairing the organizing committee of that conference, it had been easy to schedule a meeting where “a proposal from the existing International Geotextile Society will be made” regarding “the possible addition of geomembrane professional interests within the existing society or forming a new geomembrane society”, according to the conference program.

The meeting, which took place on 23 June 1984, was attended by 57. I indicated that the IGS Council had agreed to broaden the scope of the IGS to include geomembranes. It was decided to form a committee composed exclusively of geomembrane specialists from seven countries, co-chaired by Piero Sembenelli (Italy) and Robert Wallace (USA). The committee met the next day and accepted the offer from the IGS. The by-laws of the IGS were then amended to include not only geomembranes, but also all related products. In particular, it was agreed that, since geotextiles, geomembranes and related products belong to the same family of materials, they should be discussed at joint conferences. As a result, the scope of the IGS was extended to “geomembranes and related products” and the Third International Conference on Geotextiles, held in Vienna (Austria) in 1986, included papers on geomembranes and related products.

The 1990 international conference was called Fourth International Conference on Geotextiles, Geomembranes and Related Products. Clearly, all geosynthetics were then

members of the family and the time was right for a name change. In 1992, the IGS Council agreed to change the name of the society from International Geotextile Society to International Geosynthetics Society (thereby keeping the same acronym, IGS, an important consideration). Consequently the name of international conferences became International Conference on Geosynthetics, starting with the Sixth International Conference on Geosynthetics in Atlanta in 1998. Also, the scope of the society was broadened to incorporate associated technologies.

It is important to note that the extension of the scope of the society was made with the same spirit as the formation of the IGS: it was not a decision imposed from the top; it was a decision made by representatives of the industry.

The IGS at Work

In 25 years, the IGS has grown remarkably. Today, the IGS has more than 2000 members, including more than 125 corporate members and about 100 student members. During this period, the IGS has accomplished a lot, including: six international conferences in Vienna (Austria), The Hague (The Netherlands), Singapore (Singapore), Atlanta (USA), Nice (France) and Yokohama (Japan), in addition to the two international conferences that preceded the formation of the IGS, in Paris (France) and Las Vegas (USA); coordination of regional activities, including regional conferences, in Europe, Asia, Africa and the Americas; development of chapters and chapter activities in 32 countries or group of countries; an awards program with special emphasis on awards encouraging young members of the discipline including students; promotion of education, preparation of educational tools (CDs, Videos), and dissemination of technical documents (books, proceedings, bibliographies, etc.); preparation of a comprehensive terminology and list of symbols, an essential tool to ensure consistency in our discipline; and active cooperation with other professional societies to promote the use of geosynthetics and the technical and scientific work of members of the geosynthetics discipline.

Thanks to its activities, the IGS is, and will be, present in all parts of the world where the geosynthetics industry is vibrant. For example: in China in 2008, with GeosyntheticsAsia held in Shanghai; in South Africa in 2009, with GeoAfrica to be held in Cape Town; and in Brazil in 2010, with the 9th International Conference on Geosynthetics to be held in Guarujá (São Paulo). Also, the IGS starts planning for the regional conferences scheduled in 2012, i.e. GeoAmericas, EuroGeo and GeosyntheticsAsia, to be held respectively in Lima (Peru), Valencia (Spain) and Bangkok (Thailand).

The IGS has been very active in the dissemination of information, which is its primary goal. IGS News, the indispensable newsletter of the geosynthetics discipline has been published regularly since 1985, and the IGS has two official technical journals, Geotextiles & Geomembranes and Geosynthetics International. It is noteworthy that these two journals are ranked by specialized organizations among the very best journals in the field of geo-engineering. The reasons are simple: the geosynthetics discipline is the most exciting branch of geo-engineering; and the editors and editorial boards of these two journals are driven by the same enthusiasm that drives the IGS officers and Council members. It should be noted that dealing with the official journals has required a significant amount of work from the IGS officers, in addition to the work done by the editors (whereas many people may think that technical journals are smoothly, and somehow automatically, run by their publishers). [More details on the history and activities of the IGS may be found on the IGS website, www.geosyntheticssociety.org]

Conclusion and Challenge

The geosynthetics discipline is a remarkable discipline. Geosynthetics have been the most important innovation in the field of geotechnical engineering in the second half of the 20th century. With their multiple applications, geosynthetics have pervaded all branches of geotechnical engineering. As a result, today it is impossible to practice geotechnical engineering without geosynthetics. Such an outstanding discipline deserves an outstanding professional society. With the IGS, the geosynthetic discipline has the outstanding international society that it deserves.

However, there are still some people who ask if it was really necessary to create “another” international society rather than joining an existing society. History shows that the right decision was made. No existing society would have treated, as equals, scientists, engineers, manufacturers, contractors, etc. No existing society would have provided an open forum for civil and environmental engineering and the synthetics industry as the IGS does. No existing society could command the authority that is conferred upon the IGS. The IGS enjoys this authority because every member — individual and corporate — knows that the IGS emanates from all of us, in a very open manner. Without the authority of the IGS, some dispute on the venue of an international conference or other matter would have already split our profession into geographic and/or interest groups.

Today, we tend to take the IGS for granted. May the anecdotes and the historical facts evoked above help our young members understand where we come from and realize that, without the IGS, and without the considerable amount of work involved in the formation and the development of the IGS, their profession would be different today, and would certainly not be as well organized as it is. Geosynthetics engineering is now a respected discipline that attracts outstanding professionals, in great part because the IGS has given this discipline a foundation and a prestige that are universally acknowledged.

This impressive success of the IGS should not be taken for granted forever. Also, what was a great achievement yesterday may not be a model for tomorrow. The great achievement of the pioneers who laid the foundations for the remarkable success of the IGS was to bring together polymer scientists and geotechnical engineers, textile or plastic manufacturers and earthwork contractors, civil engineering design firms and material suppliers. But this should be considered a first step, not a final goal. Unfortunately, we

have been so successful at bringing people together that we tend to keep together. As a result, today we have a new challenge. The challenge is to open our discipline to the outside world. The challenge is education as much as innovation; and the teacher becomes as important as the researcher. This is a challenge for the young members of the IGS. We, the pioneers, met our challenge which was to bring together all people interested in geosynthetics to create a discipline. Young members of the IGS, your challenge is to bring this discipline to the world, to disseminate information.

Our challenge was to converge. Your challenge is to diverge.

Young members of the IGS, you must meet your challenge. And, if you do, I can predict a bright future for geosynthetics and the IGS.

By J.P. Giroud
Past President of the IGS

This article is an updated and expanded version of a paper published in the Proceedings of the 8th International Conference on Geosynthetics, pages 3 - 6.

The People of IGS

Peter E. Stevenson

As the 25th anniversary year of the IGS and the final Anniversary Year Edition of the IGS News draws near I find myself reflecting on the extraordinary people I have known in those 25 years. I hope you will find some of these anecdotes entertaining. Those of you needing a briefer version could review the history of the council on the website (only 1.5 pages and with many more people cited).

The first decade 1983 - 1989

Before I joined the IGS Council in the spring of 1984 an Interim Committee was formed that preceded the formation of the IGS and in fact organized the IGS. Peter Rankilor volunteered to be the treasurer of the Interim Committee but Jean Pierre Giroud replied: "This is fine, but we have no money". In a great gesture, Peter opened his wallet, put money on the table and said: "yes, we have money!" So, the first financial contribution to our society was a gift from the treasurer. This clearly measures the enthusiasm of the founding fathers.

As for me, where better to begin than at the beginning with Charles Schaerer, the first President of the IGS. Already retired when the IGS was formed, combining energy and vision, Charles was instrumental in those early organizing days. Charles was an elegant person and he was a ladies man. My wife Rosemary has never forgotten dancing with le grand Charles to the Viennese Waltz at the Gala in Vienna during the third International Conference on Geosynthetics. The other highlight of the Vienna Gala was Howard Murray in full kit and kilt, translating the speeches of the dignitaries.

Continuing in chronological order brings me to the first Vice President of the IGS, J.P. Giroud. In J.P.'s 12 year term as an IGS officer (Vice President, President and Past President) and the following 13 years of constant support, he worked with the energy of a lightning bolt combined with vision, intellect and extraordinary attention to detail. J.P. is truly the father of the IGS as well as the geosynthetics industry, but that is only part of J.P.'s contribution, the presence of Genevieve at IGS events around the world: Japan, Boston, Vienna, the Hague, Atlanta …. the list is too long to continue…., brought her special grace and style to the IGS and very much to the IGS's credit.

Next I turn to Guy Massenaux, the first IGS Secretary. Guy was the center piece in the organizing of the IGS. Drafter of the bylaws in deep collaboration with J.P., Guy also created the first edition of the IGS Handbook, drafted the various guidelines and advised the organizers of conferences such as Vienna and the Hague. Guy set the standards and established the path for the successful growth of the IGS.

One member of the first IGS Council that stands out in memory is Heinrich Schneider. Heinrich single handedly organized the 3rd International Conference on Geosynthetics in Vienna and a spectacular event it was. Nothing since has quite matched the IGS Council visit to the President of Austria's office and the viewing of the incredible artworks of inlaid stone that decorated his office.

Another member of that first council that stands out in memory is my old friend and colleague, Bernard Myles. Bernard has served the IGS for many years, having been elected to four terms (16 years). This 25th year brings his fourth term to an end. I fully expect him to continue to put energy into the IGS for some time to come. A particular memory is the 5th International Conference on Geosynthetics in Singapore where Myles, Rosemary and I could be said to be living on the economy as budgets were tight and we were not quartered in the conference hotel or its like, we stayed in hotels where the included breakfast was rice based porridge. Other standout personalities from that first council were Peter Jarrett, Masami Fukuoka, Etienne Leflaive, Peter Rankilor and Koos van Harten. Prof and Mrs. van Harten graciously put Rosemary and I up for the night upon the occasion of our arrival in 1990 in Den Hague after the hotel concierge had left for the day. Peter Jarrett became the first editor of the *IGS-News;* Masami Fukuoka became a friend who taught Rosemary and me to appreciate Sumo and other things Japanese.

The second IGS Council, elected in Vienna in 1986, brought Rudolf Floss, Piero Sembenelli and Steve

Warner to the council. Professor Floss continued in the IGS for many years, closing his service as Vice President in 1994. Steve Warner as President of IFAI in the United States remains very much involved with the IGS and continues to serve as one of the society's financial advisors. Pietro Sembenelli is remembered as an elegant gentleman who freely offered advice and guidance to the IGS and its people.

Kerry Rowe was elected to the council in 1988. Kerry's contributions to the IGS are manifold. First he was editor of the *IGSNews*, next a council member, and then elected President in 1990 followed by a term as Past President. Currently, among his many activities Kerry is the editor of the IGS Journal "*Geotextiles and Geomembranes".* Once again the IGS was led with energy, drive and exacting standards and once again the IGS responded by growing.

The second decade 1990 - 1999

Daniele Cazzuffi was elected to council in 1990. Cazzuffi's long service continues to today where he serves as Past President of the IGS. Daniele's dedication, energy and vision are surely reflections of his mentor and friend J.P. Giroud, Daniele's contributions are too many to list, but one vignette says everything to me. There was that moment in Yokohama during the awards ceremony in the 8th International Conference on Geosynthetics when tow headed Pietro Cazzuffi (age 3) crossed the stage seeking his daddy. Everyone noticed but the ceremony continued without interruption and Pietro found his father and was proud to sit on his lap.

The young man's namesake, Pietro Rimoldi, was elected to council in 1994. In addition to being a legend in his own right, Pietro was the key developer of the IGS Code of Ethics. An excellent footballer he scored a goal against me in the Hague but I deflected his shot in Singapore so we closed our IGS soccer careers even, one to one.

Also elected to council in 1990 was Wim Voskamp who was also elected to the position of Secretary serving until 1994 when he was elected as Treasurer. Wim served as Treasurer until 2002 and then again from 2004 to 2006. Currently retired, traveling and assisting his son's internet business Wim remains a friend and occasional correspondent. One other person stands out from the 1990 event in the Hague, Gert den Hoedt was the master of ceremonies for the Dutch chapter, hosts of the 4th International Conference on Geosynthetics and it was a happy reunion to see Gert and his wife in Edinburgh at EuroGeo4.

1992 brought a pantheon of stars to the IGS Council: Toshi Akagi became a friend and a guide, he led a tour of Kyoto and Tokyo for several IGS council members and we were an unruly lot. Toshi thought he was herding cats. I was so pleased to see him again in Shanghai at Geosynthetics Asia 2008. Toshi was also famous for his relationship with Genevieve Giroud. Genevieve was legendary as was her luggage while Toshi Akagi is an experienced traveler who wisely carries light luggage. Professors Akagi's strategy was famously defeated on several occasions at airports and train stations by the unexpected appearance of Genevieve Giroud and her numerous suitcases and bags, which T. Akagi ended up carrying very graciously.

Richard Bathurst's long career in the IGS began in 1992 and he went on to serve for many years including IGSNews editor, council member, Vice President, President and Past President and continues today as editor of the IGS Journal *"Geosynthetics International".* My favorite memory of Richard was associated with Geosynthetics Asia 2000 in Kuala Lumpur where Richard, Rosemary, David Walters and I were entertained by one of Richard's clients on a tour which included a casino so high on a mountain that it was above the cloud level. 1992 was Barry Christopher's first tour on the council, he was later co opted for one tour in 2002. Colin Jones elected to council in 1992 became President in 1994 and then served as Past President. We enjoyed the rowing competition at the Atlanta Olympics in company with Colin and Pat and our friendship continues with a wonderful visit to York following EuroGeo4. Beginning in 1992 Chris Lawson has contributed to the IGS in many ways, two terms on council, member of the Awards Committee, and Giroud lecturer in Yokohama.

J.P. Gourc was co-opted in 1993 and served until 2002 when he chaired the Technical Committee of the 7th International Conference on Geosynthetics in Nice. JPG2, (thus nicknamed in reference to his friend and former professor JPG1) continues to serve as an Ambassador for the IGS through the French Chapter and as a member of the African Activities Committee.

1994 saw another stellar group of contributors join the IGS council including Georg Heerten, serving for a second term, who after serving on council until 2002 currently leads the German chapter team that will host the 10th International Conference on Geosynthetics in Berlin in 2014. Also joining the council was Fumio Tatsuoka who continues to serve today as the President of the IGS.

In 1996 Jim Paul was elected to council and immediately began to contribute with the organization and accomplishment of the IGS mini lectures which remain an important benefit to the membership. The IGS and the industry will miss Jim's friendly smile and his leadership.

1998 brought more stars to the forefront, with the election of Steve Corbet who led the Technical Committee through the development of the Specification Guide; Philippe Delmas joined the council in 1998 and was elected treasurer in 2002. Meeting and chatting with Philippe was another pleasant reunion in Edinburgh at EuroGeo4. Ennio Palmeira was co-opted to council in 1998 and continues to serve the IGS presenting the Mercer lecture in 2007-2008, chairing both the Education Committee and the South American Activities Committee and sitting as the technical chair for the 9th International Conference on Geosynthetics to be held in Guarujá Brasil in May of 2010.

The third decade 2000 - 2008

In the year 2000 once again important contributors were elected to the council, first among them is John Cowland who serves today as the treasurer of the IGS as well as the chair of the Strategy Committee. Masashi Kamon joined the council

and subsequently served as the chair of the Asian Activities Committee until 2008 and supported the Japanese chapter presentation of the very successful 8th International Conference on Geosynthetics in Yokohama in 2006 as well as Geosynthetics Asia 2004 in Seoul, Geosynthetics Asia 2008 in Shanghai and the planned Geosynthetics Asia 2012 in Bangkok. Finally Mike Sadlier was co opted in 2000 and immediately organized the Australasian chapter embracing Australia and New Zealand. Mike continues to serve the IGS and currently chairs the Technical Committee which has just published, in 2008, an update to the IGS Terminology and Symbols document. Valentin Feodorov was co-opted to the council in 2000 after founding the Romanian chapter from a standing start of one member in 1996.

Continuing the parade, 2002 brought Gerhard Bräu to the council. Gerhard and Dagmar are now the editing team of the IGSNews and Gerhard served in exemplary fashion as the chair of the European Activities Committee from 2004 to 2008 as well as led the organizing team for EuroGeo3 in Munich in 2004.

In 2004 another Australian joined the council, Malek Bouazza, who continues to work on the IGS behalf with contribution and leadership on the African Activities Committee and the Education Committee and chairing the Asian Activities Committee as well as serving as a leader of the Australasian chapter. Pierpaolo Fantini was also elected in 2004 as was Jorge Zornberg. Jorge continues to serve currently as Vice President, chair of the North American Activities Committee and of course, immediate past chairman of the wildly successful event GeoAmericas 2008 in Cancun. Pierpaolo was reelected in 2008 and serves as co-chair of the corporate committee. Elizabeth Peggs was co opted in 2005 and elected in 2006. Elizabeth has made and continues to make important contributions to the IGS website, influences the IGS image in publications and presentation, and currently chairs the corporate committee while incidentally, managing a business and raising two boys, Keifer and Ryder.

Also elected in 2006 were Sam Allen and Neil Dixon. Neil was a key member of the organizing team for EuroGeo4 which produced the other wildly successful conference and exposition in 2008 and has been appointed chair of the European Activities Committee. Sam has assumed the responsibility of co-chairing both the North American Activities Committee and the Communications Committee.

Codicil

I do apologize for those I have left out. The first problem is that I have met so many people and Rosemary knows more people than I. Calling all of them to mind and recording a story about all of them is nearly impossible. The second problem is space, the editor and the reader would surely tire of such folksy rubbish before reaching the end.

About me and Rosemary

I was co-opted to the council in 1984 in Brussels and immediately elected Treasurer. I served in this office until 1994, when I was elected Secretary an office I continue to hold in 2008. Of course, both of us continue to be interested in continuing to serve the IGS. From the beginning Rosemary assisted me in managing the IGS finances, specifically the books. In 1994 I was elected Secretary and Rosemary became the paid employee of the IGS. She has managed the finances, the correspondence, the membership data base, the IGS office and virtually all the responsibilities one might imagine concerning the Society ever since. Rosemary and I have enjoyed our partnership in the IGS but make no mistake, the senior partner; the force behind the organization is Rosemary. It is she that attends the business of the society on a daily basis and it is she that deserves recognition.

reported by

Pete Stevenson, IGS Secretary

IGS Council Service Recognition Certificate

Celebrating the 25th Year of the IGS the Council introduced a certificate of appreciation to be presented during the year 2008 to those members who had served on the council over the 25 Year period. Presentations were made in Cancun, Shanghai and Edinburgh. Those council members who were unable to attend one of these IGS Regional events received their certificates by mail. The IGS was able to make the presentation of the certificate at one event other than the IGS Conferences.

The IGS greatly appreciates the service of the following IGS members: J. Andreu, A. Arman, M. Fukuoka, G. Heerten, P. Jarrett, E. Leflaive, B. Myles, H. Schneider, D.B. Sweetland, C van den Berg, K. van Harten, G. Massenaux, Ch Schaerer, J.P. Giroud, J.E. Fluet, P. Rankilor, H Rathmeyer, P. Stevenson, R. Floss, P. Sembenelli, S. Tonus, S. Warner, P. Barker, J. Perfetti, J. Rigo, R.K. Rowe, D. Cazzuffi, W. Voskamp, S. Ramaswamy, D.Fayoux, F. Gousse, D. Price, T. Akagi, R. Bathurst, B. Christopher, R. Jewell, CJFP Jones, C. Lawson, J.P. Gourc, J. Collin, R. Holtz, P. Rimoldi, F. Tatsuoka, G. Karunaratne, H.S. Chung, J. Lafleur, J. Paul, A.Scuero, CJV Varma, S.P. Corbet, P. Delmas, E. Palmeira, J. Cowland, D. Fettig/Halloran, M. Kamon, E.S. Lee, M. Lopes, V. Feodorov, S.P. Kaushish, M. Sadlier, G. Bräu, M. Maugeri, H. Miki, E. Alio, G. Bao, R. Rao, E C Shin, M. Bouazza, P. Fantini, J. Zornberg, E. Peggs, S. Allen, N. Dixon, N. Freitag, J. Otani, J. Ferreyros, Y.M. Chen, P. Legg, R. Jones, M Ziegler, D Bergado, H. Jeon, J Kuwano, V Pimentel.

Reported by

Pete Stevenson, IGS Secretary

Some recipients of the 2008 Council Service Recognition Certificates gather at EuroGeo4 in Edinburgh (from the left: Pete Stevenson, G.P. Karunaratne, Valentin Feodorov, Daniel Fayoux,Colin Jones, Jacques Perfetti (represented by N. Touze-Foltz), Georg Heerten, Philippe Delmas, Paul Barker, J.P. Giroud, Steve Corbet, J.P. Gourc.

