

IGS NEWS

NEWSLETTER OF THE INTERNATIONAL GEOTEXTILE SOCIETY
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FOCUS ON JAPAN

by

R.J. Bathurst, Editor IGS News

The month of November 1992 marked a series of events in Japan of interest to the international geosynthetics community. These events included two international conferences on geosynthetics, a geosynthetics seminar and IGS Council activities. At the time of writing, IGS President R.K. Rowe is following these activities with a visit to IGS Chapters in Indonesian and South East Asia.

International Symposium on Recent Case Histories of Permanent Geosynthetic-Reinforced Soil Retaining Walls, 6-9 November

The International Symposium on Recent Case Histories of Permanent Geosynthetic-Reinforced Soil Retaining Walls was hosted by the Institute of Industrial Science, University of Tokyo and organized by Professor Fumio Tatsuoka. The symposium was well attended with 135 participants. The purpose of the symposium was to provide an international forum to exchange ideas on the use of geosynthetic-reinforced soil retaining walls for permanent structures. The emphasis was the use of these structures as embankments and bridge abutments in road and railway applications. The first day of the symposium was devoted to a series of invited papers by recognized experts from a number of countries who illustrated a wide range of construction methods through case histories. Dr. Tatsuoka in his opening address to the symposium set the tone for the series of lively discussions that followed the presentations by asking the speakers and the audience to express their views on the potential problems and advantages of this rapidly emerging technology. The influence of facing type and rigidity on design and analysis was the focus of much discussion as was the relative merits of inextensible and extensible reinforcement in retaining wall construction. Case histories were given by R.J. Bathurst (Canada), D. Cazzuffi (Italy), B.R. Christopher (USA), J.G. Collin (USA), J-P. Gourc (France), C.J.F.P. Jones (UK), H. Miki (Japan), O. Murata (Japan), C.C. Huang (Taiwan), L. Wichter (Germany). The second day of the conference included presentations on model testing by Y. Matichard (France), R.A. Jewell (Belgium) and M. Sugimoto (Japan) followed by a two hour free discussion period chaired by R.A. Jewell and D. Leshchinsky (USA) who also made presentations. On the afternoon of 7 November the participants were hosted at the Japan Railway (JR) Research

Institute in Tokyo and were taken on a tour of the JR test site containing full-scale prototype geosynthetic-reinforced retaining wall structures. The results of this research project have been used by Japan Railway to develop the current rigid facing method of construction that is a cost-effective solution to railway embankment and bridge abutment structures in Japan (see Permanent Geosynthetic-Reinforced Soil Retaining Walls for Railway Embankments in Japan, IGS News Vol 8 No 1 March 1992). The scale of the trial walls and the program of testing and instrumentation was the envy of many of the modellers present at the symposium and highlighted the commitment of the corporate sector in Japan to geosynthetics research. On 9 November a day-long tour of retaining wall structures at Osaka and Amagasaki completed the program at this very successful symposium.

A hardcopy of the proceedings of this symposium will be published by A.A. Balkema Publishers in early 1993.

The International Symposium on Earth Reinforcement Practice (IS Kyushu'92) 11-13 November

The International Symposium on Earth Reinforcement Practice was held in Fukuoka (Kyushu Island) and attracted 78 overseas participants and 310 Japanese attendees. The conference was held under the auspices of the Japanese Society of Soil Mechanics and Foundation Engineering and supported by the International Geotextile Society and the Japanese Society of Civil Engineers. The conference was superbly executed by the conference organizers chaired by Professor H. Ochiai. A series of special and keynote lectures were given by internationally recognized experts in geosynthetics: Prof. T. Yamanouchi (Kyushu Sango University, Japan) *Historical Review of Geotextiles for Reinforcement of Earth Works in Asia*, Prof. J-P. Gourc (Universite Joseph Fourier, France) *Geosynthetics in Embankments, Review of Theory and Practice*, Dr. R.A. Jewell (GeoSyntec Consultants, Belgium) *Links between Modelling, Testing and the Design of Reinforced Soil*, Prof. D. Leshchinsky (University of Delaware, USA) *Issues in Geosynthetic-Reinforced Soil*, Prof. R. Kerry Rowe (University of Western Ontario, Canada) *A Review of the Behaviour of Reinforced Soil Walls*, and Prof. F. Tatsuoka (University of Tokyo, Japan) *Roles of Facing Rigidity in Soil*

Reinforcing. The first volume of the proceedings of the conference are available from A.A. Balkema Publishers and contain 126 papers (89 papers on geosynthetics or related technologies). A total of 48 papers contained in the proceedings were delivered at the conference in five sessions. Each session included a discussion period which provoked much useful discussion of the presented papers. A second volume of the proceedings containing the special lecture by Prof. Yamanouchi, keynote addresses, session summaries, discussion leader reports and floor discussions will be published shortly by Balkema.

Many of the participants took advantage of the exhibition that ran concurrently with the symposium and featured 12 manufacturers and construction companies. In addition, many attendees took some time to attend the Grand Sumo wrestling championships that were also underway in Fukuoka at the time of the conference. The conference concluded with a banquet which will be remembered for its fine food and the drinking of sake taken from a cask that was opened in traditional Japanese fashion by Prof. T. Yamanouchi, Professor M. Fukuoka and Dr. J-P. Giroud.

2nd Tokyo Geotextile Seminar

Chou University, Tokyo, 16 November

Following a tradition established in 1988 (when the IGS Council last met in Japan) current and past members of the IGS Council gave a day long series of lectures to members of the Japanese Chapter of the IGS. The presentations were given by: Prof. R.K. Rowe *The role of geosynthetics in the design of landfills*, Dr. R.J. Bathurst *Performance of several instrumented geogrid reinforced soil retaining walls in North America*, Dr. J-M. Rigo *The European harmonization of design and test methods on geosynthetics: The Japanese interest*, Mr. B. Myles *Geotextile specifications and their relationship to test methods and application requirement*, Mr. D.A. Cazzuffi *Embankment dams and impervious upstream facings: an overview of Italian practice*, Mr. P.E. Stevenson *The nature of the geotextile market in the United States*. Simultaneous translation of the speaker presentations was provided to the attendees together with a collection of preprints of the speaker lectures. The seminar was attended by more than 100 persons.

Following the seminar the speakers were hosted at a Tokyo bar where IGS President R.K. Rowe and IGS Treasurer P.E. Stevenson made their debut as Karaoke singers.

IGS Council Activities 8-16 November

The officers of the IGS held their annual meeting in Fukuoka on the 8 November followed by a two day IGS Council meeting. The Council meeting was the first for six recently elected Council members (see IGS News Vol 8 No 2 p. 3). The writer was one of the novice Council members and was duly impressed by the smooth execution of the IGS agenda chaired by IGS President R.K. Rowe. A number of important issues were decided including a decision to hold a ballot on the name of the society. This ballot will be held prior to the next international conference in Singapore in 1994. Details of this ballot will be forthcoming in the next issue of IGS News. A summary of the minutes of the IGS Council meeting by Wim Voskamp (Secretary of the IGS) is given on page 3 of this issue of IGS News.

A luncheon meeting hosted by the Japanese Chapter of the IGS was held on 16 November in Tokyo to provide a

forum for exchange of ideas between the Japanese Corporate members and IGS Council members. Almost all of the 21 Japanese Corporate members were present. Prof. R.K. Rowe congratulated the Corporate members on their support of IGS and noted that Japanese Corporate members comprise almost half of the 48 Corporate members of the society. He reviewed the many contributions of the society to its members including the activities of the education committee, student chapters, standards committee and the many seminars given by IGS Council members throughout Southeast Asia and the world. He also noted that the IGS has formed a technical committee that will compile a list of current design "standards" as its first activity. Also, the publications committee is preparing a booklet of basic information on geosynthetics to be sent to all IGS members in late 1993. Prof. Rowe also alerted the Corporate members to the advances that have been made in many western countries with respect to geosynthetics in landfill construction. He identified geosynthetics in landfill design as an area of high growth potential in Japan and Southeast Asia. Prof. Rowe also took the opportunity to thank Prof. Fukuoka for his many contributions to the IGS and in particular his efforts to successfully attract contractors and manufacturers in Japan to become Corporate members. The president and many of the IGS Council Members congratulated the Japanese corporate members and the Japanese geosynthetics fraternity on the great accomplishments that have been made in Japan and noted that Japan is a leader in geosynthetics research and application. In particular, it was apparent to all Council members that geosynthetics research and their use in civil engineering works is being driven by the Japanese Corporate members through long term in-house research programs that are on a scale not seen in most other countries. Finally, it would be remiss of the writer not to compliment Dr. T. Akagi who throughout the meeting provided spontaneous and thorough translation of the oral presentations by all participants as required.

On 15 November, D. Cazzuffi, Chairman of the IGS Education Committee gave a three-hour lecture to the student members of the Japanese Chapter of the IGS (see p. 8 of this issue).

IGS Council Tours

Several of the Council members took the opportunity during the weekend between IS Kyushu'92 and the meeting with Corporate Members to tour some of Japan's famous historical sites. Dr. T. Akagi guided the group through Nijo Castle, the Golden Pavilion and Sanjusangendo Budist Hall in Kyoto and several religious shrines in Kamakura and Tokyo. The final day of the IGS program was the 18 November and was devoted to a technical tour of the Haneda Airport offshore development project in Tokyo and the Kawakasi island construction project in Tokyo bay. Mr. M. Sakaguchi and Dr. T. Ogawa of the Taisei Corporation made themselves available to guide Prof. R.K. Rowe and the writer on these tours.

The success of the many events hosted by the geosynthetics community in Japan will soon be followed by another important Asian event—the 5th International Conference of the IGS to be held in Singapore in September 1994. I am sure, that all IGS members can look forward to a similar rewarding technical and social program in Singapore. Mark your calendar.

By-law changes for Associate Corporate Members

A postal ballot was organized in June 1992 to seek approval of the changes in the By-laws of the IGS for the formation of the Associate Corporate Membership Category.

The votes were counted on 17 July 1992 and the results recorded. The vote counting committee consisted of Koos van Harten, Koos Mouw and Wim Voskamp. A total of 502 completed ballot forms were received. Of these, 466 members voted to approve the changes, 34 members did not approve the changes and 2 votes were invalid.

As a result of this ballot the By-laws of the IGS have been changed as follows:

- 3.01 The Society shall consist of individual members, corporate members and associate corporate members.
- 3.01.03 Associate corporate members are companies or institutions, which are nominated as an associate

corporate member by an IGS corporate member. Associate corporate members remain as such for as long as the corporate member(s), to which they are associated, desire.

- 3.01.04 Existing or previous corporate members cannot become associate corporate members.
- 5.02.04 Corporate members are required to pay the subscription fee for those associate corporate members associated with them.
- 6.01.04 Associate corporate members have one vote.

Seven companies have already become Associate Corporate members of the IGS. Because this membership category was established at the request of the IGS Corporate members, we expect that the number of Associate Corporate members will increase in the next year.

Wim Voskamp, IGS Secretary

Highlights of the IGS Council Meeting Fukuoka, Japan, 9–10 November 1992 by Wim Voskamp, IGS Secretary

This meeting was the first with the newly elected Council Members: Dr. T. Akagi, Dr. C.J.F.P. Jones, Dr. R.J. Bathurst, Dr. R.A. Jewell, Mr. C. Lawson and Mr. B.R. Christopher. The meeting was attended by Mr. A.R.G. Rao representing the Indian Chapter of the IGS.

1. Prof. R.K. Rowe welcomed Prof. M. Fukuoka who was recently co-opted to the Council of the IGS in a postal ballot by the Council held in September 1992. Prof. Fukuoka has attracted a large number of individual and corporate members from Japan to the IGS and also plays a special role in assisting in the development of IGS chapters in Asia.
2. The membership for 1991 was:
 - 1241 Individual Members
 - 48 Corporate Members
 - 7 Associate Corporate Members
 - 69 Student Members
3. The Council approved new operating procedures for IGS postal ballot elections for new Council members by acclamation and voting procedures for changes to the By-laws at General Assembly meetings of the IGS. It was decided to seek the approval of the membership on changes to the By-laws that would allow for the election of new council members in conjunction with the General Assembly by postal ballot, instead of election of council members at the assembly. This ballot would allow all members to vote, not only those that attend an International Conference of the IGS and would also make it possible to reduce the length of the General Assembly.
4. At the request of several corporate members, a special plaque for corporate members will be presented indi-

cating each year of their membership. The plaque will allow corporate members to advertise their support of the IGS at conferences, exhibitions and trade shows.