C.G. Bao and T. Akagi are awarded the IGS Achievement Award (see IGS News Juli 2008) and also received the IGS Council Service Recognition Certificate from IGS Secretary P. Stevenson

Alberto Scuero receives his council service recognition certificate from Daniele Cazzuffi, IGS Immediate Past President

Call for candidates
for the IGS Awards
period of eligibility 2006 - 2009

Details available in
IGS News March 2009 issue
or from IGSsec@aol.com

Reports of IGS Meetings and Documents

IGS Council Meetings Edinburgh, 5 - 7 September 2008

The IGS Council met on the occasion of EuroGeo4 at Heriot Watt University, Edinburgh, UK, on September 7. 2008 0800-1700. Present were: President F. Tatsuoka, Vice President J. Zornberg, Past President D. Cazzuffi, Treasurer J. Cowland, Secretary P. Stevenson, Secretariat Manager R. Stevenson, Council members: M. Bouazza, P. Legg, N. Dixon, M. Ziegler, G. Bräu, R. Jones, E. Palmeira, J. Kuwano, M. Sadlier, P. Fantini, E. Peggs, M. Maugeri, N. Freitag, J. Otani, S. Allen. No proxies were received. Apologies from: J. Ferreyros, D. Bergado, Absent: Prof Y. Chen, Co option: V. Pimentel 2008 - 2012.

The minutes from Cancun and Shanghai (officers meeting) were approved. Under Matters Arising, the UK Chapter proposal to establish a repeating Jim Paul memorial award for best poster at EuroGeo events was approved. The Secretary reported that the awards ceremony would include presentation of 4 IGS awards, 2 Young IGS Member awards, 2 IGS Service awards, 6 student awards, 11 corporate recognition awards and 11 past council service recognition certificates. The awards committee was charged with investigating the impact of changing the awards period to four years with awards at the ICG. The student awards period has already been changed to four year cycle with student award presentations tied to regional conferences,

The IGS membership has 1906 paid members in 2008 in 31 chapters including the new chapter in Poland approved by the council. In addition provisional approval was given to Argentina pending the completion of administrative details in their application. There are two benefactors and there are: 113 corporate members as of 8-24-2008, 15 corporate members have joined in 2008. Three Council members were re-elected (Malek Bouazza, Pierpaolo Fantini and Mike Sadlier), while six new members of the

council were elected in 2008: Dennes Bergado, Han-yong Jeon, Russell Jones, Martin Ziegler, Jiro Kuwano, and Victor Pimentel to serve from 2008 - 2012.

Prof Brandl (Austria) was awarded the Giroud Lecture to be presented in Guarujá during the 9th ICG. The council approved the recommendations from the several regional activities committees and the 2012 Regional IGS Conferences will be held in Lima, Peru (GeoAmericas 2012), Bangkok, Thailand (Geosynthetics Asia 2012) and Valencia, Spain (EuroGeo5).

Other approved recommendations from the several committees included: a survey of professional organizations to determine which associations might bear fruit for the IGS to become a member. The Society will provide (complimentary) 2009 membership to the 2008 student award winners. The IGS membership data base will be amended to include an optional gender identification and an optional professional demographic criteria such as Engineer, consultant, educator, etc. In addition the council approved the revision of Auspices awards to include a requirement that the granting of auspices must result in the presentation of a path to join the IGS in the conference package and the implementation of the pay on line (join the IGS or pay dues) system.

At the recommendation of the Technical Committee, the recently revised Symbols and Terminology document is to be published on the web and published in print. Print copies to be distributed at assorted conferences. The Technical Committee intends to create a listing of standards. The list is to clearly identify the standards and to identify the differences among similar standards and methods, e.g. tensile tests.

The African Activities committee main focus is GeoAfrica 2009 but efforts are underway to establish other African Chapters and potential hosts for GeoAfrica 2012 or 2013. The Corporate Committee made several successful proposals that were adopted: The IGS will invite Corporate Members to nominate an award recipient from within their ranks (employees, distributors, affiliates, etc). The intention is to recognize those who are more behind the scenes, not those who typically have the opportunity to participate in IGS and related events. At the suggestion of the Corporate Committee the IGS will solicit additional email addresses within a corporate member's organization (internal resources and distributors etc) with the intent to insure the broadest distribution of the IGS News. Further the committee will survey corporate members for suggestions on how the IGS can further the objectives of the corporate membership; examples the European Construction Product Directive (CPD) and the US AASHTO M288 documents were given. The point is should the IGS seek a voice on these subjects and particularly where individual companies are prohibited from having a voice? Finally the IGS should amend the awarding of IGS Auspices conditions to include the benefit of clear booth selection priority for IGS Corporate members.

The Education committee continues its efforts on the Geosynthetics leaflets with the recruiting of additional leaflets as well as several language translations of the leaflet set. The Communications committee will review the content and impact of the IGS News and the web site with an eye to revision and improvements. The editor of the newsletter seeks to improve the responses of chapter and corporate correspondents. Each of the regional committees, North America, South America, Asia, Europe and Africa seek to support the growth of additional chapters in the regions.

The Council approved new guidelines to facilitate communications between the IGS chapters and the IGS. This includes completion of a "Standard IGS Chapter Reporting Form" to report the annual activities of each chapter. The new guidelines also include an annual summary report from the IGS Council to the chapters.

Finally the International Promotion committee seeks ways to communicate the opportunities and benefits of the 9th ICG in Guarujá while the Scientific and Advisory Committee addresses the issues of abstract and paper submission and review for the 9th ICG in Brazil in May 2010.

As of the time of the council meeting in Edinburgh three chapters had expressed interest in hosting the 10th ICG in 2014 and the German Chapter had submitted a complete proposal. The council instructed the officers to carefully review the German proposal and to report back to the Council at early September 2009 for the final approval.

Planned future meetings of the IGS include an officers meeting in March 2009 in Madrid, Spain and the council meeting at GeoAfrica 2009 in CapeTown in September 2009.

Reported by

Pete Stevenson, IGS Secretary

IGS Symbols and Terminology

Mike Sadlier

The IGS Council has approved the fifth edition of the IGS mathematical and graphical symbols document in Edinburgh September 2008.

Since publication of the fourth edition in August 2000 a number of evolutionary changes (rather than revolutionary changes) have been made to reflect the further development and refinement of geosynthetics terminology. This edition will also be placed on the IGS Web Site to provide IGS members with ready access to current geosynthetics descriptions, terminology and mathematical and graphical symbols.

Further updates will follow as the range of products, applications and related terminology expands.

A document of this type in a new and dynamic discipline will never be 'finished'. It must be considered to be alive and updated on a regular basis. This document strikes a compromise with the controversial use of barrier terms by ISO 10318. The IGS continues to define barrier as a basic function and not a specific term but refers to the barrier term as used by ISO 10318.

Reported by
Mike Sadlier, Chairman of the Technical Committee of IGS

IGS Educational Leaflets
in English, Portuguese, Spanish and Japanese

Ennio Palmeira

Reported by
Ennio Palmeira, Chair of the Education Committee of IGS

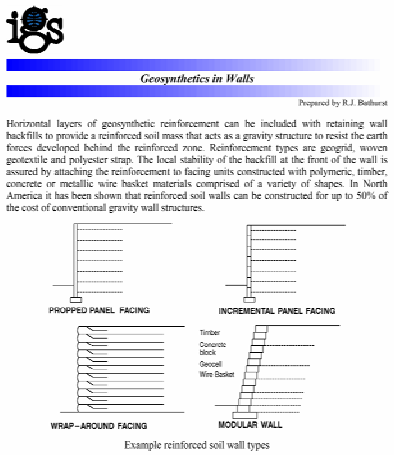
The IGS leaflets are brief descriptions of applications and characteristics of geosynthetics and their several applications.

The leaflets can be downloaded by anyone free of charge from the IGS website http://www.geosyntheticssociety.org/proceedings.htm#edu.

In view of the importance of these leaflets to promote the use of geosynthetics, the IGS Education Committee encourages your chapter to translate them to your language, if no version in your country's language is available yet (versions in Italian, French, German, Japanese and Korean are in progress). If you decide to do so, the IGS Education Committee will make the source files (in MS Word) available to the person in charge of the translation, which will help considerably his/her work. It is very important that the translated version, if not made by an expert on geosynthetics, be reviewed by one before it is sent for upload in the IGS website or publication.

The IGS Education Committee believes that the translated version of the leaflets will be very beneficial to the geosynthetics discipline and industry in your country or region.

The IGS Education Committee also takes the opportunity to encourage your chapter to produce CD's with the leaflets for distribution among university libraries in your country.


Geosynthetics in Walls

Prepared by R.J. Bathurst

Horizontal layers of geosynthetic reinforcement can be included with retaining wall backfills to provide a reinforced soil mass that acts as a gravity structure to resist the earth forces developed behind the reinforced zone. Reinforcement types are geogrid, woven geotextile and polyester strap. The local stability of the backfill at the front of the wall is assured by attaching the reinforcement to facing units constructed with polymeric, timber, concrete or metallic wire basket materials comprised of a variety of shapes. In North America it has been shown that reinforced soil walls can be constructed for up to 50% of the cost of conventional gravity wall structures.

PROPPED PANEL FACING
INCREMENTAL PANEL FACING
WRAP–AROUND FACING
MODULAR WALL
Timber
Concrete block
Geocell
Wire Basket

Example reinforced soil wall types


農業分野におけるジオシンセティックスの利用

Prepared by R. Frobel
Translated by K. Matsushima[1] & Y. Miyata[2]

農業分野でのジオシンセティックスの利用は国際的に増加しており、急成長しているマーケットの一つに挙げられます。導入当初、ジオシンセティックスは主に農地や農業用貯水池のライニングとして使用されてきました。特に、世界の乾燥地域では農業用貯水池のライニング材としてだけではなく、貴重な水が漏水しないよう水路のライニング材として利用されてきました。現在では、家畜糞尿によって汚染された地下水や地表水が農業用水路や貯水池への浸透を防止する目的で幅広く利用されています。最近では、米国の農務省、自然保全局、環境保護庁や各国の政府組織によるプログラムを通じて国民意識が高まり、厳格な取り決めが政府によって押し進められるにつれ、ジオシンセティックス、特に農地への長年の実績が豊富なジオメンブレンの利用が目覚ましく増加しています。

浸透抑制と汚染源の封じ込め

飲用水の水源はますます枯渇し、その確保にコストを要するようになっています。世界では、乾燥および半乾燥地域だけでなく、様々な地域で、高い割合の浸透損失を抑制することが現実的に求められるようになっています。こうした漏水対策ばかりでなく、家畜糞尿や大気中の有毒ガスや悪臭による汚染から、地盤や地下水源を保全する環境的な面での重要性が高まっています。長期間の信頼性が実証されている汚染源の封じ込め対策は必須であり、世界の多くの地域における環境保全に関する取り決めでは、その対策が絶対条件であるとされています。

ラグーンを有する嫌気性消化施設

浸透量を抑制する方法として従来の繊固め土やクレイライナーがありますが、それらは品質に非常にばらつきがあり、設計や適合規格を満たさないものがあります。ジオシンセティックスはこれらを代替できるものであり、高い信頼性と高い費用対効果が期待できます。ジオメンブレンは標準的なタイプとして浸透や悪臭を抑制するために使用されますが、その他にもジオメンブレンにジオコンポジット、ジオネットなどを組み合わせたジオシンセティックス製品もあります。

家畜糞尿ラグーン用ライナー

家畜糞尿ラグーン（囲）は世界中で地盤および地下水の汚染源となっています。汚染物質の拡散を抑制するため、繊固めた土にジオシンセティックスをライニングする方法が採用されています。環境汚染に関する関心の高まりや政府の取り決めが進むにつれて、ジオシンセティックスの利用は急激に増加し続けています。特に、暴露・覆土タイプのジオメンブレンや複土タイプのジオシンセティックスライナー（GCL）はよく使用されています。また、ジオテキスタイルやジオネットの複合材料は保護材あるいは排気を目的として使用されています。

家畜糞尿の悪臭を抑制するカバー

多くの科学者や衛生局員が硫化水素やアンモニアなど臭気性ガスを排出する大量の家畜糞尿に起因するさまざまな健康問題について原因を究明しています。悪臭の抑制カバーには、封じ込めの臨界状態や設計に応じて、低コストのジオメンブレンまたはコーティングした布状


Geossintéticos em Aterros sobre Solos Moles

Preparado por J. Otani e E.M. Palmeira
Traduzido por Karla C.A.P. Maia[1]

A construção de aterros sobre solos moles pode se apresentar como um grande desafio. Assim, a aplicação de geossintéticos na melhoria da estabilidade de aterros é uma das formas mais efetivas e bem testadas da técnica de reforço de solos.

Ruptura típica de um aterro não-reforçado e usos de geossintéticos como reforço.

Em tais problemas, geossintéticos podem ser efetivamente utilizados para:

1) Reduzir os deslocamentos de solos moles devido a sua baixa capacidade de carga;

2) Prevenir ruptura global do aterro e do solo mole de fundação; e


Geosintéticos en Taludes sobre Fundaciones Estables

Preparado por R.J. Bathurst
Traducido por R. D. F. Durand[1]

Las capas de refuerzo con geosintéticos son usadas para estabilizar taludes contra potenciales fallas de asentamiento utilizándolas como capas horizontales de refuerzo primario. El talud reforzado puede ser parte de la rehabilitación de taludes y/o para fortalecer los lados de los terraplenes.

Las capas de refuerzo permiten que los taludes sean construidos con inclinaciones más pronunciadas que en taludes no reforzados. Puede ser necesario estabilizar la cara expuesta del talud (particularmente durante la etapa de relleno y compactación) mediante el uso de refuerzos secundarios relativamente cortos y menos espaciados y/o mediante la envoltura de las capas de refuerzo en el paramento. En la mayoría de los casos la cara expuesta del talud debe ser protegida contra la erosión. Esto puede incorporar materiales geosintéticos como geoceldas rellenas con suelo o biomantas o geomallas que a menudo son usadas para proteger la vegetación temporalmente. La figura de abajo muestra que un dren interceptor puede ser necesario para eliminar las fuerzas de infiltración en la zona del suelo reforzado.

Ejemplo de talud restaurado con suelo reforzado.

La ubicación, número, longitud y resistencia de los refuerzos primarios necesarios para proveer un adecuado factor de seguridad contra la falla del talud es determinada usando análisis de métodos de equilibrio límite convencional modificados para incluir las fuerzas estabilizadoras disponibles provenientes de los refuerzos. El proyectista puede usar el "método de tajadas" junto con la suposición de mecanismos de ruptura tales como superficies

Talud reforzado con geosintéticos sobre fundación estable

List of IGS Educational Leaflets

The following leaflets are actually available:

- Geosynthetics in Agricultural Applications
  There is a wide variety of applications ranging from covered and uncovered ditch linings and ponds to protection of the groundwater and surface waters that are being polluted by animal waste.
- Geosynthetics Functions
  Geosynthetics include a variety of synthetic polymer materials that

are specially fabricated to be used in geotechnical, geoenvironmental, hydraulic and transportation engineering applications. It is convenient to identify the primary function of a geosynthetic as being one of: separation, filtration, drainage, reinforcement, fluid/gas containment, or erosion control.

- Geosynthetics Classification
  Geosynthetics can be broadly classified into categories based on method of manufacture.
- Geosynthetics in Drainage and Filtration
  Geosynthetics can be effectively used as drains and filters in civil and environmental works in addition to or in substitution to traditional granular materials. Geosynthetics are easy to install in the field and often cost-effective.
- Geosynthetics in Embankments on Soft Soils
  Construction of embankments on soft soils can be a challenging task. The use of geosynthetics to improve embankment stability is one of the most effectives and well-tried forms of the soil reinforcement technique.
- Geosynthetics in Erosion Control
  Erosion is a natural process caused by the forces of water and wind. It is influenced by a number of factors, such as soil type, vegetation and landscape, and it can be accelerated by various activities that occur on a specific field installation. Uncontrolled erosion processes can cause major damages to existing structures and to the environment. Geosynthetics can be properly specified to minimize or avoid such damages.
- Geosynthetics in Hydraulics Projects
  Hydraulic structures comprise the geosynthetics market segment with arguably the largest growth opportunities. The term “hydraulic structures” includes dams and canals.
- Geosynthetics in Landfills
  Geosynthetics are extensively used in the design of both base and cover liner systems of landfill facilities.
- Geosynthetics in Railroads
  Geosynthetics may perform the following functions in new track construction or rehabilitation: separation of materials with different particle size distributions, filtration, drainage and soil reinforcement.
- Geosynthetics in Road Engineering
  Roads and highway are of utmost importance to the development of any country. Due to systematic traffic of heavy vehicles, climate conditions and mechanical properties of the materials used in their constructions, highway pavements may last considerably less than expected. Geosynthetics can significantly increase the performance and durability of roads.
- Geosynthetics in Slopes over Stable Foundations
  Layers of geosynthetic reinforcement are used to stabilize slopes against potential deep-seated failure using horizontal layers of primary reinforcement. The reinforced slope may be part of slope reinstatement and (or) to strengthen the sides of earth fill embankments
- Geosynthetics in Unpaved Roads
  Geosynthetics can be effectively used to reinforce unpaved roads and working platforms on soft soils.
- Geosynthetics in Walls
  Horizontal layers of geosynthetic reinforcement can be included with retaining wall backfills to provide a reinforced soil mass that acts as a gravity structure to resist the earth forces developed behind the reinforced zone.
- Geosynthetics in Waste Water Treatment
  Geosynthetics are used in various applications in waste water facilities. The most common use is in lagoons operating with anaerobic and aerobic processes. Other applications include enhanced evaporation of wastewater and sludge dewatering by permeable geotextile geotubes.

You can find all leaflets at:
http://www.geosyntheticssociety.org/proceedings.htm#edu.

Conference Reports

XXI Italian National Conference on Geosynthetics

15 October 2008, Bologna, Italy

The XXI *Italian National Conference on Geosynthetics* was held on 15th October 2008 in Bologna. The Conference theme was *Waste Management and Coastal Protection*. The Conference was jointly organized by the Italian Chapter of the IGS (AGI-IGS) and the Bologna Engineers and Architects Association (ASSIABO) with the participation of ISSMGE-TC5 (Technical Committee on Environmental Geotechnics of the International Society on Soil Mechanics and Geotechnical Engineering), of CTD (Italian Technical Committee on Waste disposal) , of GNARC (Italian National Research Group on Coastal Environment) and of PIANC Italy (Italian Group of the International Association of Navigation) under the auspices of the Italian Environmental Ministry, of the Italian Infrastructure Ministry and of the Bologna University.

More than 100 participants attended to the Conference, which was divided in two different sessions. The first session was chaired by Mario Manassero (Politecnico of Torino) and focused on *Waste Management*. One keynote lecture and four papers were presented.

Speakers and organisers of the XXI Italian National Conference on Geosynthetics: from left Nicola Moraci, Pierpaolo Fantini, Pierluigi Aminti, Ornella Vacca, Michael Heibaum, Daniele Cazzuffi, Giovanni Cecconi, Barbara Zanuttigh and Michael Kouris

The keynote, presented by the IGS Treasurer John W. Cowland (Geosystems Ltd., Hong Kong-China), focused on the use of geosynthetics in landfill lining systems on steep slopes. In particular, different applications were analysed and the design methods of each one were illustrated.

The four papers presented covered the topics of the design of waste disposal in emergency and in critical conditions, of the use of the geosynthetics for the drainage of contaminated sediments and in diaphragm walls for contaminated soil confinement.

The second session was chaired by Daniele Cazzuffi (AGI-IGS President and IGS Immediate Past President) and focused on the *Coastal Protection*. In this case one keynote lecture and four papers were presented.

The keynote, presented by Michael Heibaum (BAW, Karlsruhe, Germany), was addressed to the use of geosynthetics in coastal protection. The four papers presented showed: design methods and Italian case histories in which a wide and interesting use of geosynthetics was done.

At the end of each session, a fruitful and interesting discussion on the different topics took place.

The next Italian National Conference on Geosynthetics will be organised in October 2009.

Reported by

Nicola Moraci, Italy

EuroGeo4 - Edinburgh 2008

7 - 10 September 2008, Edinburgh, United Kingdom

The Fourth European Geosynthetics Conference was held on 7th to 10th September 2008 at the Edinburgh Conference Centre, Heriot-Watt University, Edinburgh, Scotland, United Kingdom.

EuroGeo4 welcome reception with Right Honourable George Grubb, Lord Provost of the City of Edinburgh, and Derek Smith, Chairman of the Organizing Committee

The conference was organised by the IGS UK Chapter under the auspices of IGS and with the support of the British Geotechnical Society, The Scottish Geotechnical Group, The Engineering Group of the Geological Society of London and The Ground Forum. The conference was a great success with more than 520 delegates (including day delegates and training course attendees) and around 60 accompanying persons. Although a European conference, delegates came from all over the world.

The conference was officially opened by the Right Honourable George Grubb, Lord Provost of the City of Edinburgh at a welcome reception on the evening of 7th September. Three days of parallel technical sessions, training courses and trade exhibition then followed, covering all aspects of the use of geosynthetics in civil engineering.

Plenary session at EuroGeo4

Each day of technical sessions started with a great keynote lecture given by Prof Colin Jones (Electro-kinetic geosynthetics - from research to applications); Dr Nathalie Touze-Foltz (Geoenvironmental applications of geosynthetics); and Dr Grace Hsuan (Long-term performance and lifetime prediction of geosynthetics). The conference was also fortunate to be able to host the Mercer Lecture, given by Prof Ennio Palmeira (Soil-geosynthetics interaction: modelling and analysis). This lecture was given on the first evening of the conference and was open to delegates and non-dele-

gates alike. Three parallel technical sessions made up the remainder of each day, with the quality of presentations being very good throughout.

The training courses were developed by IGS UK Chapter in conjunction with Thomas Telford Limited. There were 3 one day courses on Ground Reinforcement, Waste Containment and Hydraulic Applications.

The trade exhibition was very popular with delegates. All lunches and refreshments were served in the exhibition hall. 32 companies were represented from all over the world. The conference organisers were very grateful to all exhibitors and sponsors, especially the four premier sponsors (Don and Low Limited, Geofabrics Limited, Huesker Geosynthetic GmbH and Tensar International), for helping to make the conference the great success that it was.

Ode to the Haggis ceremony at the conference dinner

The conference also had a great social programme. The accompanying persons were treated to a daily programme of entertainment including whisky tasting, a tour of The Royal Yacht Britannia, and visits to Loch Lomond and Edinburgh City. The highlight of the social programme was the conference dinner, which was held at Stirling Castle, some 40 minutes drive away. After a frantic 20 minutes of loading all delegates onto coaches, everyone enjoyed the evening of entertainment which included pipers welcoming delegates to the castle, a falconry display, addressing of the haggis and then when all had finished their dinner, a march back to the coaches behind a pipe and drum band.

Pipe and drum band at the festive evening at Sterling Castle

The conference was friendly and relaxed and had high quality papers and presentations that helped to make sure that all delegates enjoyed the event, met old friends and made new ones and learned something new about geosynthetics in the process.

Reported by
Derek Smith, Chairman,
EuroGeo 4 Organizing Committee

Announcements of Conferences of IGS

9th International Conference on Geosynthetics – 9ICG Guarujá, Brazil, 23 - 27 May 2010

The 9ICG is being organized by IGS Brasil, the Brazilian Chapter of the International Geosynthetics Society, and ABMS, the Brazilian Association for Soil Mechanics and Geotechnical Engineering, under the auspices of IGS, the International Geosynthetics Society (IGS) and supported by ABINT, the Brazilian Association of Nonwoven and Technical Textiles Industries.

Conference Aims

The aims of this conference are to offer:

- an outstanding opportunity of exchange knowledge and experiences between geosynthetic researchers, consultants, owners, geotechnical and environmental engineers, geosynthetic manufactures, project regulators, contractors and academics through discussion about the main geosynthetics themes, which comprises keynote lectures, paper presentations and debates.
- an overview of new technologies and innovations, by offering a large forum to engineers and researchers.

The conference will be conducted at high scientific and technical levels, and will present applications information to match the expectations of all participants.

Technical Program

The conference will highlight the MAIN topics in the geosynthetic industry and applications. The traditional Giroud Lecture will be delivered in a special session. Keynote lectures and selected papers will be presented on the main themes, which are:

- Case Histories
- Design Approaches and Numerical Solutions
- Drainage and Filtration
- Durability and Long Term Performance
- Geosynthetics in Agriculture and Aquaculture

- Geosynthetics in Dynamic Applications
- Geosynthetics in Environmental Applications
- Geosynthetics in Highways and Railways
- Geosynthetics in Hydraulic Applications
- Geosynthetics in Mining Applications
- Geosynthetics Properties
- Innovative Uses and Solutions
- New Geosynthetic Products
- Reinforced Walls and Slopes
- Reinforcement of Embankments and Unpaved Roads
- Soil-Geosynthetic Interaction

Call for Abstracts

Papers may cover any of the subjects described in the Technical Program above and the abstracts are limited to 500 words. According to the regulations by the International Geosynthetics Society, an author can have only one paper with his name as the 1st author (no limit for papers as co-author). In addition, chapters of the IGS can submit up to 10 papers on "Case Histories of Geosynthetics Engineering Practice" in addition to submissions from individuals.

Abstracts from individuals can be uploaded before January 15th 2009 (extended deadline)

Abstracts from IGS Chapters can be uploaded before 28 February 2009.

Selection of Abstracts

All the submitted abstracts will be reviewed by the International Paper Selection Committee of invited international experts on all subjects covered by the Conference. The abstracts must be sufficiently detailed to allow the experts to evaluate the scientific and technical contents of the proposed paper, especially the relevance of the results obtained and the contribution they make towards advances in the application of geosynthetics. Papers must be original and must not be of commercial nature.

Exhibition

An International Exhibition will be opened to the conference delegates and visitors to show the latest technological innovations and services provided by the geosynthetics industry. The conference venue has outstanding exhibition facilities, with 2,000 m^2 of available space for about eighty exhibitors (manufacturers, laboratories, consultants, contractors, suppliers, installers, agencies, project offices, and all organizations related to geosynthetics). Detailed information for both the 9IGC and the international exhibition will be available after May, 1st, 2008, at the conference website: www.9icg-brazil2010.info

Venue

The 9ICG will be held at Sofitel Jequitimar Hotel in Guarujá, Brazil. Guarujá is a beautiful coastal town about 90km from the city of Sao Paulo, which is the biggest metropolis in South America and offers a large variety of cultural, touristic and gastronomic attractions.

Language

English will be the official language of the Conference.

Important Deadlines

Abstracts submission:
January 15th 2009

Acceptance of abstracts:
February 28th 2009

Papers submission for individuals:
July 31st 2009

Papers submission for IGS Chapters: July 31st 2009

Conference Secretariat

9ICG - Brazil 2010
Av. Brigadeiro Faria Lima, 1478 sala 314, São Paulo, SP,
01451-001, Brazil.
Tel.: + 55 11 3032 3399
Fax: + 55 11 3819 6311
E-mail: info@9icg-brazil2010.info
website: www.9icg-brazil2010.info

GeoAfrica 2009, 2 - 5 September 2009
Cape Town, South Africa

GeoAfrica 2009 will present a forum for consulting engineers, manufacturers, installers and academics to exchange information about current and potential applications for geosynthetics in Africa.

This will be the first conference to be held under the auspices of the IGS and in association with the Geotechnical Division of the South African Institution of Civil Engineering (SAICE) in the region, and will present an opportunity to meet the top geosynthetics specialists and prospects on the continent. Every visitor to the exhibition floor will be a potential customer, and professionals seeking geosynthetic solutions to their challenges will attend each technical session. This will be the largest gathering of geosynthetics professionals seen in Africa to date.

Language

English is the official language of the conference.

Update on Abstracts Received

There has been a wonderful response to the call for abstracts (now oversubscribed), from all over the world, and a wide range of topics has been offered. This will lead to an excellent conference technical programme.

Technical Programme: Important Dates

Call for Abstracts Issued:
15 June 2008

Closing for Receipt of Abstracts:
30 September 2008

Notification to Authors of Acceptance of Abstracts:
30 December 2008

Receipt of Completed Papers:
28 February 2009

Return of Reviewed Papers to Authors for Correction (if required):
30 May 2009

Receipt of Final Papers:
15 June 2009

Authors' Registration and Payment of Attendance Fee:
15 May 2009

Printing of Abstracts and Conference Programme Hard Copy Book:
15 June 2009

Presentation of Papers:
2 - 4 September 2009

Exhibition

The conference will include an exhibition for the specification and trade of geosynthetic products and technology to users throughout Africa, as well as those wishing to make an entry into the continent.

Details of the conference are currently being finalised. If you would like to participate in this major event, please send an e-mail with your contact details to Leslie Ferreira at lesley@cebisaconferences.co.za and we will put you on the conference mailing list.

Exhibition Critical Dates

Registration and Payment:
From 1 July 2008

Exhibition Stand Sales Closes:
31 July 2009

(at the end of October 2008 there were only 7 stands left!)

Build-up: 1 September 2009

Breakdown: 4 September 2009

For more Information

Conference & Exhibition & Secretariat: Lesley Ferreira, Email: lesley@cebisaconferences.co.za

Tel: +27 21 559 4574
Fax: +27 21 559 4574/086 692 7220
Web site: www.gigsa.org
or www.GeoAfrica2009.org

Announcements of Conferences under the Auspices of IGS

FS-KGEO 2009, 12 February 2009
Munich, Germany

The 11th Conference on Geosynthetics (FS-KGEO 2009) of the German Special Geosynthetics Section and German IGS Chapter within the German Geotechnical Society (DGGT) will be held February 12th 2009 in Munich. The conference is again under the auspices of IGS and a representative of IGS Officers is invited to give an opening address.
The call for papers was open until middle of November. The final program will be distributed by mail at the end of 2008 and will be available at the webpages:
http://www.gb.bv.tum.de/fachsektion/a_aktuell.htm.

Topics

The main topics will be the new published draft of the "Recommendations for Reinforcement with Geosynthetics" (EBGEO) and presentations on how to prepare a correct tendering for the application of geosynthetics shown at different case studies.

Exhibition

The conference will be held in connection with a geotechnical conference ("Geotechnik - Tag") of Technische Universitaet Muenchen on February 13th 2009 and the exhibition will span both days. The number of booths is limited and most of them are already booked.

Language

German is the official language of the conference.

For more Information

Gerhard Bräu, g.braeu@bv.tum.de,
tel. +49/89/289-27139, fax -27189
www.gb.bv.tum.de/fachsektion

Geosynthetics 2009, 25 - 27 February 2009
Salt Lake City, Utah, USA

Geosynthetics 2009, the largest geosynthetics industry event in North America, will be held at Salt Palace Convention Center in Salt Lake City, Utah. It is being organized by TenCate Geosynthetics North America, under the auspices of IGS, NAGS, GSI, GMA and IFAI.

At this conference one can explore important issues affecting the water resources, mining, construction, and regulatory communities in the US, Canadian and Mexican markets.

Engineers, environmental specialists, water or transportation regulators, will have a menu of technical programs, workshops and courses to select from. Geosynthetics 2009 will feature design, engineering strategies and cost-saving geosynthetics solutions.

Geosynthetics 2009 also provides courses, demonstrations and ses-

sion that would be of interest to new engineers in the field.

Technical and Education Program

The theme of the conference is Hydraulic and Environmental Engineering, and the areas of focus include: Shoreline and water protection, conveyance and storage, mining, agriculture, aquaculture, temporary roads and drainage.

Approximately 35 technical and educational programs will be offered at Geosynthetics 2009, including keynote lectures, technical paper sessions (featuring 122 paper presentations), workshops, discussion panels, student papers, short courses and live demonstrations covering all aspects of geosynthetic materials, research, performance, testing, design, engineering, construction, case histories and field experience highlighting the conference theme.

Keynote lecturers

- J. P. Giroud; "Criteria for Geotextile and Granular Filters" (Terzaghi Lecture)
- David B. Paul; "30 Years of Geosynthetics Use - What may be in Store for the Next 30 Years"

Special Sessions

- GRI-22 Conference
- Workshops and demonstrations

Trade Show

Geosynthetics 2009 will include an exhibition where geosynthetics and geotechnical products and services will be exhibited. The exhibition should be of special interest for the following:

- Exhibitors include manufacturers and service providers showcasing geotechnical solutions and technologies and innovations
- Exhibits will include the latest products, technologies, services and equipment for the geosynthetics industry

Visitors Profile

The conference is thought to be of interest for the following group of people:

- Geotechnical, environmental and civil engineers
- Project designers
- Specifiers
- Government regulators
- Government agencies
- Landscape architects
- Contractors
- Consultants
- Fabricators and installers
- Facility owners
- Construction craftsmen
- Manufacturers
- Researchers, professors and students

Registration

Seating is limited. For best value register online by January 16, 2009 at: www.geoshow.info

Please register early. Discounts are available for government employees, students and groups of 3 or more attendees from the same company.

For more Information

For more information contact Tracie Coopet: tkcoopet@ifai.com.

7èmes Rencontres Géosynthétiques, 1 - 3 April 2009

Nantes, France

The 7th francophone symposium « Rencontres Géosynthétiques » organised by the French Chapter of IGS will be held from April 1st to 3rd in Nantes under the auspices of IGS.

This congress is the opportunity to make a standpoint at a French – speaking communities level about:

- the more updated applications of geosynthetics (for instance this time the use of geosynthetics in mining applications, for polluted soils and sustainable development),
- the long term behaviour of earthworks including geosynthetics,
- standardization and quality control policy

The conference will start with a day courses on the basic of geosynthetics and their applications.

The participation of practitioners to this kind of event is encouraged since presentation of case histories is a substantial part of the program. About 300 attendees are expected.

Specific sessions will be dedicated to:

- Landfills and geosynthetics lining systems,
- Roads and railways,
- Reinforcement structures, and
- Hydraulic works.

The proceedings will include 60 papers each reviewed by two members of the Scientific Committee. It's also worth noting the active participation of geotechnical/geosynthetics companies with 30 booths reserved.

The well-know traditional banquet will take place in a Château close to the River Loire in a friendly atmosphere and over a glass of local wine.

Language

French is the official language of the conference

For more Information

Françoise BOURGAIN
Ponts Formation Edition
Formation continue de l'École des ponts Paristech
15, rue de la Fontaine au Roi, 75127 PARIS Cedex 11
Tel.: +33(0) 1 44 58 27 79
Fax: +33(0) 1 44 58 28 73
Email: bourgain@enpc.fr

http://www.rencontresgeosynthetiques.org/

Reported by
Hugues Girard and Nathalie Touze-Foltz, IGS members

Geo-Environmental Engineering 2009, 10 - 12 June 2009

Vancouver, Canada

The Department of Civil Engineering, University of British Columbia will host a three-day geoenvironmental engineering conference, jointly organized by:

- Korea Institute of Construction Technology, Korea
- Kyoto University, Japan,
- Seoul National University, Korea
- University of British Columbia, Canada
- University Joseph Fourier, France

The conference will be held under the IGS auspices

Objectives

The Geotechnical and Environmental professions have long been contributing to understanding contaminated site issues. This 3-day conference will bring together professionals who seek solutions to geoenvironmental problems from many disciplines including geotechnical, geological, mining, chemical and environmental engineering, biologists, toxicologists from industry, the regulatory community, and academia to seek new solutions to technical and regulatory issues regarding geoenvironmental engineering and contaminated sites.

The conference themes will be:

- Policy and Application
- Site Characterization and Investigation
- Investigation Techniques
- Environmental Sustainability
- Environmental Risk Assessment and Management
- Remediation of Contaminated sites and Related Topics
- Waste Containment Systems, e.g. Tailings Dams
- Landfill / Waste Management
- Case Studies in Mining & Industrial Contaminated Sites
- Contribution to Global Environmental Problems
- Fate and Transport of Contaminants
- Topics related to Geo-environmental Disciplines

The conference will include:

- Presentations of approximately 15 minutes duration;
- Posters and exhibitor displays;
- Publication and distribution of conference proceedings of
- accepted papers (Format to be determined);
- Hosted lunch and two coffee breaks each day.
- Half -day post-conference tour (June 12, 2009)

Important Dates

Submission of paper abstracts
February 1, 2009

Acceptance of abstracts
February 25, 2009:

Submission of full papers
April 1, 2009:

Language

English is the official language of the conference

For more Information

Conference Chair:

Loretta Li, Ph.D., Ph.D., P.Eng.

Associate Professor (Geo - Environmental Engineering), Department of Civil Engineering, University of British Columbia

6250 Applied Science Lane, Vancouver, Canada V6T 1Z4

Tel: 604-822-1820

Fax: 604-822-6901

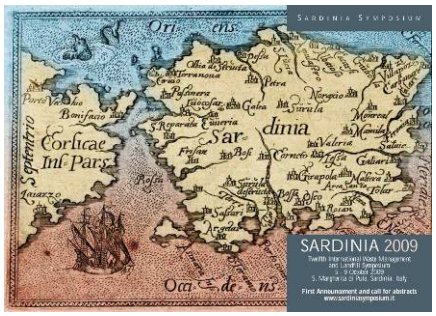
E-mail: gee2009@civil.ubc.ca

http://gee2009.civil.ubc.ca

Sardinia 2009, 5 - 9 October 2009

Twelfth International Waste Management and Landfill Symposium

S. Margherita di Pula, Cagliari, Italy



Waste management strategies and technologies are currently undergoing rapid development. The Sardinia Symposia were established in order to make knowledge and experiences in this field readily available. The Symposia have become the Reference Forum, where leading experts meet and present their research activities and experiences and discuss new concepts and technologies. The Symposia have witnessed and contributed worldwide to the development of modern waste management strategies such as the integrated waste management hierarchy, recovery of energy and sustainable landfilling.

The Symposium will focus on innovative aspects of Sustainable Waste Management, presenting new technologies, describing the state of the art and related case studies, discussing controversial subjects, sharing experiences among different countries, and evaluating social and economical balances.

The Symposium will include oral presentations, poster sessions, specialized sessions and specific workshops. Training courses will be offered by the IWWG under the supervision of international leading experts before the start of the Symposium.

The Symposium will be organised by IWWG - International Waste Working Group and CISA - Environmental Sanitary Engineering Center (IT) under the auspices of the IGS.

VENUE AND LOCATION

Sardinia 2009 will be held on the Forte Hotel Village Complex situated near S. Margherita di Pula (Caligari), Sardinia

SYMPOSIUM THEMES

The Symposium will last five days and will deal with municipal and commercial solid waste, hazardous waste and special waste including the following topics:

- Waste policy and legislation
- Waste management strategies
- Public participation and education
- Waste management assessment and decision tools
- Waste characterisation as a tool for waste management strategies
- New concepts for waste collection
- Waste minimisation and recycling
- Biological treatment
- Thermal treatment and advanced conversion technologies
- Mechanical biological treatment prior to landfilling
- Sanitary landfilling
- Integrated wastewater and solid waste management
- Waste management and climate change
- Waste management in developing and low income countries
- Special sessions

EXHIBITION

A commercial exhibition will be held during the conference where associations and companies can display technical literature and other material.

Call for Papers

Deadline for Abstracts:
30 January 2009

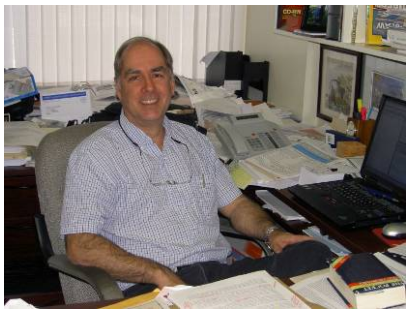
Abstracts should be addressed to:

Sardinia 2009 Organising Secretariat - Eurowaste Srl
Via Beato Pellegrino 23 - 35137 Padova (Italy)
E-mail: papers@sardiniasymposiu.it

News from the IGS Chapters

Richard Bathurst and Yoshihisa Miyata win Awards

R.M. Quigley Award for 2008 and 2008 Best Paper Award from Japan Chapter of IGS



Richard Bathurst

Yoshihisa Miyata

IGS members Yoshihisa Miyata and Richard J. Bathurst are the recipients of the Canadian Geotechnical Society R.M. QUIGLEY AWARD for the best paper published in the Canadian Geotechnical Journal in 2007.

The paper citation is: Yoshihisa Miyata and Richard J. Bathurst, 2007. Development of K-stiffness method for geosynthetic reinforced soil walls constructed with c - φ soils, Canadian Geotechnical Journal, Vol. 44, No. 12, 1391-1416.

This is the second year in a row that Professor Bathurst has received this prestigious award from the Canadian Geotechnical Society.

The same authors also won the 2008 BEST PAPER AWARD from Japan Chapter of IGS for the years 2006 to 2007. The paper citation is: Miyata, Y. and Bathurst, R.J. 2006. Prediction model of soil reinforcement load for geogrid reinforced walls with cohesive soil backfills, Geosynthetics Engineering Journal, Japan Chapter of IGS, Vol. 21, pp. 223-22 (in Japanese).

News from South African IGS Chapter (GIGSA)

Report-back Sessions on Cancun and Edinburgh

Starting on 19 November, GIGSA will present report-back sessions on the Cancun GeoAmericas 2008 and Edinburgh EuroGeo4 conferences. These will be held in Johannesburg on 19 November, and in Cape Town and Durban on dates yet to be set at time of writing. South African delegates to these two conferences will present their views on the events and highlight papers that they personally found interesting.