5. Mr. P. Stevenson (IGS Treasurer) presented a report of the IGS financial statements for 1992 and a proposed budget for 1993. This budget was approved. The Council asked the Officers of the IGS to present, at the next Council meeting, a review of the 1993 financial statements and a proposed budget for 1994. The Council members requested that all future financial statements separate IGS operating expenses from costs incurred in support of promotional activities.
6. It was agreed that the IGS financial statements will be reviewed by a Chartered Professional Accountant every year and in the year preceding the General Assembly a full audit will be made by this accountant. The results of this full audit will be made available at the General Assembly.
7. The Council asked Dr. J-P. Giroud to prepare a proposal for the formation of a Complaints/Practice Review Board. This group of "wise men/women" would advise the membership on difficult or controversial subjects related to the orderly promotion of geotextiles, geomembranes, related products and associated technologies in the market place. Further, the Council decided to create a Technical Committee, chaired by Mr. C. Lawson, to handle technical reviews and other technical questions.
8. The formation of the Indonesian, Dutch and Italian Chapters of the IGS was approved. The formation of French and German Chapters of the IGS is currently underway.
9. The Council was given a report by Prof. S.D. Ramaswamy on the excellent progress towards the 5th In-

ternational Conference of the IGS to be held in Singapore in October 1992.

10. The Council unanimously voted that the North American Chapter of the IGS (NAGS) be invited to prepare a formal proposal to host the 6th International Conference of the IGS (1998) along the lines that have been agreed to and that NAGS present their proposal prior to the next Council meeting for approval.
11. The Council agreed that a postal ballot of the IGS Membership will be held prior to the next General Assembly to decide on the name of the IGS. Details of this postal ballot will be published in the March 1993 issue of IGS News.
12. The Council agreed that its members would review the final version of geosynthetics graphics symbols prepared by Dr. J-P. Giroud and consider the comments received after publication of the draft set in IGS News Vol 7 No 3 (November 1991).
13. The Council approved the publication in early 1993 of the Geosynthetics Bibliography that is nearing

completion under the supervision of Dr. J-P. Giroud (see article on page 11 of this issue of IGS News).

14. It was decided to print a new IGS promotion brochure in English in the current calendar year. A version of the brochure in Spanish may also be prepared. If other languages are required it is up to the Chapters to supply translations of the English version. Printing of other language brochures could be done next year.
15. The Council appointed new chairmen for some of the committees:

Promotion:	P.E. Stevenson
Publication:	C.J.F.P. Jones
Voting procedures/By-laws:	R.A. Jewell
Technical Committee:	
Chairman:	C. Lawson
Vice Chairman:	B.R. Christopher

16. The Japanese Chapter was thanked for the excellent organization and assistance during this meeting of the IGS Council.

GEOSYNTHETICS CONSTRUCTION QUALITY ASSURANCE: A CHANGE IN PHILOSOPHY

by Ian D. Peggs and E. Ray Steinle, Jr.

I-CORP INTERNATIONAL, INC., Boynton Beach, Florida, USA

The geosynthetics CQA industry has grown and continues to grow at a rapid rate as landfills and liquid impoundments receive liners and covers. At the same time, CQA plans have been expanded as original models have been built upon and built upon. We feel it is time to stop expanding these plans and start from scratch again, since many plans are tending to become extensions of project specification documents. Liability that rightfully belongs with designers and installers is being assumed by CQA firms. In one extreme case, an installer demanded that the CQA firm assume the warranty for the installation if the installer were to perform according to the demands of the CQA firm. At the same time, many of the same CQA firms are not contributing to the solution of quality problems or initiating procedures to improve quality. And then there are CQA firms and monitors who know virtually nothing about the durability and performance of plastics. In most cases, CQA as presently performed is only touching the tip of the quality iceberg: we should be doing much more.

According to the ISO 9000 (ANSI/ASQC Q90) series of Quality Management and Quality Assurance standards, CQA should simply be a series of procedures that ensure that the geosynthetics have been installed as designed and specified. Site CQA, by itself, is not intended to ensure the absolute quality and integrity of a project: that is the designer's responsibility. We have often been asked to perform CQA on inadequate designs and on unbelievably inadequate CQA plans. We have often refused to do so! CQA must be built-in at the design stage for ISO 9000 procedures to be fully effective.

A CQA plan should be only a part of a geosynthetics Integrated Quality Program (IQP), a more comprehensive

quality program that should involve polymer experts from the beginning to the end of a geosynthetics project. Geosynthetics IQP personnel should work with designers to ensure the constructibility of the design, to help select the correct type of polymeric products (and to ensure selection of the most durable resin of that type of polymer), to assist with proper specifications and the correct tests for conformance and performance testing, and assist in the development of the site CQA plan.

The IQP personnel should then be heavily involved with the selection of the geosynthetic installer to ensure that the installer is capable of providing the specifications and quality required by the designer. They will ensure that the installer's CQC plan and capabilities mesh with the project requirements and that there are no grey areas that will lead to construction delays. This is the major omission in current CQA projects. During construction, the IQP personnel will ensure that the specifications are met and will also ensure that installation practices are those that will not only ensure that the liner is installed with integrity, but that it is also installed to be durable. This is where polymer expertise is essential. This implies a significant contribution by the IQP personnel to the finer points of installation practices. The IQP personnel should initiate improvements in quality where they can be made, not by instructing and controlling the installer, but by leading discussions with all parties involved, through the designer, to a consensus position.

This synergism between geotechnical/civil designers and polymer experts can be very powerful, as described by J-P. Giroud at the 4th International Conference at the Hague (1990).

TERMS AND DEFINITIONS: A FRENCH PERSPECTIVE

by

Ph. Delmas and Y. Matichard

French Committee of Standardization of Geotextiles Geomembranes and Related Products

Geosynthetic terminology has been the subject of much debate in the past year especially with respect to geotextiles and geomembranes (see IGS News Vol 8 No 1 & 2 March, July 1992 GEO WHAT ? by Prof. J.M. Rigo and Vol 8 No 2 July 1992 GEOSYNTHETICS: TERMS AND DEFINITIONS by W.A. Gevers, G. den Hoedt and W. Voskamp).

The geosynthetics fraternity is keenly aware of the importance of terminology especially at a time when IGS itself is engaged in a review of its name. More importantly, good terminology should provide a common language in a discipline that is constantly evolving with a growing range of products and applications. The purpose of this article is to put forward some arguments related to the discussion on terminology from the French point of view.

TERMINOLOGY RELATED TO GEOMEMBRANES

Discussion on terminology began four years ago with the formation of a working group of the French Committee of Geotextiles and Geomembranes (CFGG). A standard entitled "Geomembranes Terminology" was published in October 1991 under the reference NF P84-500 and contains 82 terms. Space precludes publication of these terms but readers are invited to contact the authors to obtain the standard and a list containing many English translations of geomembrane related terms. The authors will not review the entire document in this article but will address some important issues.

Geomembranes

Produit adapté au génie civil, mince, souple, continu, étanche au liquide même sous les sollicitations en service. Note: dans l'état actuel des techniques, ni les produits de faible épaisseur fonctionnelle (inférieure à 1 mm), ni les produits dont l'étanchéité est assurée uniquement par un matériau argileux, ne sont considérés comme des geomembranes.

An English translation is:

A thin, flexible continuous product, used in civil engineering works, impermeable to liquid even under field stresses. Note: In the present state of practice, products thinner than 1 mm and products for which water tightness is only ensured by a clay material are not considered to be geomembranes.

Geomembrane lining system (GLS) or Dispositif d'étanchéité par geomembrane (DEG)

Ensemble de composants constitué par:

- une structure support, si nécessaire
- la structure d'étanchéité
- une structure de protection, si nécessaire

An English translation is:

A set of elements composed of:

- a supporting layer, if relevant
- the liner
- a protective layer, if relevant

The concept of GLS (DEG) is sufficiently broad to cover all possible lining systems that include at least one geomembrane.

Composite geomembrane or Géomembrane composée

Produit manufacturé formé par superposition et assemblage de plusieurs composants dont au moins une geomembrane. Les composants autres que la geomembrane sont dénommés matériaux associés. Ils sont indissociables de la geomembrane sans altération de celle-ci.

An English translation is:

A manufactured product made by superposition and assembly of several components at least one of which is a geomembrane. The other components are termed associated products. The associated products cannot be detached from the geomembrane without damaging it.

This latest definition addresses the difficult problem of defining composite products. The approach adopted here is to classify a composite product as near as possible to the term which best fits its main function. Therefore, a composite made of a geomembrane with an adhesive geotextile or a geomembrane with a swelling clay layer will be defined as a composite geomembrane "géomembrane composée" and not as a geocomposite. Based on the same principle, a geotextile that functions as an impervious barrier through impregnation with bitumen will be a geomembrane. The case of bentonitic membranes should be carefully examined as they are not classified as geomembranes according to NF P84-500 (because they are not continuous). These products are classified as "geocomposites for water retention" (*géocomposites d'étanchéité hydraulique*).

TERMINOLOGY RELATED TO GEOTEXTILES

Geotextile terminology is actually easier because of the previous work by ISO and current work by CEN in Europe. As described by J.M. Rigo, a draft standard is at the stage of CEN inquiry. When adopted, CEN definitions will be compulsory for all European countries. A revision time following formal adoption of the CEN standard will allow for modifications. However, it is worth thinking about the CEN definitions now. For example, the term "geosynthetics" does not exist at the present time in the CEN draft standard.

THE 1992 MERCER LECTURE

The Mercer Lecture is a platform to encourage the exchange of advanced technology between geotechnical engineers and the geosynthetics industry. Every two years a leading international figure is selected to present the lecture in Europe, the Far East and in North America. The selection committee comprises representatives from the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), the International Geotextile Society (IGS) and from Netlon Limited. Dr. Mercer, after whom the lecture series is named, is the founder of Netlon Ltd.

This years lectures, held in London – UK, New Orleans – USA and Kochi – Japan, were delivered by Professor Robert Koerner, the founder and director of the Geosynthetics Research Institute at Drexel University in the USA. Professor Koerner is a past-President of the North American Geosynthetics Society and the author of several books and over 90 technical papers.

reported by J. Paul, IGS Member

SUMMARY OF 1992 MERCER LECTURE DELIVERED BY PROFESSOR ROBERT KOERNER

*by Professor Colin Jones
Chairman of the UK Chapter of the IGS*

During the last 10 to 20 years, geosynthetics have developed into a viable subset of civil engineering materials for use in geotechnical, environmental and transportation related applications. There is still reluctance on the part of many design engineers to use geosynthetics despite the

continuously growing fund of knowledge on testing, design and long-term performance.

Part of the reason is that few civil engineers benefit from formal education in the design and use of polymers;



Presentation ceremony for the Mercer Lecture given at the Institute of Civil Engineers, London UK on 13 May 1992: (left to right) Dr. C. Clayton, Chairman of the British Geotechnical Society, Professor A. McGown, University of Strathclyde, UK, Mrs. Mercer, Mrs. Koerner, Dr. B. Mercer, Netlon Ltd., Professor R. Koerner, Director, Geosynthetics Research Institute, Drexel University, USA, Professor C.J.F.P. Jones, Chairman, UK Chapter of the IGS.

far less the specific subject of geosynthetics. However, the often quoted excuse of not having used them before is not considered by Dr. Koerner to be a valid reason for not ever using them. Experience suggests that there are three main areas of technical concern regarding the use of geosynthetics:

- Long-term filtration performance of geotextiles
- Long-term creep and stress relaxation in geosynthetics
- Long-term degradation of polymers

Each of these areas is examined to explain the current state of knowledge, including the results of recent research.