Elections for new GIGSA Committee

The two-year term of the current GIGSA Committee is at an end, and national elections are being held. The results will be announced on 19

November, during the GIGSA AGM which will be held at the Head Office of SAICE - the South African Institution of Civil Engineering in Midrand (halfway between Pretoria and Johannesburg).

Peter Davies, an IGS Individual Member and a founding member of GIGSA in 1994, who has served on the GIGSA Committee in various portfolios including editing the GIGSA newsletter since its inception, feels "It's time for the young Turks to take GIGSA forward" and is stepping off the committee in 2009. He will however remain the Technical Chair of the GeoAfrica 2009 conference until its conclusion, after which he will revert to being 'the man in the street' IGS / GIGSA member.

GeoAfrica 2009

GeoAfrica 2009, (the first IGS regional conference to be held in Africa) will be held in Cape Town over 2 - 5 September 2009, and will be hosted by GIGSA in partnership with the Geotechnical Division of SAICE, The South African Institute for Engineering and Environmental Geologists (SAIEG), the Southern African Institute of Waste Management (IWMSA), and Geosynthetica.net. The four-day conference whose anchor sponsors are Aquatan Lining Systems, CETCO and GSE has attracted over 120 abstracts and adjudication of these is scheduled to be complete by end November 2008. GIGSA invites interested parties to visit the GeoAfrica 2009 web site at www.geoafrica2009.org

First needlepunched GCL plant in Africa

The first needlepunched GCL plant in Africa has been established by Kaytech Engineered Fabrics who have been manufacturing polyester continuous filament needlepunched geotextiles in South Africa since 1978. Manufacturing has just commenced at the company's geosynthetics base in Atlantis near Cape Town. When fully operational, the high-capacity plant will produce 5.8 m wide GCLs in a number of grades. Cover and carrier nonwovens for the GCLs will be produced on the 6 m width needlepunched nonwoven staple fibre plant Kaytech has located on the same site – another first for Africa. The plant will use natural Sodium bentonite sourced from a local mine.

Reported by

Peter Davies, IGS News Correspondant from South Africa IGS Chapter

Dutch Chapter (NGO) celebrates its 25th anniversary in style

NEDERLANDSE GEOTEXTIELORGANISATIE

The Dutch Chapter of the IGS, the Nederlandse Geotextiel Organisatie (NGO) celebrated its silver anniversary this year. On December 8, 1983 the Memorandum of Association of the NGO was passed in Rotterdam. The idea of starting a Dutch geosynthetics organization was born during the autumn of 1982 during the 2nd International Geosynthetics Congress in Las Vegas. A large Dutch delegation attended the congress. They had a few things in common: A lot of them were working on the Delta Works and all of them can, in hindsight, been seen as pioneers of the use of new materials. The Delta Works is one of, if not, the greatest feat of hydraulic engineering ever performed. After the flood disaster in the south - west part of the Netherlands, caused by failure of the sea dikes in February 1953, which cost nearly 2.000 people their lives and flooded 150.000 hectares of land, it was evident that a drastic plan had to be implemented quickly. The dikes had to be strengthened and most of the river mouths had to be closed off or at least closable barriers installed. Twenty days after the flood the Delta Commission was formed. In the years after the disaster great dams and storm surge barriers were designed and built in record time. It was important to build lasting constructions simultaneously and there were insufficient raw materials, manpower and / or funding to build conventionally. If the work was to be completed before statistics predicted another disaster, the engineers would have to develop new techniques, be prepared to stick their necks out and start thinking outside of the box. Which is exactly what they did. The engineering generation of the 50's and the 60's started numerous innovations in hydraulic engineering, which would have a great influence on modern design and construction techniques in the decades to come. One of these innovations was the use of geotextiles, which were mainly used in the construction of the foundations of the barriers. Many of these new foundation techniques were based more on gut feeling and trial and error, than on modern, theoretical design methods, which then hardly existed. Amongst these engineers were the pioneers who attended the 1982 congress in Las Vegas. The Delta Works were hot and many Dutch papers on the use of geotextiles in coastal and hydraulic engineering were presented. Hopefully this little piece of history will contribute to how the Dutch are perceived around the word. They were already renowned for cultivating tulips, making cheese, wearing clogs and living in windmills, but they also are masters of hydraulic engineering.

Edinburgh Castle

On the 7th September 2008 we celebrated our 25th anniversary with a dinner for our members in the old

city centre in Edinburgh. This venue was chosen to coincide with EuroGeo 4, which was held in the following week in the university campus in Edinburgh. Many of the members would be attending EuroGeo 4 and those who were not, enjoyed a weekend away in good company. A total of 30 members, many with their partners, attended the dinner. A bagpiper, in formal Scottish dress, gave us a loud welcome to the dining room. He proceeded to tell us about the tradition of the Haggis and what went into it. The Haggis was served as a starter. The piper spoke with a thick Scottish accent, which we couldn't understand.

Networking between courses

After the starter our chairman, Arian de Bondt, oblivious to the fact that he had just eaten a mixture of sheep's, bladder, hart and lungs, welcomed the NGO members and introduced the first guest speaker: Hans Dorr, former secretary of the NGO and one of the pioneers mentioned above. Hans took us on a trip down memory lane, and spoke of the evolution from tradesmanship to science in geosynthetics that he had witnessed in his long career. After the first course, Sjaak Oostveen (Technical University of Delft) gave a presentation about the Master Class Geosynthetics, which was held at the TU Delft in 2008 and will also be part of the curriculum in the coming academic year. All the guest lecturers are members of the NGO.

Arian de Bondt enjoing the Scottish atmosphere

The evening continued in an informal atmosphere and after the main course Frans de Meerleer, chairman of the Belgian Geosynthetics Organization, spoke of the similarities and the differences between The Netherlands and Belgium, mainly, but not only, with regard to geosynthetics.

When the dessert had been served, the current NGO Chairman, Arian de Bondt, gave an overview of the achievements of the NGO in the period 2003-2008 and then presented a forecast for the coming years. He closed the dinner with a thank you to all the participants for contributing to an unforgettable evening. Well, Arian thought he was closing the dinner, but the infamous Gert den Hoedt, one of our honorary members, was present and it is a well known fact that he never leaves a dinner without making an after dinner speech. Gert, who is now a pensioner, but was also one of the pioneers, traditionally took the floor. He reacted to the earlier speeches and suggested that NGO should consider organizing another international geosynthetics congress, like The Hague in 1990 or EuroGeo 1 in Maastricht in 1996. We will have to take that into consideration.

Reported by
Shaun O'Hagan
Chairman of the public relations committee, Member of the NGO board.

Activities of IGS - Czech Republic

ČESKÁ REPUBLIKA

On the occasion of the "IGS - Czech Republic" general meeting, held on 05 November 2008, the members analyzed activities and agreed on future steps in order to gain reputation and credit in public construction of Czech Republic.

Besides organizing technical conferences with the subject "Faults and deficiencies when using geosynthetics in standard practice" which were held in Prague and Brno on 9 - 10 April 2008, some of our members were nominated for normative working groups to participate in the process of updating the Czech Republican legislation with particular focus on utilization of geosynthetics in road constructions. That takes into account all functions of geosynthetics like separation, filtration, reinforcement, drainage and protection.

Technical Conferences at Brno on 9 – 10 April 2008

Members of IGS-Czech Republic are active in internal working groups, to prepare a final draft for a nominated member which finally represents IGS-Czech Republic at the meeting of normative working group.

Technical Conference at Prague on 9 – 10 April 2008

It was agreed that a new national conference shall be organized at spring 2010.

A further intention of the committee of the IGS-Czech Republic is, to be more active in Slovakia and to work more closely with Slovakian colleagues.

All important matters are published on our website: www.igs.cz

Reported by
Pavel Mann, IGS News Correspondant of IGS - Czech Republic

News from IGS - Portugal

The 3rd Portuguese Seminar on Geosynthetics will be held at University of Coimbra, Portugal, on 19 - 20 November 2009. It will include a short-course and 3 thematic sessions on the following topics: environment, dams, erosion, roads and railways.

Keynotes lectures will be given by invited speakers. A Technical Exhibition is going to take place also.

Abstracts can be submitted until 31 January 2009. Final papers have to be submitted before 30 June 2009.

The official language of the seminar will be Portuguese, but presentations can also be done in English or Spanish.

This event is organised by Portuguese chapter of the IGS (IGS-Portugal), Portuguese Geotechnical Society (SPG) and University of Coimbra (FCTUC).

Further informations can be found at the web site (available soon): 3SPGeossinteticos.dec.uc.pt

For any further information please contact: 3spgeo@dec.uc.pt

reported by
Madalena Barroso, IGS News Correspondant from Portugal

List of IGS Chapters and their Chairpersons

Australia and New Zealand
Australasian Chapter (2002)
President: Mr. Mike Sadlier
sadlier@attglobal.net

Belgium
Belgian Chapter (2001),
Chairman: Frans De Meerleer,
frans.texion@skynet.be
toon.deruyver@copro.eu
www.belgian-geosynthetics.be/

Brazil
Brazilian Chapter (1997)
President: Prof. Mauricio Ehrlich
igsbrasil@igsbrasil.org.br
www.igsbrasil.org.br

Chile
Chilean Chapter (2006),
President: Mr. Mauricio Ossa,
mossa@igs-chile.org
http://igs-chile.org/index.html

China
Chinese Chapter (1990)
Chairman: Li, Guangxin
postmaster@ccigs.com.cn
www.ccigs.com.cn

Czech Republic
Czech Chapter (2003)
Chairman: Mr. Petr Hubik
info@igs.cz
www.igs.cz

France
French Chapter (1993)
President: Mr. Jean-Pierre Magnan
Francois.caquel@equipement.gouv.fr

Germany
German Chapter (1993)
Chairman: Prof. Dr.-Ing. Martin Ziegler
service@dggt.de
www.gb.bv.tum.de/fachsektion/index.htm

Greece
HGS, Greek Chapter (2005)
President: Mr. Dimitrios K. Atmatzidis
dac@upatras.gr

India
Indian Chapter (1988)
President: Dr. G.V. Rao
cbip@cbip.org
www.cbip.org

Indonesia
INA-IGS, the Indonesian Chapter (1992)
President: Mr. Gouw Tjie Liong
ina_igs@binus.ac.id

Italy
AGI-IGS, the Italian Chapter (1992)
President: Dr. Ing. Daniele Cazzuffi
agiroma@iol.it
www.associazionegeotecnica.it/~agi/

Japan
Japanese Chapter (1985)
Chairman: Dr. Hiroshi Miki
secret$cigs.or$g
wwwsoc.nii.ac.jp/jcigs/

Korea
KC-IGS, The Korean Chapter (1993)
President: Dr. Sam-Deok Cho
yusung@chonbuk.ac.kr
www.kgss.or.kr

Mexico
Mexican Chapter (2006)
President: Giovanni Bellei
IGSmexico@prodigy.net.mx

The Netherlands
Netherlands Chapter (1992)
President: Dr. Ir. A. H. de Bondt
mail@ngo.nl
www.ngo.nl

North America
North American Geosynthetics Society (NAGS) (Canada, USA) (1986)
President: Dr. David Elton
NagsDirector@aol.com
www.nags-igs.org

Norway
Norwegian Chapter of IGS (2008)
Chairman: Arnstein Watn
Arnstein.watn@sintef.no

Peru
Peruvian Chapter (2001)
President: Miguel De La Torre
gerencia@geoserviceing.com
www.igsperu.org

Philippines
Philippine Chapter (2007)
President: Engr. Emil Morales
pnjavier@hotmail.com
www.igsphilippines.com

Poland
Polish Chapter (2008)
Chairman: Prof. Adam Bolt
abolt@pg.gda.pl

Portugal
Portuguese Chapter (2003)
President: Maria de Lurdes Lopes
Lcosta@fe.up.pt

Romania
Romanian Chapter (1996)
President: Dr. Valentin Feodorov
loretta@mail.utcb.ro

Russia
Russian chapter of IGS (RCIGS, 2008)
President: Prof. Andrey Ponomaryov
ofrikhter@permonline.ru

South Africa
South African Chapter (1995)
President: Garth James
geotexgp@iafrica.com
www.gigsa.org

South-East Asian Chapter
South-East Asian Chapter (1988)
President: Dr. Chew Soon Hoe
indrayogan@bbr-singapore.com.sg

Spain
Spanish Chapter (1999)
President: Mr. Angel Leiro
pabad@cetco.es
www.igs-espana.com

Thailand
Thai Chapter (2002)
President: Prof. Dennes T. Bergado
bergado@ait.ac.th
www.set.ait.ac.th/acsig/igs-thailand

Turkey
Turkish Chapter (2001)
President: Prof. Fazil Erol Guler
eguler@boun.edu.tr

United Kingdom
U.K. Chapter (1987)
Chairman: Russell Jones
petera@huesker.co.uk
www.igs-uk.org

West Pacific Regional Chapter
West Pacific Regional Chapter (1997)
President: Dr. Rong-Her Chen
ttateh@cycu.edu.tw

Note:
- In case of not updated information, the IGS chapters are invited to notify to both IGS Secretary and IGS News Editor

IGS Award Winners 2008

Prof. Benedito de Souza Bueno, Brasil

The "Geovala" method to reduce vertical loads over buried pipes

Benedito de Souza Bueno

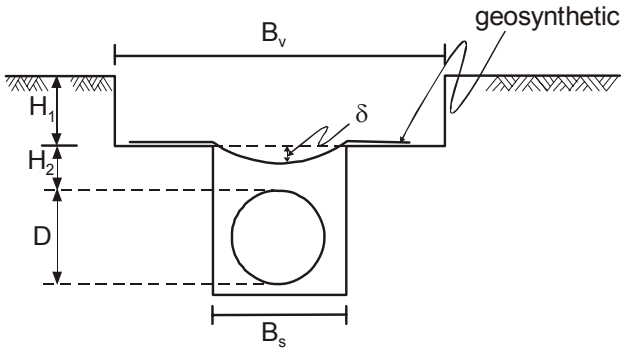


Figure1: Trench installation using the "Geovala" method.

A number of research initiatives have been conducted over the last several years at the Laboratory of Geosynthetics at the University of Sao Paulo, under the direction of Prof. Bueno. This includes the assessment of creep of geosynthetics, soil-reinforcement interaction, degradation of geomembranes, and instrumented reinforced soil walls, to name a few. Because of space constraints, only one research aspect is presented in this note, namely, the use of a new method to reduce the vertical stresses over buried pipes.

Buried pipes can be classified according to the way of their installation as: (i) in trench, and (ii) projecting pipes. In the first case, pipes are installed in narrow trenches excavated in the natural ground, which are subsequently filled with compacted soil. On the other hand, projecting pipes are installed under compacted embankments and include negative and positive projecting pipes. Positive projecting pipes are installed such that their top projects over the natural ground surface, while negative projecting pipes are placed within shallow trenches, excavated in the natural ground, which are then covered by a compacted embankment. The crown of negative projecting pipes is always below the ground level.

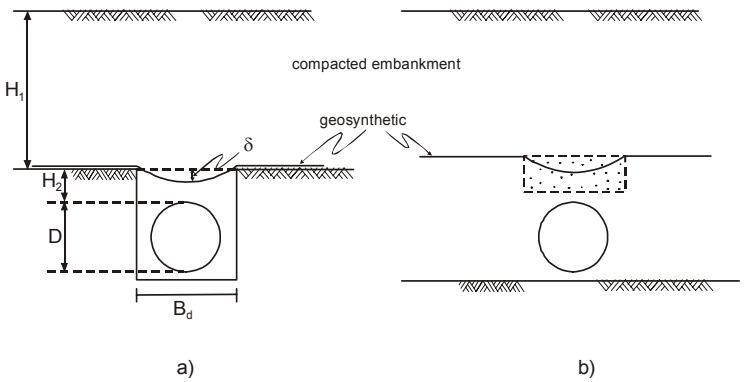


Figure 2: Projecting pipe installation using the Geovala method: a) negative projecting pipe; b) positive projecting pipe.

Geosynthetics can be used to reduce the stresses on the top of pipes. A new system was devised by Prof. Bueno and named "Geovala." Figure 1 shows trench installation using the Geovala method. As shown in the figure, trench installation requires excavation of an over-trench that is wider than the pipe trench. The pipe rests at the bottom of the narrow trench, which is filled with soil. Geosynthetic reinforcement is placed on the over-trench, which is subsequently filled with compacted soil. It should be noted that, while typical procedures involve placement of well compacted soils surrounding pipes, the backfill is placed under comparatively loose conditions in the Geovala system. The overall objective of the system is to minimize

vertical stresses acting over the pipe.

The geosynthetic should be placed without wrinkles. Since vertical deformation occurs once vertical loads are applied, the geosynthetic behaves as a stretched membrane fixed at the edges and loaded in its central portion. Two situations may then occur:

a) The geosynthetic deforms vertically but does not touch the top of the pipe. In this case the narrow trench may even not be filled with soil. In this case, a perfect void is created. If the geosynthetic is well anchored at the sides of the over-trench, the vertical load is entirely supported by membrane action. No vertical load reaches the crown of the pipe. This case may only be considered in practice if the walls of the trench are rigid and will not collapse due to the applied loads. In fact the narrow trench behaves as an artificial self-supported cavity;

b) The trench is filled with loose soil. In this case, although the reinforcement still deforms and sustains part of the vertical load, as it rests on the top of the loose backfill soil, it transmits part of the vertical load to the top of the pipe. To minimize the vertical load on the pipe, a small gap below the geosynthetic can be created to allow its free deformation. As in the previous case, since the reinforcement does not touch the trench backfill, no vertical load is transmitted to the pipe.

Figure 2 shows a projecting pipe installation: negative projecting pipe and positive projecting pipe. The installation of a negative projecting pipe is similar to that of a trench pipe. The main difference is that the geosynthetic rest on the soil surface in the negative projecting condition and is covered by an embankment. Consequently this case can be thought of as an over-trench of infinite width.

The positive projecting installation using the Geovala method requires the use of a U-section that is installed over the top of the pipe during the building of the embankment. This auxiliary piece has been named “geocalha” (“calha” means channel section in Portuguese). With the geocalha, a shallow trench is created, which will remain empty in order to allow geosynthetic deformation (i.e., as the geosynthetic deforms it does not touch the bottom of the geocalha). The geocalha can be built by placing two parallels lines of raffia bags filled with local soils. The bags are then compacted with a manual tamper and the geosynthetic is laid on to top of the bag layers. The geocalha can also be built by simply excavating a shallow trench on the compacted embankment where it is located.

Vertical stress acting on the top of the pipe

The vertical stresses, σ_V, are induced by the self-weight of the soil layer above the pipe and external loading. The vertical stresses are resisted by three mechanisms:

- A portion of the vertical stresses is transferred by positive arching from the internal soil prism (soil block that acts on pipe span) to the surrounding soil, σ_A;
- A portion of the vertical stresses is transferred laterally by the geosynthetic membrane action, σ_M;
- A portion of the vertical stresses is transferred to the top of the pipe, σ_C.

Therefore,

$$\sigma_V = \sigma_A + \sigma_M + \sigma_C \quad [1]$$

The value of σ_A can be calculated using Marston’s theory of vertical load on buried pipes. The value of σ_M can be calculated using, for example, Giroud´s methodology of geosynthetic bridging a void. For the cases where the deformed geosynthetic do not touch the soil above the pipe, σ_C can be considered negligible.

Since value of σ_V can easily be estimated, σ_C can be computed in a general case as:

$$\sigma_C = \sigma_V - (\sigma_A + \sigma_M) \quad [2]$$

This new trench method using the geocalha can be successfully used in most types of installation, including wide trenches, projecting pipes, and situations were trench walls are not stable.

Dr. Patrick J. Fox, USA

Shear Strength of Geosynthetic Clay Liners

Patrick J. Fox

Development of Large Dynamic Direct Shear Machine

In 2004, a large direct shear machine was designed and constructed for static and dynamic shear testing of GCLs and GCL liner systems (Figure 1). The machine tests rectangular GCL specimens measuring 305 × 1067 mm and has a maximum shear displacement of 254 mm, which is sufficiently large to measure residual or near-residual shear strengths in most cases. The shearing system is driven by a computer-controlled hydraulic actuator capable of imposing general stress-controlled or displacement-controlled dynamic loading to a test specimen. The actuator has a maximum frequency of 4 Hz for sinusoidal loading with a displacement amplitude of 25 mm. The maximum displacement rate for burst loading (i.e., single thrust) is 1 m/s. A paper on the design and performance of the machine was published in the *Geotechnical Testing Journal* and received the Best Paper Award (Fox et al. 2006).

Investigation of Static Shear Strength

Using the above direct shear machine and a previous large shear machine (Fox et al. 1997), my research teams have conducted ex-

tensive testing on the static shear strength of GCLs. Research topics have included internal shear strength, interface shear strength, residual shear strength, failure mechanisms, and the effects of reinforcement type, conditioning procedures, and shear displacement rate. As an example, Figure 2 compares failure envelopes for internal shear of hydrated unreinforced, stitch-bonded, and needle-punched GCLs. The bulk of these findings as well as future research needs were published in a state-of-the-art report (Fox and Stark 2004).