For the subject of long-term filtration performance of geotextiles a large number of laboratory tests have been developed. These tests are described in detail in the paper and the relative advantages and disadvantages are discussed. The tests all use a combination of soil and geotextile to simulate in-service conditions and some can replicate dynamic flow conditions.

In the second section, the paper examines the large volume of work published on the creep performance of geosynthetics which is extremely important for reinforced soil walls and steep slopes. However, there are cases where the related phenomenon *stress relaxation* is important and here, very little work has been carried out. Dr. Koerner proposes an analytical method of relating stress relaxation to creep in order to use the vast amount of information on creep to produce additional data on stress relaxation. It is accepted that this is a rather simplified relationship and that, for some products and some applications, there is a need for specific stress relaxation testing to be carried out.

Polymer degradation is a subject of great importance. In his paper, Dr. Koerner examines the various degradation mechanisms and shows that developments in polymer

production and formulation have overcome many of the earlier concerns. On the other hand, there are environments for which some polymers are unsuitable and these need to be taken into account in design. Linked to durability is the problem of lifetime prediction for geosynthetics. Lifetime is taken as the time for a properly formulated, manufactured and installed geosynthetic product to reach the end of functionality. This is often taken as the half-life of a particular property – e.g. the time when elongation reduces strength to 50% of its original value.

A number of lifetime prediction methods have been developed and these are discussed and compared. Results of lifetime predictions for high density polyethylene for example, do show quite a large variation. But since they vary from 200 to 750 years, the difference is not particularly relevant in comparison with the design life for a geotechnical structure which is likely to range between 50 and 120 years.

The paper acknowledges that not all of the answers are known today and in fact proposes ideas for future research and testing. However, it is stressed that geosynthetics are not new, nor untried and it is unlikely in the future that engineers will be involved in radical innovation as a diverse range of proven applications has already been established. Since it is the mandate of a design engineer to use the most cost-effective, state-of-the-art material system at his or her disposal, then in many cases today this should involve the use of geosynthetic materials.

The content of the lecture was informative and challenging and this was further enhanced by Dr. Koerner's enthusiastic style of presentation. The 1992 lecture series was deemed a success, with a high level of interest at each of the three international venues.

Editors Note: The full text of Dr. Koerner's Mercer Lecture can be found in Geotextiles and Geomembranes Vol. 12 No. 1 1993.

Meeting of the Japanese IGS Student Members Tokyo, 15 November, 1992

by

D.A. Cazzuffi

Chairman of the IGS Education Committee

More than 70 students attended a meeting organized by the Japanese Chapter of the IGS at the Science University of Tokyo on Sunday 15 November 1992. The meeting was held in conjunction with a lecture presented by Daniele Cazzuffi, Chairman of the IGS Education Committee. The subject of the three hour lecture was: *Geosynthetics: Types, functions and specifications in geotechnical engineering applications.*

The lecturer was introduced by Prof. M. Fukuoka, President of the Japanese Chapter of the IGS and Past-President of the ISSMFE (International Society for Soil Mechanics and Foundation Engineering). At the end of the lecture, the speaker emphasized the fundamental role of the IGS Education Committee for the scientific and engineering development of geotextiles, geomembranes, related products and associated technologies in universities

and colleges. A particular thank you was addressed to the Japanese Chapter of the IGS and particularly to Prof. M. Fukuoka, who has been largely responsible for the increasing numbers of Japanese student members in the IGS. The enthusiastic response of the Japanese students should act as an example for IGS members in other countries to promote the participation of more student members in the IGS. All IGS members working at universities or colleges should be available to act as local contact members for their students.

Any questions concerning IGS student membership should be addressed to the IGS Education Committee Chairman, Daniele Cazzuffi or to the IGS Treasurer, Peter Stevenson (addresses can be found on p. 13 and 14 of this issue).

Corporate Profiles

The IGS Council has decided that in each issue of the IGS News up to three Corporate Members will be allocated space to allow them to introduce their company or association and present their achievements. The criteria for selec-

tion of corporate profiles were described in IGS News, Vol. 4, No.2, p. 7. Alternatively, you can get details by writing to the Editor. There is no charge for having a corporate profile published; it is a benefit of corporate membership.

GEOTECHNICS HOLLAND B.V.

by

Betty Eijzenga

Zuider IJdijk 58, 1095 KN Amsterdam, the Netherlands

Geotechnics Holland B.V., located in Amsterdam, is a high-tech company specialized in the delivery and installation of products for civil engineering and environmental applications. Geotechnics is a rapidly expanding company and is getting ready for European unification. Geotechnics currently has interests in companies located in Great Britain, Ireland, Sweden, Denmark, Finland, Spain, Italy and Poland. Products from Geotechnics Holland B.V. are sold in more than 40 countries.

Among the products that Geotechnics supplies are:

MEBRA-DRAIN: Prefab vertical drainage wicks for land reclamation works in harbors and urban areas. These drainage wicks are used to accelerate consolidation of soils below embankments and to minimize post-constructive settlements. This product has been installed for the French/English Channel Tunnel project.

GEOLOCK: A chemical resistant vertical cut-off wall with a watertight expansion joint and sealed lock construction. This product is used for contaminated ground separation, sludge deposits, waste water basins and other water retaining structures (e.g. used for the aqueduct construction project in Grouw, the Netherlands).

GUNDLINE: Flexible HDPE geomembrane for encapsulation of contaminated soils, protective layers for storage ponds and isolation of refuse dumps/hazardous waste disposal areas. This product has been installed for the Parrot's beak project, a sludge depot in the Rotterdam harbor.

TYPAR: Spunbonded, polypropylene geotextile for soil stabilization and drainage (used for the Deltaworks in the Netherlands).

GEOFLEX: A novel product offered by Geotechnics is Geoflex. Geoflex is a plastic sheet piling system used as an alternative to hardwood sheet piling. The material is resistant to weathering and has a long service life. In addition, the material is resistant to naturally occurring materials in the ground such as rodents, salt or fresh water. Geoflex was developed in response to the need to manufacture economic sheet piling with a long service life. For example, the material can be recycled. In order to adapt the quality of the polymer material to the demands required of the installed product, stabilizers, flow improvers, coloring and other additives have been added to improve resistance to UV degradation. Wood piling systems typically contain harmful preservatives such as creosote

that place a burden on the environment. Currently the trend is towards natural bank protection by means of shallow slopes and a vegetated cover. However, in some cases such a solution is not possible, (e.g. dams, shore line protection, canal banks, steep slopes or channels with high velocity flows). For these situations, Geoflex is a possible alternative.

GEOSAFE: Geotechnics also supplies Geosafe, a non-woven needle punched geotextile, specially developed as a construction material in civil engineering works. Polypropylene, polyester and polyethylene are used as raw materials in the manufacturer of these products. Geosafe is available in mass per unit area ranging from 150 to 7000 grams/m² and thickness from 2 to 20 mm and hence is suitable for a wide range of filtration, separation and geomembrane cushion applications. In many cases the material results in a substantial reduction in building costs and maintenance, while the service life of the construction increases considerably. Millions of square meters are now in use.

Geotechnics is dedicated to a sound quality control program of its inventory in order to ensure high quality products. In addition, Geotechnics provides expert advice to its clients based on many years of experience and a wide range of technologies for civil engineering and environmental applications.

Geotechnics Holland B.V. has been a Corporate Member of IGS since 1991.



Geoflex sheet piling supplied by Geotechnics B.V.

THE TENAX GROUP

by Pietro Rimoldi and Paolo Grisorio

Tenax Spa, Via Industria 3, 22060 Vigano' (Como) Italy

Tenax began in Italy in 1960 with the production of plastic nets for packaging, gardening and fencing. Today Tenax is an international group of companies with a widely diverse product line and with manufacturing subsidiaries in Italy (Vigano' and Rieti), in the USA (Jessup, Maryland), and marketing offices in Italy, the USA, Germany, and Switzerland.

The production and marketing of Tenax geosynthetics began in 1983. The Tenax Group has 30 years of experience and research in plastics and has developed extrusion and stretching equipment to manufacture plastic nets and geogrids. The philosophy of the Tenax Group can be summarized by the words: technology and flexibility. The Tenax Group strives to introduce new products and offer innovative solutions to a constantly changing international marketplace. The Tenax Group has one of the greatest production capacities for specialized geosynthetics in the world. The group can produce diamond and square-shaped products as well as unique tri-planar junction geogrid products. Tenax holds patents for new products such as Tenax Tenweb for erosion control. Tenax Tenweb is constructed with a unique discontinuous welded connection. Tenax can produce geogrids with 3 ribs and is capable of producing a geogrid with double transverse ribs. The following is a list of Tenax products and typical applications.

MONO-ORIENTED GEOGRIDS used for soil reinforcement. The main applications for these geogrids are construction of retaining walls, sound barriers, steep slopes, embankments, and failed slope remediation.

BI-ORIENTED GEOGRIDS for soil stabilization. The main applications for these products are reinforcement of road foundations over subgrades with low bearing capacity, stabilization of parking lots, storage yards, landfills, and the reinforcement of asphalt and shotcrete in tunnels.

GEONETS for drainage and geomembrane protection. The principal application is planar drainage media in landfills.

GEOCOMPOSITES for drainage, filtration and geomembrane protection. The most common application is planar drainage and filtration media in landfills, road and railway foundations, retaining walls, parking lots and playing fields.

GEOCELLS for erosion control. Three-dimensional,

honeycomb structure products used for soil confinement on arid, rocky slopes. The three-dimensional honeycomb structure can be used to establish vegetation.

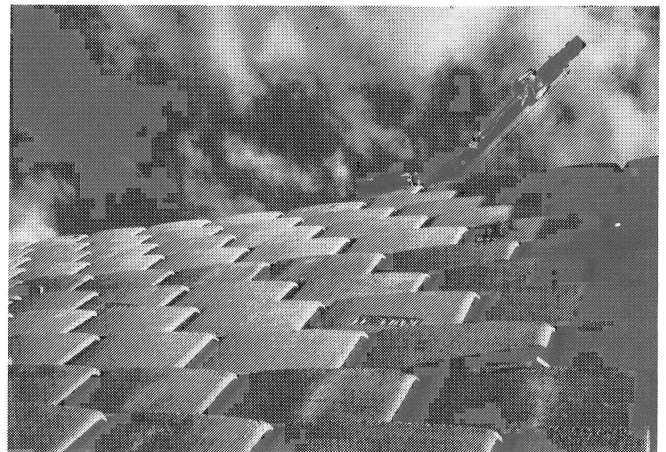
GEOMATS for erosion protection. Three-dimensional, high tensile strength products used principally for erosion control on slopes and to assist in re-vegetation.

STRIP DRAINS for drainage and accelerated consolidation of soil. The main types are: a) vertical strips to accelerate consolidation of clayey soils; b) horizontal strips for drainage below roadways and airfield pavements.

NURAGHE SYSTEM for permanent retaining wall systems. The system comprises mono-oriented geogrids for reinforcement and concrete blocks that are vibro-compressed for the wall face. Commonly used as retaining walls and abutments.

Tenax provides assistance to all of its geosynthetic customers, including design and installation recommendations. Tenax products are subjected to strict quality control standards using an in-house testing laboratory. In addition to quality control testing, the Tenax laboratory is employed as a research facility to develop new geosynthetic testing procedures. Tenax is represented on major international geosynthetic standards associations including ASTM D35, CEN TC 189, ISO/TC 38/SC 21, and GRI.

Tenax has been a Corporate Member of IGS since 1991.



Nuraghe system for permanent retaining wall systems

IGS welcomes new Associate Corporate Members

Associate Member	Corporate Affiliate	Country	Year
Frank Parker & Co.	Don & Low	UK	1992
Raswill Representative	Tenax Spa	Singapore	1992
Trump Corp.	Tenax Spa	Taiwan	1992
Ardon International	Tenax Spa	UK	1992
Remo Ltd.	Tenax Spa	Turkey	1992
Tenax Kunststoffe GmbH	Tenax Spa	Germany	1992
Tenax Corp.	Tenax Spa	USA	1992

Geotextiles & Geomembranes: An Official Journal of the IGS

In 1993 the Journal will be published in 8 issues in order to provide a more frequent service to subscribers and more timely publication for the authors. The subscription price for 1993 has been set at Pounds 270 (UK). The reduced subscription offer to individual IGS members represents a 40% discount off the full price, i.e. Pounds 162 (UK).