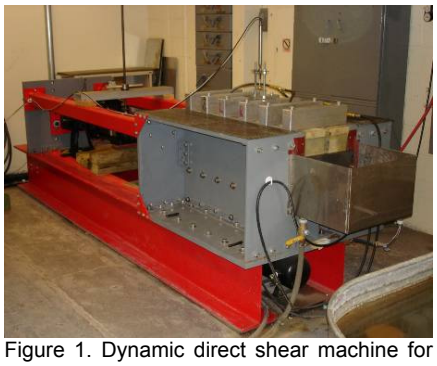


Figure 1. Dynamic direct shear machine for geosynthetic clay liners (Fox et al. 2006).

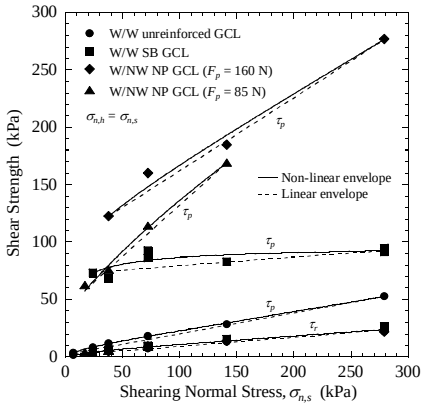


Figure 2. Peak and residual failure envelopes for hydrated unreinforced, stitch - bonded, and needle-punched GCLs (Fox and Stark 2004).

Our research team also compiled a large database of GCL internal and interface static shear strengths (Chiu and Fox 2004). The data was obtained from the literature, manufacturers, and our own testing programs and are representative of the most common GCL materials and interfaces used in practice. The published relationships are useful for: 1) gaining insight into the shear behavior of GCLs, 2) illustrating the variability of GCL shear test results, 3) obtaining preliminary strength parameters for trial design purposes, and 4) comparing with the results of future shear tests on similar or new GCL products. An example of relationships obtained for peak shear strengths of GM/GCL interfaces is presented in Figure 3.

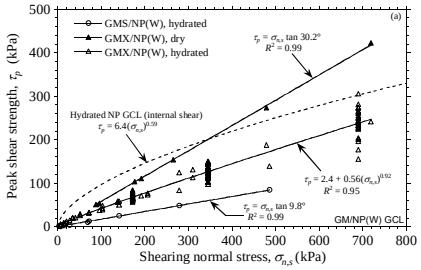


Figure 3. Peak shear strengths for GM/NP(W side) GCL interfaces (Chiu and Fox 2004).

Investigation of Dynamic Shear Strength

The new shear machine has been used to investigate the dynamic internal shear behavior of hydrated needle-punched GCLs. Monotonic and cyclic shear tests have been performed to investigate the effects of displacement rate, displacement amplitude, number of cycles, excitation frequency, and motion waveform on material response. Monotonic (i.e., single direction) shear tests indicate that peak shear strength first increases and then decreases with increasing displacement rate. Cyclic shear tests indicate that dynamic response is primarily controlled by displacement amplitude. Number of cycles (≥ 10), excitation frequency, and waveform have little effect on cyclic shear behavior or post-cyclic static shear strengths. Cyclic shear stress - displacement relationships display hysteresis similar to natural soils with some differences due to GCL reinforcement. Secant shear stiffness displays strong reduction with increasing displacement amplitude and degradation with continued cycling. Values of damping ratio are significantly higher than those typical of natural clays at lower shear strain levels. Cyclic tests with increasing displacement amplitude yield progressively lower post-cyclic static peak strengths due to greater levels of reinforcement damage. However, post-cyclic static residual strengths are unaffected by prior cyclic loading. Figures 4 – 6 present representative data from monotonic and cyclic shear tests on a W/NW needle - punched GCL at a shearing normal stress of 141 kPa.

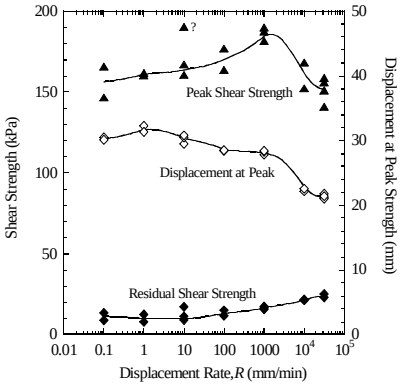


Figure 4. Effect of shear displacement rate on peak and residual shear strengths and displacements at peak for monotonic shear of a hydrated needle-punched GCL (Nye and Fox 2007).

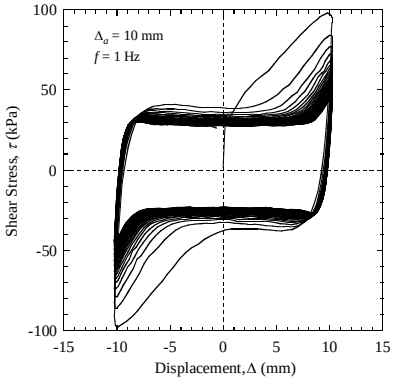


Figure 5. Shear stress vs. shear displacement hysteresis loops for 50 cycles of a ±10 mm cyclic shear test of a hydrated needle-punched GCL (Nye and Fox 2007).

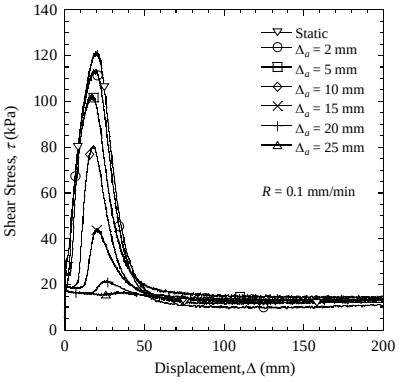


Figure 6. Effect of cyclic displacement amplitude (Δ_a) on post-cyclic static shear behavior of a hydrated needle-punched GCL (Nye and Fox 2007).

Investigation of Progressive Failure Effects for GCLs in Direct Shear

Research was conducted to investigate the effects of specimen

end-clamping and progressive failure on the measured shear stress-displacement behavior and shear strength of textured GM/GCL interfaces (Fox and Kim 2008). The experimental data indicate that the average peak shear strength is reduced and displacement at peak is increased when shear failure occurs progressively from one side of a test specimen to the other. A nonlinear elastic-plastic numerical model was developed and verified using the test data. The model was then used to investigate mechanisms of progressive failure, including distributions of interface shear stress and GM axial strain, movement of peak shear resistance along the interface, effects of GM and GM/GCL interface constitutive models, effects of reduced friction capacity on other possible sliding surfaces, effects of movement of fresh GM material into the failure surface during shear, and effects of specimen length. This study concluded that accurate measurements of shear stress - displacement behavior and strength are obtained when gripping surfaces prevent slippage of the test specimen during shear and the intended failure surface has the lowest shear resistance of all possible sliding surfaces. The use of proper gripping surfaces reduces difficulties in test data interpretation and increases the accuracy and reproducibility of test results. The effects of progressive failure on the measured shear stress-displacement relationship of a GCL/GM interface are shown in Figure 7 and the geometry of the numerical model is shown in Figure 8.

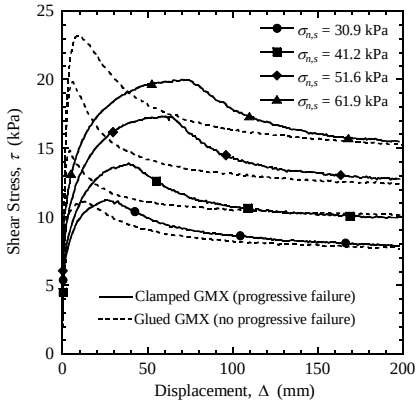


Figure 7. Experimental stress – displacement relationships for glued and clamped textured GM/GCL interface shear tests (Fox and Kim 2008).

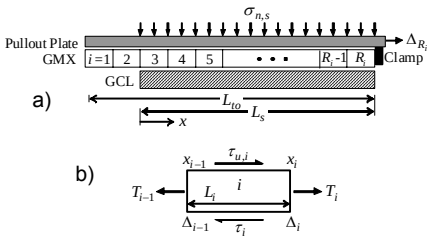


Figure 8. Geometry of numerical model developed to investigate progressive failure effects:
(a) textured GM/GCL interface shear test, and (b) single element of GM specimen (Fox and Kim 2008).

References

Fox, P. J., Rowland, M. G., Scheithe, J. R., Davis, K. L., Supple, M. R., and Crow, C. C., (1997). "Design and evaluation of a large direct shear machine for geosynthetic clay liners," *Geotechnical Testing Journal*, 20(3), 279-288.

Fox, P. J., and Stark, T. D. (2004). "State-of-the-art report: GCL shear strength and its measurement," Geosynthetics International, 11(3), 141-175.

Chiu, P., and Fox, P. J. (2004). "Internal and interface shear strengths of unreinforced and needle-punched geosynthetic clay liners," Geosynthetics International, 11(3), 176-199.

Fox, P. J., Nye, C. J., Morrison, T. C., Hunter, J. G., and Olsta, J. T. (2006). "Large dynamic direct shear machine for geosynthetic clay liners," Geotechnical Testing Journal, 29(5), 392-400.

Nye, C. J., and Fox, P. J. (2007). "Dynamic shear behavior of a needle-punched geosynthetic clay liner," Journal of Geotechnical and Geoenvironmental Engineering, 133(8), 973-983.

Fox, P. J., and Kim, R. H. (2008). "Effect of progressive failure on measured shear strength of geomembrane/GCL interface," Journal of Geotechnical and Geoenvironmental Engineering, 134(4), 459-469.

Naue GmbH & Co KG, Germany

Research and Development on Needle-Punched GCL's

During the EuroGeo 4, the Fourth European Conference on Geosynthetics, in Edinburgh, Scotland, the International Geosynthetics Society (IGS) awarded NAUE GmbH & Co. KG an IGS Award in recognition of the company's activities on development and research on needlepunched Geosynthetic Clay Liners.

This is the second award for NAUE this year from the IGS. In March, the company was recognized for its 20+ years of membership in the IGS, which itself is celebrating its 25th anniversary.

The needlepunched Geosynthetic Clay Liner Bentofix was developed in 1988, and since then a good number of refinements to the product's construction and the manufacturing process have separated it from similar products in the field. Also, the field has benefited from these refinements in that these discoveries have improved product performance, spurred greater use of GCLs across numerous sectors, expanded design options for engineers and clients, and given standards committees, laboratories, universities and institutes more data with which to work and improve overall quality control.

In short, it has had a ripple effect.

The 1988 discovery of the needle-punch nonwoven geotextile method of manufacturing (Bentofix's launching point) stands as a key example. The advance enabled not only the rapid, safe production of GCLs but the efficient shipping of GCLs in rolls. Also, the previously low friction coefficient of the sought-after clay used in GCLs – bentonite - ceased to be of concern because this new method of manufacturing transferred the shear

stress from the clay to the highly engineered geotextile to which the bentonite had been bonded.

The speed of manufacturing, shear stress transfer, and ease of installation that needle-punching led to cannot be measured simply by square meters of materials produced; but the volume of production is worth noting and emblematic of the field's growth.

It's estimated that more than several 100 million square meters (includes licence manufacturing) of GCLs have been put into service and needlepunched GCL's have reached more than 90 % market share.

The Refinement Process

All manufactures find ways to improve their products at the point of production, and these stories are valuable. Some of the key refinements to Bentofix have been:

- A unique fibre-bonding process locks the needle-punched fibres into place. This creates a high internal shear-strength with unsurpassed creep resistance.
- The complete impregnation of the non-woven cover of the Bentofix with bentonite powder creates an ideal, intimate contact condition between the Bentofix and a geomembrane. This discovery came about during investigations into the flow rate between GCLs and geomembranes in composite systems (studies which were being conducted in 1992).
- Similarly, the 50-cm-width impregnation of GCL panel side overlaps with bentonite powder creates a self-sealing overlap and reduces additional on-site overlap treatment.
- Continuous development of the needling process has brought about a low (10%) moisture content in the Bentofix range of products.
- The addition of continuous needle detection and removal devices during manufacture has improved product quality.

Expanding Reach

Manufacture, of course, is not the only place in which companies expand expertise and realize product potentials. Expansion in application is key—again, not just for the manufacturer but for the entire profession—and NAUE has taken GCLs quite a ways.

For example: underwater installations, such as for canals.

NAUE has used a combined sandmat/GCL system for underwater installation, and it has opened the potential for GCLs to be used in waterway sealing without disrupting active traffic. The GCL provides excellent impermeability. The bentonite powder-impregnated 50-cm-edge (ie, sealed overlaps) assures long-term performance.

In this application, homogeneous swelling of the GCL below water and a long-term peel strength are created through the installation of a top layer made of an uniform thickness of quartz. The quartz also provides the weight responsible for the immediate sinking of the entire GCL composite. And the sandmat acts as a protection layer against the loading of a riprap layer.

Another example: the waste management industry's use of GCLs.

GCLs provide economical and environmental advantages when used as the base layer in landfills instead of cells relying on multiple layers of hard-to-construct compacted clay. Also, GCLs can increase the potential containment volume and reduce the amount of necessary excavation. From a logistical view, the advantages are easy to see: one truckload of Bentofix, for example, covers 4000m² compared to only 40m² (50 cm thick) for a similar truckload of clay.

Similar logic applies to the use of GCLs in landfill capping systems. The necessary cover thickness will be less with a GCL; meaning: more containment reserved for waste burial. And the simplicity of installation—no need for generators or welding machines—also assists with safety requirements for such sites.

The sealing of dykes and dams is another interesting application to which GCLs are and have been applied to great economic success, especially where there is a local shortage of natural sealing material with a low hydraulic conductivity. The Sainte-Marguerite Dam in France is an exemplary case. The 42-year-old, 20 m-high structure was lined with Bentofix GCL as the primary watertight barrier.

The dam's cross section reveals some interesting aspects of the project's scope and hints at the degree to which geosynthetics may aid this piece of the water management field:

- Foundation of 20m layer of compacted coarse sand
- Watertight trench with a maximum depth of 65m
- Sealing of the slope with Bentofix
- One metre of protection backfill in two layers of sand and gravel and stones

For other instructive water management applications, NAUE does not need to look outside of Germany, where the devastating flooding of 2002 has led to various dyke construction projects. A basic "three - zone dyke" principle is guiding the refurbishment: a barrier, dyke core and a down-stream load filter. Bentofix GCL has been the choice for several hundred thousand square metres of up-stream barriers: it is a very cost-effective alternative to a 60cm clay layer.

More Growth to Come

The advantages for GCLs are many. In addition to the aforementioned ease of installation and long-term performance, NAUE has found that truly outstanding sealing properties ($k < 5 \times 10E\text{-}11$ m/s) can be engineered, and the ability to install these products in all weather conditions has only expanded the scope of what can be done.

As can be seen, Bentofix is an extremely versatile clay-based lining product. Once hydrated it is an effective barrier against liquids, vapours and gases.

With many years of successful installations, the range of Bentofix applications is virtually limitless; waste and contaminated soil caps; landfill base liners; gas and vapour seals; surface impoundment liners; secondary containment; dams, canals and water courses; tailings containment; groundwater protection; sorptive barriers; vertical barriers; waterproofing; and others.

Prof. Nicola Moraci, Italy

Geosynthetic Pullout Behaviour

Nicola Moraci

Development of a large scale pullout test apparatus

The research was carried out using a large scale pullout test apparatus developed by the author (Moraci et al., 2004) The test apparatus is composed by a pullout steel box (1700 x 600 x 680 mm), a vertical load application system, a horizontal force actuator device, a special clamp, and all the required instrumentation (Figure 1).

The pullout box consists of steel plates welded at the edges; the front wall, at mid height, has an opening of 45 mm of width. This opening is necessary to allow the insertion of the clamping device and of the sleeves, 0.25 m long, fixed to the front wall. A smaller opening (3mm wide) is provided at the back wall of the box in order to allow the connection between the systems used to measure the internal displacements of the specimen and the transducers fixed on the external wall of the box.

An air filled cushion, in which the air pressure has been carefully controlled, applies the vertical load. A steel plate is used to restrain the air cushion on the upper side. An electric jack applies the pullout force, which is measured using a load cell placed between the electric jack and the clamping system. The apparatus is capable to produce confined failure of the geosynthetic specimens using a clamp placed inside the soil, well beyond the sleeve in order to keep the geosynthetic specimens always confined in the soil for the test duration. The friction between the soil and the side walls of the box is minimised by the use of smooth Teflon films. The equipment incorporates two sleeves near the slot at the front of the pullout box, in order to avoid front wall effects as recommended by some researchers. The specimen displacements have been measured and recorded using inextensible steel wires or steel rods connected to at least six different points along the geogrid specimen. The wires have been connected to displacements transducers fixed to the external back side of the box. All the measurements have been digitally recorded on a personal computer at defined constant time intervals.

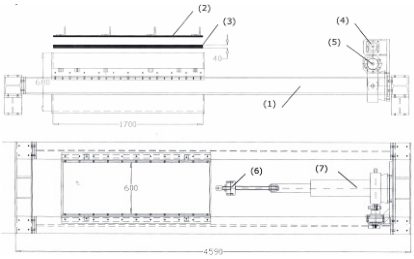


Figure 1 Pullout test apparatus: 1) frame; 2) steel plate; 3) air bag; 4) electric engine; 5) reducer; 6) load cell; 7) electric jack.

Experimental research

More than 100 pullout tests have been performed varying the specimen length (L_R= 0.40, 0.90, 1.15 m), the applied vertical effective pressures were (10, 25, 50 and 100), the type (extruded, welded and woven) and the stiffness of geogrid. The displacement rate has been equal to 1.0 mm/min for all tests.

A uniform medium sand soil was used in these tests (U=1.5, d50=0.22 mm). Direct shear tests, performed at 95% γ_{dmax} yield very high single values of the peak shear strength angle ϕ'p, in the range between 48° and 42°, ϕ'cv results equal to 34°.

The test results clearly showed the influence of the different parameters studied (reinforcement stiffness and structure, embedded length and vertical effective stress) on the pullout behaviour of geogrids embedded in granular soils. In particular, the main conclusions were the following:

The pullout behaviour depends on reinforcement length and on the applied vertical stress (Figure 2).

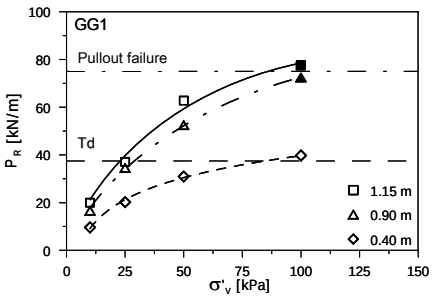


Figure 2 Peak pullout resistance envelopes

The phenomenon that has the largest influence on pullout strength and on the interface apparent coefficient of friction ($\mu_{S/GSY}$), both at the peak and at the residual conditions, is the dilatancy of the soil at the interface (Figure 3).

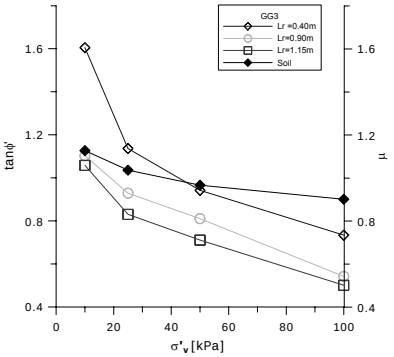


Figure 3. Peak interface apparent friction coefficient vs. σ'_V for different reinforcement lengths

The experimental results have also shown that the extensibility of reinforcement have an influence on peak pullout strength. In particular, extensibility effects are more evident for long reinforcements and for high confining stresses. In residual conditions the extensibility effects are negligible.

The empirical results also show an increase of peak and residual pullout strength, and therefore of the mobilized interface apparent coefficient of friction, while increasing the competent bearing area of the each node (Ab=Ar +At), upon which the passive mechanism are mobilized (Figure 4).

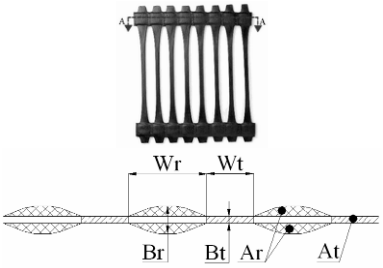


Figure 4 Schematic cross section A-A of the geogrid bar.

The apparent coefficient of friction mobilized in residual conditions depends only on applied vertical stress and geogrid geometry. In these conditions $\mu_{RS/GSY}$ does not depend on reinforcement length.

The node displacements curves obtained by pullout tests may be useful in stability analysis performed by means of displacement methods.