Reduced subscriptions are available directly from the publisher:

Subscription Department
Elsevier Applied Science Publishers
Crown House, Linton Road,
Barking, Essex IG11 8JU
United Kingdom

Members are reminded that to take advantage of this discount they must inform Elsevier Publishers that they are a member of IGS.

The Editor, T.S. Ingold, the Editorial Chairman, J-P. Giroud, the IGS Editorial Board Representative and the IGS President, R. Kerry Rowe, all hope that IGS members will use *Geotextiles & Geomembranes* as an outlet for their technical papers and thus contribute toward the continuing success of this high quality publication which now has subscribers in over 40 countries worldwide. Papers should contain work not published in full elsewhere and should be sent to:

Dr. T.S. Ingold
Mulberry Lodge
St. Peters Close, St. Albans
Hertfordshire AL1 3ES
United Kingdom

Instructions to authors are also available from Dr. T.S. Ingold.

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Geosynthetics Bibliography

(are your publications listed? Deadline 31 January 1993)

At the recent IGS Council held in Fukuoka, Japan on 9–10 November, Dr. J–P. Giroud presented a draft version of the “Geosynthetics Bibliography” that is proposed to be published in early 1993 (see report on IGS Council Meeting p. 4). This valuable document will be published under the auspices of the IGS.

This document will contain references to publications on geosynthetics which have appeared before 1 January 1993. The references have been taken from journals, conferences, symposia, books, monographs, reports, theses and any other publications that are related to geosynthetics.

At present, the bibliography contains over 4000 entries and has been painstakingly compiled from Dr. Giroud’s own library and the collections of a number of individuals throughout the world who have answered Dr. Giroud’s calls for help.

The bibliography is organized as follows:

Part 1: References from International Conferences on Geotextiles, Geomembranes and Related Products.

Part 2: References from publications entirely dedicated to geosynthetics (i.e. Conferences, excluding those in Part 1, and Edited Volumes).

Part 3: References from publications not entirely dedicated to geosynthetics.

Part 4: References of papers published in journals.

Part 5: List of publications of selected authors.

Part 6: List of theses, books, reports and monographs on geosynthetics.

While much work has already been done by Dr. Giroud and co-workers, it is important that this landmark collection be as complete as possible. At this point the Geosynthetics Bibliography contains references from well known journals, conferences, books and reports mostly in the English language. Dr. Giroud invites all IGS members and non-members to contact him with the title of any journal publication, conference, symposium, book, thesis, etc., or any other publication that may not be widely circulated or otherwise well known and is related to geosynthetics. Of particular interest are local conferences and symposia on geosynthetics that are not well known beyond a national or regional boundary.

Similarly, the section on theses requires input from IGS members. If you have authored or supervised a graduate thesis (Masters or Ph.D. level) on geosynthetics please send the reference to Dr. Giroud.

If an individual has published at least 15 papers on geosynthetics prior to 1 January 1993, then his/her publications list is eligible to be included in Part 5 of the Geosynthetics Bibliography. However, it is up to these authors to contact Dr. Giroud and supply the reference data themselves if they are to appear in this special section (the references supplied by an individual author will also appear in the other parts of the bibliography as applicable in

order to make each section complete). The author lists must be supplied in chronological order with the earliest publication first. Sixty authors have already sent their list of references. More are expected after this announcement.

In order to be eligible for listing in the bibliography, strict adherence to the following format is required: Any reference must include the names and initials of all authors; title of the paper, book, thesis, etc.; publication name, volume and number; publisher (if a book); date; and first and last page number.

Examples of reference format are as follows:

1. Journal paper

Dabke, C.S., Rawes, B.C., and Iengar, S.S., “Role of Geotextiles in Marine Construction”, Geotextiles and Geomembranes, Vol. 11, No. 3, 1992, pp. 223–234.

2. Conference paper

Saathoff, F., “Filterwirksamkeit gedehnter Geotextilien”, Proceedings of the 1st Kongress Kunststoffe in der Geotechnik, K–Geo 88, Hamburg, Germany, Sep 1988, pp. 5–14. (in German)

3. Paper in book or special publication

Bathurst, R.J., Benjamin, D.J., and Jarrett, P.M., “Laboratory Study of Geogrid Reinforced Soil Walls”, Geosynthetics for Soil Improvement, R.D. Holtz, Editor, Geotechnical Special Publication No. 18, ASCE, Proceedings of a symposium held in Nashville, TN, USA, May 1988, pp. 178–192.

4. Thesis

Barber, J.F., “Experimental Study of Geotextile-Reinforced Foundations”, Ph.D. Thesis, Cornell University, Ithaca, NY, USA, 1986, 231 p.

References that are not in English should indicate in parenthesis the language of the publication.

Contributors are requested to fax any submission to Dr. Giroud at the address below followed by a hard copy for safety by mail or courier:

Dr. J–P. Giroud
GeoSyntec Consultants
One Park Place, 621 N.W. 53rd Street, Suite 650
BOCA RATON, FLORIDA, 33487 USA
Tel: 1 (407) 995–0900 Fax: 1 (407) 995–0995

NOTE NEW ADDRESS, TELEPHONE and FAX NUMBER for Dr. Giroud.

The due date for submissions is 31 January 1993. This deadline is final. Enquiries are also welcome.

The Geosynthetics Bibliography will be an important reference for all IGS members and the international geosynthetics community. Your help to ensure that the collection is complete will be greatly appreciated.

reported by R.J.Bathurst, Editor IGS News

IGS Inventory of Geosynthetics – related Computer Software

An issue of the Journal Geotextiles and Geomembranes will soon be published that is devoted exclusively to computer software programmes for the design and analysis of civil engineering structures that incorporate geosynthetics (Computer Programmes for Geosynthetic Applications, Vol. 12 No. 5, April 1993). The IGS Council at its annual meeting held on 9–10 November 1992 in Kyushu adopted a motion to continue the momentum established by this issue and begin an inventory of geosynthetics-related computer software.