Theoretical research

A new theoretical method to determine the pullout behaviour of extruded geogrids embedded in a compacted granular soil was developed (Moraci et al. 2006, 2008). In particular, in the theoretical method: the frictional and the bearing component of the pullout reistance of geogrids are evaluated by simple equations (considering the scale effects negligible, Moraci and Gioffrè 2006), the mobilisation of both frictional and bearing components of pullout resistance were determined using the load transfer functions approach (Figures 5) and the geometry of the elements on which the bearing resistance mobilizes, the soil dilatancy effects and the geogrid extensibility were taken into account (Figure 4).

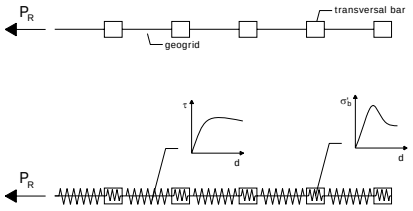


Figure 5. Idealized model used in load transfer analyses.

The comparison between theoretical and experimental results showed a good agreement, thus confirming the reliability of the proposed approach (Figure 6).

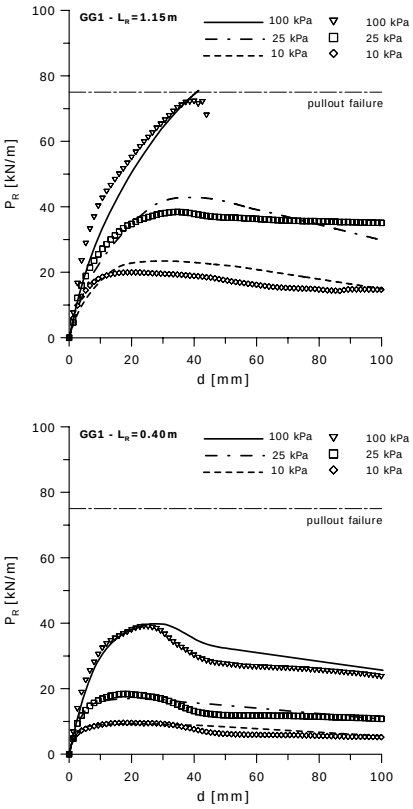


Figure 6. Comparison of theoretical and experimental pullout curves.

In particular, the proposed method predicts the pullout curves well, especially for low applied confining stress. Moreover, using this method it is possible to predict the pullout response for different reinforcement lengths and stiffness and different confining stresses on the base of simple pullout tests performed in order to evaluate the load transfer curves.

References

Moraci N., Romano G., Montanelli F. (2004) Factors affecting the interface apparent coefficient of friction mobilised in pullout condition. 3rd European Geosynthetics Conference, March, Munich, pp. 313 - 318.

Moraci N., Gioffre' D. (2006). A simple method to evaluate the pullout resistance of extruded geogrids embedded in granular soil. Geotextiles and Geomembranes (Elsevier) 24, pp. 116 - 128

Moraci N., Recalcati P.G. (2006). Factors affecting the pullout behaviour of extruded geogrids embedded in compacted granular soil. Geotextiles and Geomembranes (Elsevier) 24, pp. 220 - 242

Cardile G., Gioffre' D., Moraci N. (2006). A new theoretical method to evaluate the peak and the residual pullout resistance of extruded geogrids embedded in granular soils. 8th ICG September, Yokohama, Japan, Vol.4 pp.1431 - 1435.

Moraci N., Cardile G., Gioffre' D. (2008). A theoretical method to predict the pullout behaviour of extruded geogrids embedded in granular soils. 5th Int. Symp. on Earth Reinforcement, November 14-16, 2007 Fukuoka, Japan, pp. 281 - 287

IGS Young Award Winners 2008

Daiki Hirakawa, Japan and Warat Kongkitkul, Thailand

Creep Deformation of Geosynthetics

Daiki Hirakawa

Warat Kongkitkul

Previously and still now, the creep deformation and creep rupture of geosynthetic reinforcement is often but wrongly considered as a phenomenon of mechanical degradation with time. However, the results from tensile loading tests of a wide variety of geosynthetic reinforcement employing various loading histories and their analyses (i.e.,

Hirakawa et al., 2003; Kongkitkul et al., 2004, 2007a) showed that creep is not mechanical degrading but it is merely a viscous response (as explained in some more detail later). A series of plane strain compression (PSC) tests were also performed on sand specimens either unreinforced or reinforced with different types of geosynthetic reinforcements. The load-strain-time behaviour of geosynthetic reinforcement arranged in the backfill was analysed based on a non-linear three-component (NLTC) model.

Theoretical considerations on the time effects

The so-called 'time effect' on the load-strain behaviour of geosynthetic reinforcement consists of the following two components, as with geomaterials:

- *Rate effect*; noted by effects of strain rate on monotonic loading (ML) load-strain behaviour, creep deformation, load-relaxation and so on, and described as a function of instantaneous irreversible (or inelastic or visco-plastic) strain rate, not the time.
- *Ageing effect*; defined as time-dependent changes in the load-strain properties, including tensile rupture strength, yielding properties, elasticity, viscosity and so on, and described as a function of the time that has elapsed since a specifically defined origin.

'*Rate effects*' can be coupled or interacted with '*ageing effects*': e.g., the creep deformation rate increases when '*negative ageing effects*' become relevant by temperature increase, weathering, chemical or biological degradation and so on. That is, creep deformation is controlled directly by the '*rate effects*' and indirectly by the '*ageing effect*'.

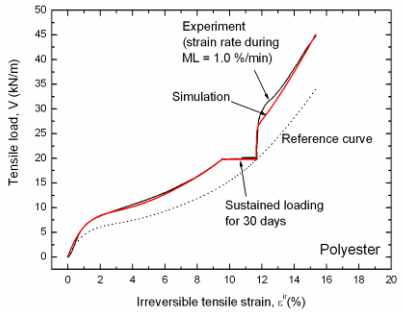


Fig. 1 Simulation of 30-day sustained loading otherwise ML test on PET geogrid

Mathematical modelling and numerical simulations

To properly simulate both '*rate* and *ageing effects*' with geosynthetic reinforcement, an elasto - viscoplastic model was developed within the framework of a NLTC model, firstly when the '*ageing effect*' is not active. The developed model can simulate very well the load-strain-time relations measured as typically shown in Fig. 1. Secondly, the model was modified to take into account the '*ageing effect*', in addition to 'rate *effect*', by making the elasto-plastic part of the model behaviour a function of the time having the origin when a given type of ageing effect starts. Then, the model became able to simulate the load-strain-time behaviour when both '*rate effects*' and '*ageing effects*' take place simultaneously. Subsequently, the model was used for the following simulations:

- *Temperature-accelerated creep tests*: The load-strain-temperature behaviour of a given geosynthetic reinforcement can be simulated by treating the effects of an increase in the ambient temperature as '*negative ageing effect*' (Fig. 2). An increase in the creep rate upon an increase in the temperature can be simulated very well (Kongkitkul and Tatsuoka, 2007).
- *Creep rupture when the material property degrades with time*: The creep rupture when subjected to long-term sustained loading (SL) with simultaneous material degradation (as in usual field cases) was simulated (curve 3 in Fig. 3). It was shown that separated consideration of the creep reduction factor, RF_{CR}, and the durability reduction factor, RF_D, in the current design method (curve 2) may considerably underestimate the true creep rupture strength (curve 3) (Kongkitkul et al., 2007d).

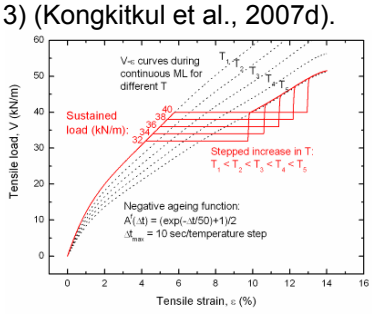


Fig. 2 Comparison of tensile load-strain curves from a numerical SIM tests and continuous ML tests at different but constant temperatures

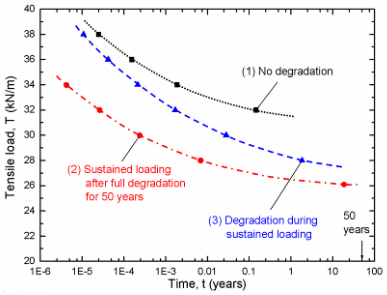


Fig. 3 Creep rupture curves obtained by simulation under three different degradation conditions

Load-strain-time behaviour of geosynthetic reinforcement arranged in the backfill

In usual engineering practice and research, the creep deformation of a geosynthetic reinforcement arranged in soil structures is evaluated without taking into account the creep deformation (or more rigorously the viscous property) of the backfill. Results from a series of PSC tests using specimens of two largely different sizes showed the following:

- The strength of geosynthetic - reinforced sand specimens that had been subjected to SL in the pre-peak regime is maintained essentially the same as the one obtained by continuous ML tests (without SL stages) (Kongkitkul et al., 2007b).
- The tensile force in the reinforcement arranged in the backfill under fixed boundary stress conditions decreases with time unless the failure of reinforced backfill is imminent (as with ordinary geosynthetic-reinforced soil structures) (Kongkitkul et al., 2007c). This finding indicates that the possibility of creep rupture of geosynthetic reinforcement arranged in full-scale geosynthetic-reinforced soil structures is usually very low and the conventional method to determine the design rupture strength of geosynthetic reinforcement is conservative in this respect.

Considerations on the creep reduction factor

It is shown above that the current design method to obtain the long-term design strength of geosynthetic reinforcement is conservative because the possibility of creep rupture and the effects of material degradation on the rupture strength

are *separately* taken into account by simply reducing the tensile strength from fast tensile loading tests of virgin samples by using 'durability reduction factor, RF_D (larger than unity)' as well as 'creep reduction factor, RF_{CR} (larger than unity)' (curve 2 in Fig. 3). It was proposed to determine the long-term design tensile strength without using a creep reduction factor when it can be confirmed that the design strength is smaller than the new creep rupture strength that is determined by numerical analysis based on the proposed model in which creep deformation and material degradation take place simultaneously during a given design life time (Fig. 4; Kongkitkul et al., 2007d).

Finally, we also feel very honoured with that two of articles cited above (i.e. Kongkitkul & Tatsuoka, 2007; and Kongkitkul et al., 2007d) were selected for the 'Best paper in *Geosynthetics International* for 2007' award.

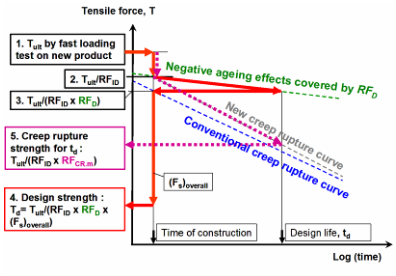


Fig. 4 Newly proposed method to obtain the design strength (not controlled by creep rupture) of given geosynthetic reinforcement

References

Hirakawa, D., Kongkitkul, W., Tatsuoka, F. and Uchimura, T. (2003): "Time - dependent stress-strain behaviour due to viscous properties of geogrid reinforcement", Geosynthetics International, Vol.10, No.6, pp.176-199.

Kongkitkul, W., Hirakawa, D., Tatsuoka, F. and Uchimura, T. (2004): "Viscous deformation of geosynthetic reinforcement under cyclic loading conditions and its model simulation", Geosynthetics International, Vol.11, No.2, pp.73-99.

Kongkitkul, W. and Tatsuoka, F. (2007): "A theoretical framework to analyse the behaviour of polymer geosynthetic reinforcement in temperature-accelerated creep tests", Geosynthetics International, Vol.14, No.1, pp.23-38.

Kongkitkul, W., Hirakawa, D. and Tatsuoka, F. (2007a): "Viscous behaviour of geogrids; experiment and simulation", Soils and Foundations, Vol.47, No.2, pp.265-283.

Kongkitkul, W., Tatsuoka, F. and Hirakawa, D. (2007b): "Effects of reinforcement type and loading history on the deformation of reinforced sand in plane strain compression", Soils and Foundations, Vol.47, No.2, pp.395-414.

Kongkitkul, W., Tatsuoka, F. and Hirakawa, D. (2007c): "Rate-dependent load-strain behaviour of geogrid arranged in sand under plane strain compression", Soils and Foundations, Vol.47, No.3, pp.473-491.

Kongkitkul, W., Tatsuoka, F. and Hirakawa, D. (2007d): "Creep rupture curve for simultaneous creep deformation and degradation of geosynthetic reinforcement", Geosynthetics International, Vol.14, No.4, pp.189-200.

John S. McCartney, USA

Geosynthetics in Unsaturated Conditions

John S. McCartney

I am honored to be selected as a recipient of the 2008 Young IGS Award. This article summarizes my research on the hydraulic interaction between geosynthetics and unsaturated soils, which was partly the basis for the award. My contribution is built upon those of researchers and practitioners, who identified the importance of considering the role of unsaturated nonwoven geotextiles in the performance of geotechnical systems such as slopes, landfill and mine tailing covers, retaining walls, and pavements. For instance, Karen Henry and Bob Holtz in the mid 1990's used geotextiles to block capillary rise in unsaturated soils to avoid frost heave damage to pavements. John Stormont and his colleagues in the late 1990's developed tests to characterize the hydraulic properties of unsaturated geotextiles, and used geotextiles to drain water from unsaturated soils to maintain high stiffness and low hydraulic conductivity. Greg Richardson observed in 1997 that geotextile underdrains for slopes would not conduct water until the overlying soil was nearly saturated, leading to higher unit weight than expected and slope failure.

My research efforts in this area were geared toward using physical models of soil – geosynthetic systems to verify trends in water flow noted in field studies, and to build an understanding of how the hydraulic properties of unsaturated geotextiles can be used to predict these trends. The motivation behind my research is the promotion of performance-based design of geotechnical systems that incorporate unsaturated geotextiles. Although the simplest option to design these systems would be to assume saturated conditions, such designs do not account for the actual performance of the system under the environmental conditions at a given location. Accordingly, it is difficult to judge the site-specific level of conservatism in such designs, potentially resulting in high construction costs and inefficient use of materials. Consideration of the hydraulic interaction between soils and geosynthetics is vital if designers assume unsaturated conditions will remain throughout the project's lifetime. Physical modeling is an important step in the development and evaluation of performance-based designs that can consider the changes in moisture content, hydraulic conductivity, and stiffness that affect the performance of soil-geosynthetic systems.

Due to their network of pore spaces formed by interlaced fibers, unsaturated nonwoven geotextiles have hydraulic properties similar to soils. Specifically, geotextiles have a water retention curve (WRC), which describes changes in moisture content with matric suction, and a hydraulic conductivity function (K-function), which describes changes in impedance to water flow with matric suction. In contrast to soils, the hydraulic properties of nonwoven geotextiles are affected by high compressibility under relatively low stresses, anisotropy, and

wettability depending on the fiber polymer type and manufacturing processes (e.g., thermal treatment). A comparison between the hydraulic properties of a nonwoven geotextile with those of different soils is shown in Figure 1. Due to their high porosity, nonwoven geotextiles have similar hydraulic behavior to coarse-grained soils. Specifically, these materials are highly conductive when saturated, but drain to nearly dry conditions with low permeability when unsaturated (*i.e.*, suctions more than 1 kPa). A unique feature of the water retention curve and hydraulic conductivity function of the unsaturated geotextile shown in Figure 1 is that they were determined concurrently from a hanging column test, adapted with a constant head Mariotte tube to measure outflow (or inflow) during imposition of suction values.

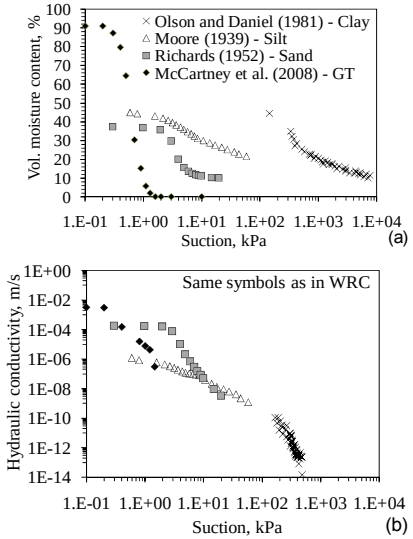


Fig. 1: Hydraulic properties of unsaturated geotextiles and soils: (a) WRC; (b) K-function

An understanding of the WRC and K-function of unsaturated nonwoven geotextiles is needed to model the conditions leading to formation of a capillary break, a phenomenon which prevents water from flowing from an unsaturated soil into a nonwoven geotextile until the soil is nearly saturated. For example, at high suctions (i.e., 100 kPa) the silt in Figure 1(a) has a moisture content of approximately 25%, while the nonwoven geotextile is air dry. Capillarity prevents water from flowing from the silt into the air-filled pores of the geotextile until the matric suction at their interface decreases to a point that the water from the silt can displace the air in the geotextiles (i.e., at 1 kPa). The impact of the capillary break is that the silt will be nearly saturated when reaching the suction at which the geotextile begins to absorb water. Accordingly, a capillary break can be a useful tool for engineers in creating hydraulic barriers in unsaturated systems like landfill covers, or a potential hazard if not considered in design of slope underdrains or retaining walls.

A case where hydraulic interaction between unsaturated soils and a geosynthetic drainage layer caused unexpected behaviour was at the evapotranspirative landfill test covers at the Rocky Mountain Arsenal in Colorado. A geocomposite drainage layer was used in a lysimeter beneath an instrumented cover, as shown in Figure 2.

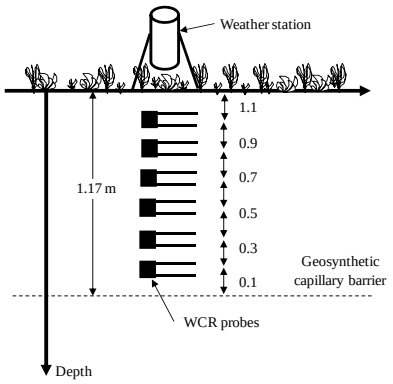


Fig. 2: Instrumented lysimeter

The geotextile lysimeter was intended to collect the water that reached the base of an alternative test cover. Instead the nonwoven geotextile prevented water from leaving the soil due to the capillary break effect. During extended periods of rain, water accumulated near the base of the cover, as shown in Figure 3. In this case, a tool ended up influencing the conditions it was intended to measure.

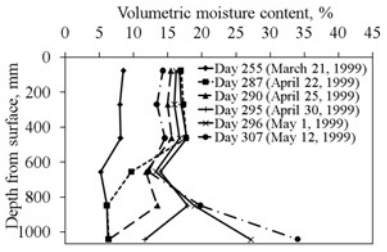


Fig. 3: Ponding of water above a geotextile capillary break

These trends were observed under variable atmospheric boundary conditions, so research was needed to verify these trends in a controlled setting. Instrumented column flow tests were used to model infiltration and evaporation from soil layers underlain by a geosynthetic capillary barrier, as shown in Figure 4.

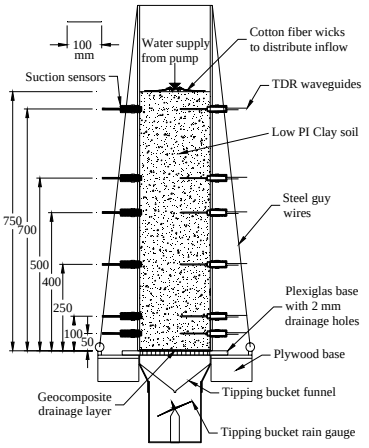


Fig. 4: Column flow test

A constant infiltration rate was imposed on the soil surface, and the moisture content with depth in the soil layer was monitored using time domain reflectometry. The moisture content profiles observed in the laboratory in Figure 5(a) are similar to those noted in the field in Figure 3. Geosynthetic capillary barriers were also compared side by side with soil-only capillary barriers (silt underlain by coarse sand) under the same infiltration conditions. The moisture storage results in Figure 5(b) indicate that geosynthetic capillary barriers provide a greater increase in moisture storage of overlying soil layers than sand capillary barriers.

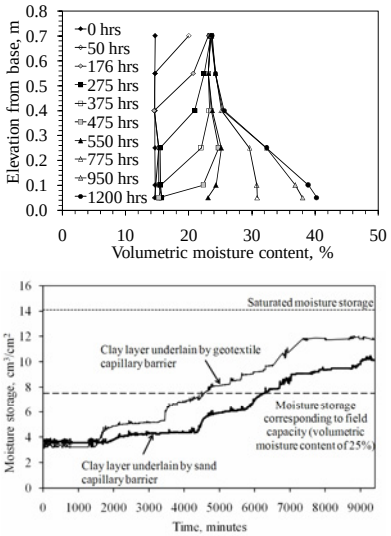


Fig. 5: (a) Moisture profiles; (b) Moisture storage in soil overlying capillary barriers

Efforts to prove the feasibility of this approach have encouraged the use of geosynthetic capillary barriers in many applications to increase the moisture storage of soils or to limit the migration of gas. The applications range from landfill covers, pavement moisture barriers, gas barriers for landfill and mine tailing covers, to precision agriculture systems.

References

McCartney, J. and Zornberg, J. (2004). "Use of Moisture Profiles and Lysimetry to Assess ET Cover Performance." 5th Int. PhD Symp. in Civil Eng. the Netherlands. pp. 961-969.

McCartney, J., Kuhn, J., and Zornberg J. (2005). "Geosynthetic Drainage Layers in Contact with Unsaturated Soils." 16th ISSMGE Conf. 12-16 Sept. Osaka, Japan.

25 Years of IGS Award Winners

Honorary Member

1989	M. Fukuoka
1994	G. den Hoedt
2002	J.P. Giroud
2006	R. K. Rowe
2008	R. Koerner

Recipients of the IGS Plaque

1990	G. Massenaux
1994	T. Ingold
2002	L. Zong Yao
2002	W. Zheng Hong
2002	W. Yu Ren
2006	R. J. Bathurst
2006	W. Voskamp

Giroud Lecturer

1998	R.M. Koerner
2002	R. K. Rowe
2006	C. Lawson

Mercer Lecturer

1992	R.M. Koerner
1994	J.P. Gourc
1996	F. Tatsuoka
1998	A. McGown
2001	R. J. Bathurst
2005	J.P. Giroud
2007	E.M. Palmeira

IGS Award

1990	J.E. Fluet
1990	E.R. Steinle
1994	R.J. Bathurst
1994	R.A. Jewell
1994	R.M. Koerner
1994	J.P. Giroud
1994	R. Bonaparte
1994	F. Tatsuoka
1994	M. Tateyama
1994	O. Murata
1994	H. Tarumi
1996	K.-H. Blume
1996	E. Palmeira
1996	R. Kerry Rowe
1998	R.J. Fannin
1998	H. Miki
1998	R. Bathurst
1998	Z. Cai
1998	T. Ingold
1998	C. Jenner
1998	C. Lawson
1998	B. Myles
1998	R. Wilson-Fahmy
1998	D. Narejo
1998	R. M. Koerner
2000	D. Cazzuffi
2000	P. Rimoldi
2000	A. Scuero
2000	P. Sembenelli
2000	J.P. Gourc
2000	K. Warlouzel
2002	T.M. Allen
2002	I. Al-Qadi
2002	J.S. Thornton
2002	W. Voskamp
2002	B. Christopher
2002	J. DiMaggio
2002	V. Elias
2004	J.P. Giroud
2004	M. Shinoda
2004	J. Zornberg
2004	E. Palmeira
2004	M. Gardoni
2004	R.K. Rowe
2004	A. Li
2006	B. Ramsey
2006	A. H. Aydilek
2006	M. Bouazza
2008	B. de Souza Bueno
2008	P. J. Fox
2008	N. Moraci
2008	Naue GmbH & Co KG

Young IGS Member Award

1990	R.A. Jewell
1996	J. Zornberg
1998	S. Merry
2000	T. Uchimura
2004	J. Kupec
2006	Y. In Oh
2006	N. Touze-Foltz
2006	F. Cartaud
2008	D. Hirakawa
2008	W. Kongkitkul
2008	J. S. McCartney

Special Finalist Recognition Award

1990	R.K. Rowe
1990	K.L. Soderman
1990	B.L.J. Mylleville
1990	R. Bonaparte
1994	I.D. Peggs

IGS Service Award

2001	T. Akagi
2001	D. Elton
2001	C. Lawson
2002	J. Renard
2004	J. Paul
2007	R. Floss
2008	G. Bao
2008	M. Kamon
2008	K. McInnis
2008	B. Myles

IGS Pioneers

2006	P. Barker
2006	D. Cazzuffi
2006	B. Christopher
2006	D. Fayoux
2006	C. Finazzi
2006	M. Fukuoka
2006	C. Fuller
2006	J.P. Giroud
2006	J.P. Gourc
2006	G. Heerten
2006	R. Holtz
2006	J. Kassner
2006	C. Lawson
2006	B. Myles
2006	P. Rankilor
2006	R.K. Rowe
2006	P. Sembenelli
2006	P. Stevenson
2006	R. Wallace

IGS Achievement Award

2006	P. Aguiar, Brazil
2006	D. Bergado, Thailand
2006	S.D. Cho, Korea
2006	K. Iwasaki, Japan
2006	E. Leflaive, France
2006	K. Legge, South Africa
2006	G.V. Rao, India
2006	L. Sarti, Italy
2006	H. Schroeder, Germany
2006	D. Suits, North America
2008	J. Perfetti, France
2008	W. Wilmers, Germany
2008	A. Cancelli, Italy
2008	G. Watts, UK
2008	T. Akagi, Japan
2008	E. S. Shin, Korea
2008	C. G. Bao, China
2008	D. Vidal, Brazil
2008	R. R. Vargas, Mexico
2008	M. Ossa, Chile

Official Journals of the IGS

Electronic Journals Free to IGS Members

IGS official journals ranked in top three of international "geo" journals

The International Geosynthetics Society is unique amongst international learned societies by having two official peer-reviewed archival journals – Geotextiles and Geomembranes (G&G) published by Elsevier Ltd. and Geosynthetics International (GI) published by Thomas Telford Ltd. The publishers of these journals are two of the top publishers of international engineering and science technical journals.

Another unique feature of the relationship between the society and the journals is that all IGS members have electronic access to each issue as a benefit of IGS membership. Comparing annual IGS membership dues to the annual cost of any technical journal reveals that this is a tremendous saving to our members.

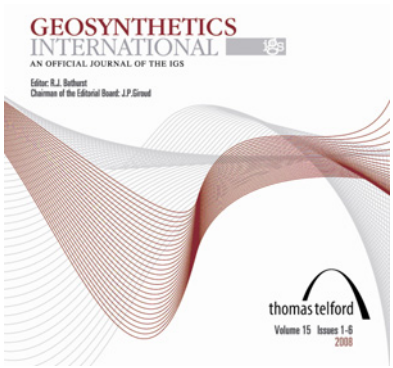
The strong link between our two journals and the IGS is also strengthened by having two past presidents of the IGS as the current editors of these journals – Professor R. Kerry Rowe (Geotextiles and Geomembranes) and Professor Richard J. Bathurst (Geosynthetics International). In addition, Dr. J.P. Giroud (a founding member of the IGS and a past president) is chairman of the editorial board of Geosynthetics International.

The editors of both journals are pleased to report that G&G and GI were ranked respectively, first and third amongst the top 25 "geo" journals on the basis of the 2007 Impact Factor computed by Thomson Scientific (formerly ISI). The impact factors were 3.05 for G&G and 1.15 for GI. Impact factor is calculated as the number of citations in all peer-reviewed journals to articles that appeared in the target journal in the two previous years (i.e. 2005 and 2006) divided by the number of articles in the journal in the target year (i.e. 2007). This is an imperfect measure of the impact of a journal on our discipline and is better suited to fast-paced medical science fields for which this metric was originally conceived. Technical articles in the geoengineering and geoenvironmental fields (including geosynthetics) have much longer life times and value. This is clear when one examines the large number of landmark papers that have appeared in both journals over the last two decades. Nevertheless, for academics for whom impact factor is a concern when deciding where to submit technical manuscripts and for tenure and promotion evaluations, both journals are rated in the top three. Furthermore, the editorial board members of both journals vote to choose annual best papers and these awards are very highly regarded in our geosynthetics fraternity.

Both editors are delighted to report that the number of high quality papers submitted to the journals continues to increase. All submissions are subjected to critical peer review by experts in the field and this has ensured the continuous and uniform high quality of the papers accepted for publication. We hope that all IGS members will take advantage of this unique benefit of IGS membership to regularly read the excellent articles that appear in the journals. Equally important, we invite all IGS members to consider submitting high quality technical articles to the journals.

The editors
R.J. Bathurst & R.K. Rowe
GeoEngineering Centre at Queen's - RMC
Kingston, Ontario, Canada

Geosynthetics International



Geosynthetics International is an official journal of the IGS and has established itself as a premier peer-reviewed journal on geosynthetics. The Journal publishes technical papers, technical notes, discussions, and book reviews on all topics relating to geosynthetic materials (including natural fiber products), research, behaviour, performance analysis, testing, design, construction methods, case histories, and field experience.

Geosynthetics International is only published electronically starting Volume 10 (2003) by Thomas Telford and is free to IGS Members. All others, e.g., corporations, companies, and university libraries, can subscribe at a rate of £ 421 / US$ 870. An individual rate for those non-members whose organization subscribes, but would like an additional personal subscription (including the update CD) will be available for £ 60 / US$ 108.

The update CD is issued annually as part of the subscription for non-IGS Members and includes all papers published in that year. IGS

Members can opt to buy the CD for US$ 100.

Visit the Journal's web site given below for subscription information and instructions for accessing the latest issues.

Papers should be work not published in full elsewhere and should be sent to one of the following individuals:

Professor R.J. Bathurst, Editor *Geosynthetics International*
Department of Civil Engineering
Royal Military College of Canada
P.O. Box 17000, STN Forces Kingston, Ontario K7K 7B4, Canada
Tel: 1/613 541 6000, Ext. 6479
Fax: 1/613 541 6218
E-mail: bathurst-r@rmc.ca

Dr. J.P. Giroud, Chair *Geosynthetics International*
J.P. Giroud, IC.
5837 North Ocean Boulevard
Ocean Ridge, Florida 33435, USA
Tel: 1/561 737 1642
Fax: 1/561 733 2809
E-mail: jpg@jpgiroud.com

For subscription details visit the Journal's web site at: www.thomastelford.com/geosynthetics or contact:

Maria Davis
Thomas Telford Ltd
1 Heron Quay
London E14 4JD, UK
Tel: 44/20 7665 2460
Fax: 44/20 7538 9620
maria.davis@thomastelford.com

Content of Volume: 15, Issue: 4 (2008)

Content of Volume: 15, Issue: 5 (2008)

Geosynthetics International - Best papers in 2007

Geosynthetics International is an official journal of the International Geosynthetics Society and serves the mandate of the society to disseminate important technical developments to its members.

We are delighted to announce the best papers in Volume 14 (2007) selected by the Editor and the Editorial Board Chairman based on votes by the Editorial Board Members. In this competition the Editor and Editorial Board Chairman did not vote and papers co-authored by the Editor were not eligible. This year we had the special result of three papers tied for "Best *Geosynthetics International* Paper for 2007" and three papers tied for second place. This outcome reflects the uniformly high quality of the papers published in the journal. The "Best *Geosynthetics International* Paper for 2007" awards go to:

- Take, W. A., Chappel, M. J., Brachman, R. W. I. & Rowe, R. K. (2007). Quantifying geomembrane wrinkles using aerial photography and digital image processing. *Geosynthetics International*, 14, No. 4, 219–227
- Kongkitkul, W. & Tatsuoka, F. (2007). A theoretical framework to analyse the behaviour of polymer geosynthetic reinforcement in temperature-accelerated creep tests. *Geosynthetics International*, 14, No. 1, 23–38
- Kongkitkul, W., Tatsuoka, F. & Hirakawa, D. (2007). Creep rupture curve for simultaneous creep deformation and degradation of geosynthetic reinforcement. *Geosynthetics International*, 14, No. 4, 189–200

The following papers were tied for second choice and thus receive honourable mention as "one of the best papers published in *Geosyn-*

thetics International in 2007". They are:

- Lange, K., Rowe, R. K. & Jamieson, H. (2007). Metal retention in geosynthetic clay liners following permeation by different mining solutions. *Geosynthetics International*, 14, No. 3, 178–187
- Abdullah, C. H. & Edil, T. B. (2007). Behaviour of geogrid-reinforced load transfer platforms for embankment on rammed aggregate piers. *Geosynthetics International*, 14, No. 3, 141–153
- Smith, M. & Filz, G. (2007). Axisymmetric numerical modeling of a unit cell in geosynthetic - reinforced, column-supported embankments. *Geosynthetics International,* 14, No. 1, 13–22

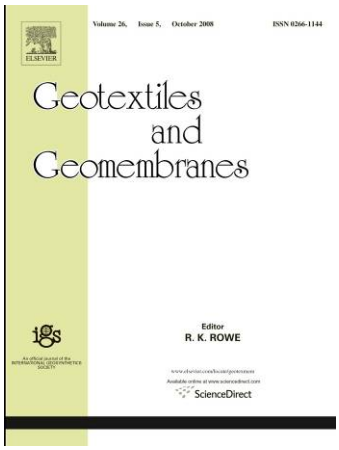
We thank the members of the Editorial Board for participating in the best paper selection process and congratulate the authors of these excellent papers. Each paper reflects the high standards of the Journal and is an important contribution to our geosynthetics discipline.

Geosynthetics International is published by Thomas Telford Ltd. All IGS members have free access to these papers and all other papers published in *Geosynthetics International* as a benefit of membership.

reported by

R.J. Bathurst, Editor
J.P. Giroud, Chairman of the Editorial Board

Geotextiles & Geomembranes



Geotextiles and Geomembranes is dedicated to the mission of the IGS, which is to promote the scientific and engineering development of geotextiles, geomembranes, related products, and associated technologies.

The Journal publishes technical papers, technical notes, discussions, and book reviews on all topics relating to geosynthetics, research, behaviour, performance analysis, testing, design, construction methods, case histories, and field experience.

Papers should be submitted electronically as a Microsoft Word or pdf file to: kerry@civil.queensu.ca

Please ensure the text is double spaced, there is an abstract with keywords included, and tables and figures are at the end following the text. Please check the Journal's instructions for authors for additional information regarding submissions. The Journal strives to provide the authors with quick, constructive reviews, and we appreciate the author's hard work in addressing these comments and quick return of revised papers.

Geotextiles and Geomembranes is now available free in electronic format to IGS Members. To activate free access and to create your personal account, you will need your IGS Membership Number. If you do not know your Membership Number, please contact the IGS Secretariat at IGSsec@aol.com.

For instructions on how to activate access and create your personal account, go the web site provided below.

A hardcopy of *Geotextiles and Geomembranes* is available at a reduced subscription rate to individual and Corporate Members of the IGS. Individual IGS Members may subscribe at an 84% discount: US$170 for six issues. IGS Corporate Members may subscribe at a 64% discount: US$396 for six issues. Please indicate that you are an IGS Member when requesting the special price.

For editorial enquiries contact:

Dr. R. Kerry Rowe, Editor Geotextiles and Geomembranes
Dept. of Civil Engineering Ellis Hall, Queens University Kingston,
Ontario K7L 3N6 CANADA
Fax: 1/613 533 6934
E-mail: kerry@civil.queensu.ca

For more information on obtaining electronic and hard copy subscriptions to *Geotextiles and Geomembranes* please go to the following IGS web site:

www.geosyntheticssociety.org/

For direct connection to the home page of the journal with the possibility to download PDF-files of the full papers (IGS members and abonnents only) please follow this link:
http://www.sciencedirect.com/science/journal/02661144

Content of Volume 26, Issue 5 (October 2008)

Mahmoud Ghazavi, Arash Alimardani Lavasan PDF (928 K)
Design of geosynthetic-reinforced platforms spanning localized sinkholes
Laurent Briançon, Pascal Villard
PDF (327 K)

Performance evaluation of silty sand subgrade reinforced with fly ash and fibre
Mahipal Singh Chauhan, Satyendra Mittal, Bijayananda Mohanty
PDF (455 K)

An investigation into the use of blends of two bentonites for geosynthetic clay liners
Slávka Andrejkovičová, Fernando Rocha, Ivan Janotka, Peter Komadel PDF (480 K)

Calendar of Events

Conferences

Symposia

Workshops

Short Courses

Expositions

Trade Shows

6th Asian Young Geotechnical Engineers' Conference – Next Generation Geotechnics
Bangalore, India
20 - 21 December 2008
E-mail: sitharam@civil.iisc.ernet.in
www.civil.iisc.ernet.in/~igc2008/

FS-KGEO 2009
Kunststoffe in der Geotechnik
Munich, Germany
12 February 2009
E-mail: fskgeo@bv.tum.de
http://www.gb.bv.tum.de/fachsektion/a_veranstaltungen.htm

Geosynthetics 2009
Salt Lake City, Utah, USA
25 - 27 February 2009
http://www.geoshow.info/

III Latin American Conference of Young Geotechnical Engineers
Cordoba, Argentina
30 March - 1 April 2009
E-mail: 3cligj@efn.uncor.edu

7èmes Rencontres Geosynthetiques
Nantes, France
1 - 3 April 2009
www.rencontresgeosynthetiques.org/

ERES 2009 - Seventh International Conference on Earthquake Resistant Engineering Structures
Cyprus
11 - 13 May 2009
E-mail: imoreno@wessex.ac.uk

International Symposium on Prediction and Simulation Methods for Geohazard Mitigation
Kyoto, Japan
25 - 27 May 2009
E-mail: foka@mbox.kudpc.kyoto-u.ac.jp
www.nakisuna2.kuciv.kyoto-u.ac.jp/tc34/is-kyoto/

Geo-Environmental Engineering 2009 (GEE 2009) the 9th Joint Seminar on Geoenvironmental Engineering
Vancouver, Canada
10 - 12 June 2009
E-mail: gee2009@civil.ubc.ca
http://gee2009.civil.ubc.ca

IS-Tokyo 2009 - International Conference on Performance-Based Design in Earthquake Geotechnical Engineering
Tsukuba, Japan
15 - 17 June 2009
E-mail: ytsoil@rs.noda.tus.ac.jp
www.rs.noda.tus.ac.jp/ytsoil/IS2009.htm

The 3rd International Geotechnical Symposium (IGS2009) on Geotechnical Engineering for Disaster Prevention and Reduction
Harbin, China
22 - 25 July 2009
E-mail: maocai@mail.ru, zhao_maocai@sohu.com
www.igs2009.hit.edu.cn

GeoAfrica 2009
The First African Regional Conference on Geosynthetics
Cape Town, South Africa
2 - 4 September, 2009
www.geoafrica2009.org

3rd Remediation Technologies Expo RemTech 2009
Ferrara, Italy
23 - 25 September 2009
Email: info@remtechexpo.com
www.remtechexpo.com

XVII Int. Conference for Soil Mechanics and Geotechnical Eng.
Alexandria, Egypt
5 - 9 October 2009
www.2009icsmge-egypt.org/

Sardinia 2009
12th International Waste Management and Landfill Symposium
S. Margherita di Pula, Cagliari, Italy
5 - 9 October 2009
Email:
info@sardiniasymposium.it
www.sardiniasymposium.it

3rd Portuguese Seminar on Geosynthetics
University of Coimbra, Portugal
19 - 20 November 2009
Email: 3spgeo@dec.uc.pt
http://3SPGeossinteticos.dec.uc.pt

9th International Conference on Geosynthetics
Guarujá, Brazil
23 – 27 May 2010
http://www.9icg-brazil2010.info

Note:

- Items in bold blue print are organized under the auspices of the IGS or with the support of the IGS.

Corporate Membership

Corporate Members of the IGS

1984

Asahi Kasei Geotechnologies Co., Ltd.
(Japan)
Du Pont de Nemours (Luxembourg) S.A.
(Luxembourg)
Fibertex A/S
(Denmark)
Japan Spunbond -- Toray Corp.
(Japan)
Okasan Livic Co. Ltd.
(Japan)
Swiss Association for Geosynthetics SVG
(Switzerland)
TenCate Geosynthetics Europe GmbH
(Austria)
Tokyu Construction Co. Ltd.
(Japan)

1985

Bonar Technical Fabrics N.V.
(Belgium)
Fritz Landolt AG
(Switzerland)
Geosynthetic Materials Association (GMA)
(USA)
Kajima Corporation
(Japan)

1986

Colbond bv.
(The Netherlands)

1987

Huesker Synthetic GmbH & Co.
(Germany)
NAUE GmbH & Co. KG
(Germany)

1988

GSE Lining Technology, Inc.
(USA)
Obayashi Corporation
(Japan)
Terram Ltd.
(United Kingdom)

1989

Belton Industries, Inc.
(USA)
Kuraray Co., Ltd.
(Japan)
Reinforced Earth Company, The
(USA)
Tensar International
(United Kingdom)
Tensar International Corporation
(USA)

1990

Shimizu Corporation
(Japan)

1991

Cofra BV
(The Netherlands)
Geosistemas Pavco S.A.
(Colombia)
Propex
(USA)
Taiyo Kogyo Corporation (SUN)
(Japan)
Tenax S.p.A.
(Italy)

1992

Cetco
(USA)
Maeda Kosen Co. Ltd.
(Japan)
Mitsubishi Plastics, Inc.
(Japan)
Mitsui Chemicals Industrial Products, Inc.
(Japan)

1993

Tanaka Co. Ltd.
(Japan)

1994

Dae Han Industrial Material Co., Ltd.
(Korea)

1995

Geofabrics Ltd.
(United Kingdom)
Tele Textiles AS
(Norway)

1996

Agru Kunststofftechnik GmbH
(Austria)
Alcoa Geosystems
(USA)
Colas Group, The
(France)
Geofelt GmbH
(Austria)
Poly Flex, Inc.
(USA)
Taiyo Kogyo Co., Ltd. (Ocean)
(Japan)

1997

FITI Testing and Research Institute
(Korea)
Officine Maccaferri S.P.A.
(Italy)
Solmax International, Inc.
(Canada)

1998

Association of RRR Construction System, The
(Japan)
Beaulieu Technical Textiles
(Belgium)
Field Lining Services
(Republic of Panama)
Integrated Geotechnology Institute Limited
(Japan)
Juta a.s.
(Czech Republic)
Maccaferri do Brasil Ltda
(Brazil)
Reliance Industries
(India)
TenCate Geosynthetics North America
(USA)
Tenox Corporation
(Japan)

1999

Araigumi Co., Ltd.
(Japan)
Atarfil S.L.
(Spain)
Emas Kiara SDN BHD
(Malaysia)
Werkos
(Croatia)

2000

BASF Construction Chemicals España, S.A.
(Spain)
Geosystem Co. Ltd.
(Japan)
Hojun Yoko Co. Ltd.
(Japan)

Hui Kwang Corporation
(Taiwan, R.O.C.)
Punzonados Sabadell, S.A.
(Spain)
TMA, S.L.
(Spain)

2001

ABG Limited
(United Kingdom)
Engepol Geossintéticos Ltda
(Brazil)

2002

Alpe Adria Textil
(Italy)
Edilfloor SpA
(Italy)
F.L.I. Environmental
(Ireland)
Laviosa Chimica Mineraria
(Italy)
Shenzhen Sheng Yi Environmental Co., Ltd.
(China (P.R.))
Terre Armee International
(France)

2003

Ace Geosynthetics
(Taiwan, R.O.C.)
Ashimori Industry Co., Ltd.
(Japan)
OJSC "494 UNR"
(Russia)
Permathene, Ltd.
(New Zealand)
PRS Mediterranean, Ltd.
(Israel)
Samyang Corporation
(Korea)
Tensar Geosynthetics (Wuhan) Limited
(China (P.R.))

2004

Gidrokor, Ltd.
(Russia)
GreenVision, S.p.A.
(Italy)
GSE Lining Technology GmbH
(Germany)
Linear Composites Limited.
(United Kingdom)
NewGrids Limited.
(United Kingdom)

2005

Arrigo Gabbioni Italia s.r.l.
(Italy)
Copro
(Belgium)
Dinagrid Geosynthetics S.L.
(Spain)
High Stiffness Polyethylene Pipes Association
(Japan)
Iran Bana Arian
(Iran)
Seven States Enterprise Co., Ltd.
(Taiwan R.O.C.)
Tokyo Ink Co., Ltd.
(Japan)

2006

Beijing Gaoneng Lining Engineering Co., Ltd.
(China (P.R.))
Checkmate Geosynthetics
(Canada)
Euroizol Geosynthetics
(Ukraine)
Garware-Wall Ropes, Ltd.
(India)
Geoliners de Mexico SA de CV
(Mexico)
Geosolutions Serviços em Geossintéticos Ltda.
(Brazil)
geosynthetica.net
(USA)
GSE Lining Technology Chile S.A.
(Chile)
I-CORP INTERNATIONAL
(USA)
MiraCell CCS Sdn Bhd
(Malaysia)
TeMa Technologies and Materials Srl
(Italy)
Viganò Pavitex S.P.A.
(Italy)

2007

Geosinteticos Trical, C.A.
(Venezuela)
Geosynthetics Technologies Co., Ltd.
(Saudi Arabia)
Geotech L.L.C.
(United Arab Emirates)
Hakogatayouheki Institute Co., Ltd.
(Japan)
Supertex, Inc.
(USA)
Texinov
(France)

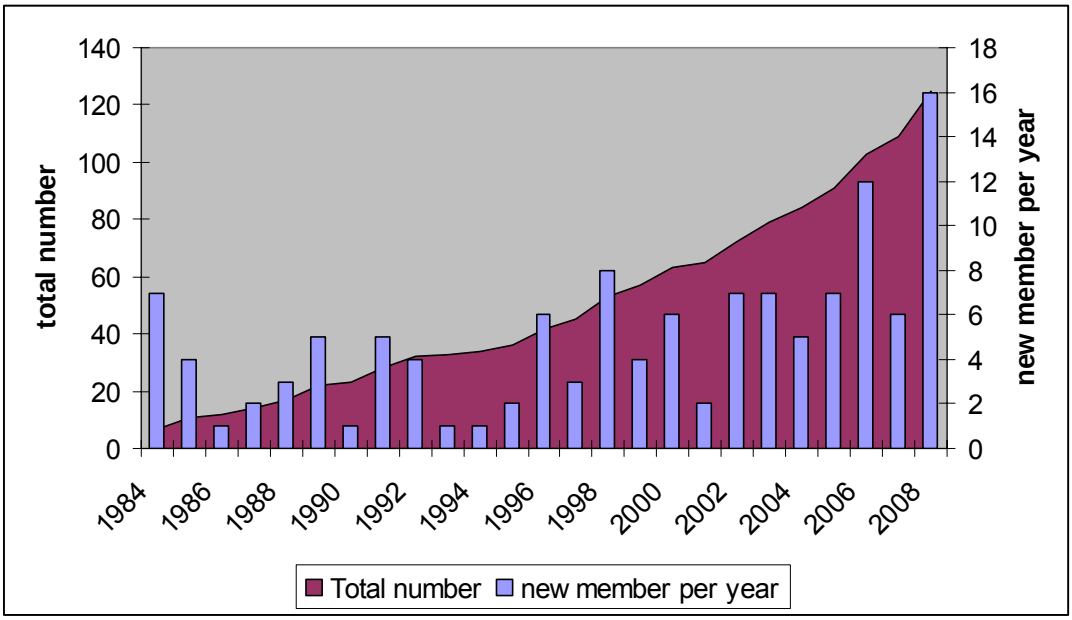
2008

Alyaf Industrial Company Ltd
(Saudi Arabia)
Aqua Terra
(Republic of Panama)
BMC Gulf Trading & Contracting LLC
(United Arab Emirates)
Chidak Baspar
(Iran)
Coripa S.A.
(Argentina)
CTH Geosynterer AS
(Norway)
Fontana International GMBH
(Austria)
Geosinteticos Origo SA C.V.
(Mexico)
Intermas Nets S.A.
(Spain)
Isbir Sentetik Dokuma Sanayi A.S.
(Turkey)
Kaytech Engineered Fabrics
(South Africa)
Manifattura Fontana S.p.A.
(Italy)
Mekamore Co., Ltd
(Korea)
Ramalho Comercial Ltda
(Brazil)
Servicios de Ingenieria Geosintetica S.A. (SIGSA)
(Costa Rica)
Sohams Foundation Engineering Pvt. Ltd
(India)
TechFab India Industries Ltd.
(India)
Tekpro
(Russia)
TRI/Environmental Inc.
(USA)

Notes:

- A click to the name of the corporate member leads to the corresponding entry at the IGS website. The corporate members are encouraged to check their entry there!
- Date is earliest year of continuous membership

Development of Corporate Membership



Celebrating 20 Years of Corporate Membership

On the occasion of the 25th of the IGS in 2008 the Society has initiated a program to recognize those corporate members that have 20 years or more continuous membership. In 2008 there are 18 such companies. In 2010, at the 9th ICG, the program will continue with as many as 6 companies to be recognized.

Recognition ceremonies and the presentation of a "gift" for each company have taken place at the three IGS events in 2008, GeoAmericas in Cancun, Geosynthetics Asia in Shanghai and EuroGeo4 in Edinburgh or sent by mail. The companies that have been recognized are listed below.

Geosynthetic Materials Association (GMA), USA

Asahi Kasei Geotechnologies Co., Ltd., Japan

ASAHI-KASEI GEOTECH

Bonar Technical Fabrics N.V., Belgium

NAUE GmbH & Co. KG, Germany

NAUE

Kajima Corporation, Japan

鹿島 KAJIMA CORPORATION

Colbond bv., The Netherlands

COLBOND

Du Pont de Nemours (Luxembourg) S.A., Luxembourg	Huesker Synthetic GmbH & Co., Germany	Terram Ltd., United Kingdom
Fibertex A/S, Denmark	Okasan Livic Co. Ltd., Japan	Japan Spunbond - Toray Corp., Japan
Fritz Landolt AG, Switzerland	Swiss Association for Geosynthetics SVG, Switzerland	Obayashi Corporation, Japan
GSE Lining Technology, Inc., USA	TenCate Geosynthetics Europe GmbH, Austria	Tokyu Construction Co. Ltd., Japan

Corporate Profile

IGS Corporate Members are encouraged to publish a Corporate Profile in IGS News. A maximum of three profiles can be published in each issue of IGS News. The criteria for the preparation and submission of Corporate Profiles are available from the Editor. There is no charge for having a Corporate Profile published; it is a benefit of corporate membership.

Incorporated in 1992 ALYAF pioneered the production of technical nonwovens for the geotextile applications and reinforcements mats for the bituminous waterproof membrane manufacturing industry in the Middle East. In 2005 it doubled its production capacity by adding a new production line. The tremendous confidence shown by its customers lead ALYAF to further increase in capacity and upgrade its range in 2008 by investing in the premier technology for the exclusive production of geotextiles.

ALYAF INDUSTRIAL CO LTD

www.alyaf.com

ALYAF is the largest manufacturer of geotextile in the Middle East. It offers a wide range of high performance geotextiles from 60 gm/m2 to 1500 gm/m2, in widths upto 6 meters, engineered to serve various civil engineering applications including:

Known for its quality the entire range of ALYAF geotextiles are manufactured to strict quality management systems certified under ISO 9001:2000. ALYAF has specialized geotextile testing facilities for testing to specific ASTM, EN and ISO standards.

ALYAF has a team of dedicated engineers to provide you with efficient response to your queries, assist in the design and selection of the most appropriate geotextile as well as on site installation support.

SOIL STABILIZATION

SHORE PROTECTION, QUAY WALLS & BREAK WATERS

LANDFILLS, PONDS, ETC

PAVEMENT CONSTRUCTION

DRAINAGE SYSTEMS

TUNNEL LINING

REHABILITATION OF ASPHALT PAVEMENTS

ALYAF INDUSTRIAL CO LTD
DAMMAM 31443
SAUDI ARABIA
PHONE: +966 3 8121206
FAX: +966 3 8121836

EMAIL: info@alyaf.com

TÜV CERT
EN ISO 9001 : 2000
CERT. REG. # 04 100 010368

CELLULAR CONFINEMENT SYSTEM

IGS Council

Elected in 2006

S. Allen (USA)
G. Bräu (Germany)
N. Dixon (United Kingdom)
N. Freitag (France)
M. Maugeri (Italy)
J. Otani (Japan)
E. Palmeira (Brazil)
E. Peggs (USA)

Co-opted in 2006

M. Chen (China P.R.)
J. Ferreyros (Peru)
P. Legg (South Africa)
P. Stevenson (USA)

Co-opted in 2008

V. Pimentel (Brazil)

Elected in 2008

D.T. Bergado (Thailand)
A Bouazza (Australia)
P. Fantini (Italy)
H.Y. Jeon (Korea)
R. Jones (United Kingdom)
J. Kuwano (Japan)
M. Sadlier (Australia)
M. Ziegler (Germany)

IGS Officers

President

Prof. Fumio Tatsuoka
Tokyo University of Science
Dept. of Civil Engineering
2641 Yamazaki, Noda City
Chiba Prefecture 278-8510
JAPAN
Tel: 81/47122 98190
Fax: 81 47123 9766
E-mail: tatsuoka@rs.noda.tus.ac.jp

Vice-President

Jorge G. Zornberg, PhD., P.E.
The University of Texas at Austin
Civil, Architectural & Environmental
Engineering Department
1 Univ. Station C1792 Rm ECJ9, 227G
Austin, Texas 78712-0280 USA
Tel: 1/512 232 3595
Fax: 1/512 471 6548
E-mail: zornberg@mail.utexas.edu

Immediate Past-President

Dr.-Ing. Daniele A. Cazzuffi
CESI SpA
Via Rubattino, 54
I - 20134 Milano
ITALY
Tel: 39/02 2125 5375
Fax: 39/02 2125 5475
E-mail: cazzuffi@cesi.it

Treasurer

Mr. John Cowland
GeoSystems Ltd.
3 Arcadia, 99 Chuk Yeung Road
Sai Kung, N.T.
Hong Kong, China
Tel: 852/9884 8616
Fax: 852/2849 2918
Email: cowland@netvigator.com

Secretary

Mr. Peter E. Stevenson
226 Sitton Rd.
Easley, SC 29642-8393 USA
Tel: 1/864 855 0504
Fax: 1/864 859 1698
E-mail: igspete@aol.com

IGS News Editor and Chapter Correspondents

Editor

Gerhard Bräu
Technische Universität München–Zentrum Geotechnik
Baumbachstrasse 7, 81245 München, Germany
Tel: +49-89-289-27139, Fax: +49-89-289-27189
Email: g.braeu@bv.tum.de

Chapter Correspondents

Belgium, Frans De Meerleer, frans.texion@skynet.be
Brasil, André Estêvão Silva, tesouraria@igsbrasil.org.br
China, Xiao-Wu Tang, tangxiaowu@zju.edu.cn
Czech Republic, Pavel Mann, mann@igs.cz
Germany, Gerhard Bräu, g.braeu@bv.tum.de
Greece, Anastasios Kollios, akollios@edafomichaniki.gr
India, G. Venkatappa Rao, gvrao.19@gmail.com
Italy, Nicola Moraci, nicola.moraci@unirc.it
Japan, Jun Otani
junotani@kumamoto-u.ac.jp
the Netherlands, Shaun O'Hagan, s.ohagan@planet.nl
North American Geosynthetics Society, L. David Suits,
Nagsdirector@aol.com
Norway, Hanne Louise Moe, hanne.l.moe@sintef.no
Portugal, Madalena Barroso, mbarroso@lnec.pt
Romania, Loretta Batali, Loretta@hidro.utcb.ro
Russia, Vladimir Kleveko, vlivkl@pochta.ru
South Africa, Peter Davies, peter@kaytech.co.za
South Korea, Myoung-Soo Won,
wondain@kunsan.ac.kr
Spain, Pedro L. Abad, Pedro.Abad@cetco.es
Thailand, Ms. Lynn, igs-thailand@ait.ac.th
Turkey, Orkun Akkol, orkunakkol@orientreserch.com
United Kingdom, Peter Langley,
PLangley@geofabrics.com
West Pacific, San-Shyan Lin,
ssLin@ntou66.ntou.edu.tw

IGS News is published three times per year. Material for publication should be submitted to the Editor by 31 January, 31 May, and 30 September, for possible publication in the March, July, and November issues, respectively.

IGS Clothing

IGS Logo Clothing is now available on-line. Hats, visors and various shirts can be viewed and ordered through the Members Only Section (www.geosyntheticssociety.org/membersOnly/Login.asp) of the site.

	Item Name	Item Number	Available Sizes	Colors	Cost
	Visor	840	One size fits all	White, Stone, Aqua, Carrot, Khaki, Dandelion	$11.00
	Cap	810	One size fits all	White, Khaki	$11.00
	T-Shirt	PC61	S, M, L, XL	White, Aqua, Ash, Gold, Daffodil, Light Blue, Lime, Red, Natural,Orange Sherbet, Pink, Sand, Stonewash Green, Stonewash Blue, Spruce, Heather, Colonial Blue,	$11.00
	Gildan Golf Shirt	3800	S, M, L, XL	Ash, Gold, Sport Grey, Cardinal Red, Sand, Carolina Blue, Light Blue, Tangerine, Yellow Haze	$17.00
	Cutter & Buck Golf Shirt	02481	S, M, L, XL	White, Lotus, Putting Green, Red, Black, Sea Blue, Navy Blue	$35.00
	Short Sleeve Button Down	507	S, M, L, XL	Light Stone, White, Faded Blue	$28.00
	Long Sleeve Button Down	620	S, M, L, XL	Cypress, White, Light Blue, Stone	$35.00

International Geosynthetics Society
P.O. Box 347
Easley, SC 29641 USA
telephone: +1-864-855-0504

Hints for easy usage of this document

To allow easy and most effective use of this IGS News we tried to incorporate as many links to further information on the internet as possible. This means that moving around with the mouse pointer in the PDF-file allows direct linkage to webpages of the conferences, documents of IGS, journals, email addresses, IGS Corporate Members pages and many other things.

Furtheron you can click on the page numbers at the "Content" on the front page to jump directly to the article.

Another useful tool is the "bookmark" function within your PDF--Reader. This functionality shows you on the left part of your screen the content with the headlines of the articles and on the right part the article itself.

If you have any further ideas to improve the usage of IGS News – please let us know!

Imprint

Visit the IGS Website:
www.geosyntheticssociety.org

IGS MEMBERSHIP REQUIRES ELECTRONIC COMMUNICATION – PLEASE ENSURE WE HAVE YOUR CURRENT E-MAIL ADDRESS

IGS News is published by:

International Geosynthetics Society
P.O. Box 347
Easley, SC 29641
USA
Tel: +1-864-855-0504
Fax: +1-864-859-1698
Email: IGSsec@aol.com

For editorial enquiries contact:

Mr. Gerhard Bräu
Technische Universität München –
Zentrum Geotechnik
Baumbachstrasse 7
81245 München
Germany
Tel: +49-89-289-27139
Fax: +49-89-289-27189
Email: g.braeu@bv.tum.de

The International Geosynthetics Society

OBJECTIVES OF THE IGS

The International Geosynthetics Society was formed with the following objectives:

- to collect, evaluate, and disseminate knowledge on all matters relevant to geotextiles, geomembranes, related products, and associated technologies;
- to improve communication and understanding regarding geotextiles, geomembranes, related products, and associated technologies, as well as their applications;
- to promote advancement of the state of the art of geotextiles, geomembranes, related products, and associated technologies; and
- to encourage, through its Members, the harmonization of test methods, and equipment and criteria for geotextiles, geomembranes, related products, and associated technologies.

WHY BECOME A MEMBER OF THE IGS?

First, to contribute to the development of our profession.

By becoming an IGS Member you can:

- help support the aims of the IGS, especially the development of geotextiles, geomembranes, related products, and associated technologies;
- contribute to the advancement of the art and science of geotextiles, geomembranes, related products, and their applications;
- provide a forum for designers, manufacturers, and users, where new ideas can be exchanged and contacts improved; and
- become increasingly informed, involved, and influential in the field of geotextiles, geomembranes, related products, and associated technologies.

Second, to enjoy the benefits.

The following benefits are now available to all IGS Members:

- the IGS Membership Directory, published yearly;
- the newsletter, IGS News, published three times per year;
- free electronic issues of Geosynthetics International and Geotextiles & Geomembranes;
- a CD containing the 19 IGS Mini Lecture Series;
- a DVD containing the three IGS Videos;
- information on test methods and standards;
- discount rates on the purchase of any future documents published by the IGS and on the registration cost of all international, regional, or national conferences organized by or under IGS auspices;
- preferential treatment at conferences organized by or under the auspices of the IGS; and
- the possibility of being granted an IGS award.

IGS MEMBERSHIP APPLICATION

Membership of the International Geosynthetics Society (IGS) is open to individuals or corporations "... engaged in, or associated with, the research, development, teaching, design, manufacture or use of geotextiles, geomembranes, and related products or systems and their applications, or otherwise interested in such matters.". The annual fee for membership is US$45 for individuals and US$1000 for Corporate Members. Individuals of, or not of, corporations who voluntarily contribute a minimum of US$200 annually to the IGS, in excess of their membership dues, will be mentioned in the IGS Directory in a separate list as benefactors.

Write your address below as you wish it to appear in the next *IGS Directory*

Title (circle one): Mr. Ms. Dr. Prof. Other _____ Position _____

First name: _____

Last name: _____

Company name: _____

Address: _____

_____

City: _____ Province/State: _____

Postal code: _____ Country: _____

Telephone: _____

Fax: _____

E-mail: _____

Send this completed form to:

IGS Secretariat
P.O. Box 347
Easley, SC 29641-0347
USA

Telephone: **1/864 855 0504**
Fax: **1/864 859 1698**
E-mail: **igssec@aol.com**

Eligibility (i.e., your connection to geotextiles, geomembranes, related products, and associated technologies):

_____

_____

_____

_____

_____

_____

Membership fee schedule: ❑ Individual US$45.00 ❑ Corporate US$1,000.00 ❑ Benefactor's contribution (at least US$200.00)

Mode of payment:

❑ Check enclosed drawn on a US bank

Date: _____

❑ Credit card (circle one): Mastercard Visa American Express

Account number: _____

Expiration date: _____

Name on card: _____

Authorized signature: _____

Please check whether there is a local IGS Chapter in your country!
(see list at page 23 of this issue)