IGS members are asked to contribute to this inventory by supplying the following information for candidate computer software programmes:

Software name: (e.g. Geowall ver 2.1)

Hardware requirements: (e.g. IBM 386 computer or compatibles, 2Mb extended memory, MacIntosh, HPGL plotter, etc.)

Operating system: (e.g. MS-DOS 3.1 or better, OS/2,

etc.)

Program description: This section should include no more than 300 words describing the scope of the program and the analytical methods and design strategies implemented in the code (include references to papers available in the literature).

Typical results: Not more than one page.

Contact: (i.e. vendor or contact person).

Cost:

The information on each programme will be restricted to two pages. Enquiries and submissions can be made by contacting Dr. R.J. Bathurst (see address on back cover of this issue) or:

Prof. J.M. Rigo
GRC-LMC – Liège University
Quai Banning, 6
B 4000 Liège, Belgium
Tel: 32 41 669234 Fax: 32 41 523395

Annual Report of the Japan Chapter of the IGS (JCIGS) February 1992

On 14 February, 1992, the JCIGS General Assembly was held in Tokyo. The following were reported and approved:

1. Membership as of 31 December, 1991:

Individual members	146
Student members	35
Corporate members	17

2. Publications in 1991:

- JCIGS Membership Directory, January.
- Report on "Geosynthetics'91" held in Atlanta February 1991.
- JCIGS Newsletters : April, June, August, November and December.
- Proceedings of the Sixth Geotextile Symposium, Tokyo, December.

3. Programs sponsored by JCIGS in 1991:

- JCIGS General Assembly, Tokyo, 15 February.
- Geotextile Lecture Meeting: A lecture was given on Geosynthetics '91 by Prof. M. Fukuoka, Tokyo, 17 April; 150 participants. Co-sponsored by the Public Works Research (Doboku Kenkyu) Centre.
- Geotextile Seminars for Student Members; 20 participants at Nihon University on 8 May and 20 participants at Tokyo Science University on 17 May.
- Sixth Geotextile Symposium, Tokyo, 3 December; 13 papers were presented and a special lecture given by H. Miki; 150 participants

4. Activities of Committees:

The dates of committee meetings held are as follows:

- Steering Committee: 25 January, 3 & 29 March, 21 June, 2 October and 27 November.
- Programs Committee: 12 & 22 November and 3 December.

- Editorial Committee for JCIGS Newsletters: 21 October.

- Meeting with the Japanese Society of Textiles: 13 September.

5. Contacts with IGS:

- Council Meetings: Attended by Prof. M. Fukuoka, in February and October.
- IGS News: The Annual Report of JCIGS to be published in November 1992 issue.
- List of JCIGS Members: Transmitted to IGS in February and June.

6. Election of JCIGS officers for 1992 (see Appendix A).

7. Programs for 1992 (see Appendix B).

8. Treasurer's Report: In the year ended 1991 the revenue was 5,474,515 yen while the expenditures were 5,400,270 yen giving a surplus of 74,245 yen. Without burdens shouldered by the officers and considerable support extended by the Japanese Society of Soil Mechanics and Foundation Engineering (JSSMFE), however, the account would have been in the red. The JCIGS has no office of its own nor any full-time employee.

Appendix A: JCIGS Officers for 1992

Chairman: M. Fukuoka

Advisors: S. Tanaka and T. Yamanouchi

Secretary General: K. Iwasaki

Board Members: Y. Abe, T. Akagi, H. Arai, F. Hashizume, T. Hirai, S. Horiya, Y. Hosoya, M. Itoh, K. Kasahara, K. Kumagai, K. Kutara, K. Makiuchi, T. Masuo, H. Miki, K. Nakamura, T. Nakaya, T. Nishigata, M. Sakaguchi, S. Suzuki, S. Takahashi, H. Tsukamoto, T. Tsuruoka, M. Wakamiya, Y. Watari, T. Yamashita, and S. Yamato

Treasurer: K. Maruyama

Auditors: S. Horiya and S. Takahashi

Secretariat: N. Yoshioka and T. Morita

Appendix B: Programs in 1992

1. Publication of JCIGS Membership Directory in January, JCIGS Newsletters in March, July and November, Proceedings of the International Geotextile Seminar to be held in November and Proceedings of the Seventh Geotextile Symposium to be held in December.
2. Sponsorship of the International Geotextile Seminar and Seminars for student members.
3. Sponsorship of the Seventh Geotextile Symposium.
4. Committee Activities by Steering Committee, Planning Committee, Programs Committee, Editorial Committee for JCIGS Newsletters and Technical Committees.

5. Participation in the IGS Council. JCIGS will continue to send a council member to IGS council meetings.
6. Co-operation extended to the International Symposium on Earth Reinforcement Practice (IS Kyushu '92) in Fukuoka, 11–13 November, 1992.
7. The Mercer Lecture given by Professor R.M. Koerner at Kochi in June and co-sponsored by JSSMFE.
8. The IGS Council held in Fukuoka in 9–10 November prior to IS Kyushu '92.

*reported by T. Akagi,
Liaison Secretary JCIGS and IGS Council Member*

Report on the Indian Chapter of the IGS

The Indian Group on Geotextiles (IGG), which functions as the Indian Chapter of the IGS, has brought out a publication entitled "Use of Geotextiles in Water Resources Projects (Case Studies)". The document highlights the use of geotextiles in some water resources projects in the country and it is hoped that it will encourage the use of geotextiles in similar applications. Publications on the use of geotextiles in roads/runways, buildings, railways, etc. are also in the planning stages.

It is also proposed to undertake a series of pilot studies related to water resources projects in conjunction with

government departments and manufacturers. The economic benefits derived from the use of geotextiles will be documented and publicized. Finally, a manual on the use of geotextiles in water resources projects is also being considered for use by field engineers.

The Indian Chapter of the IGS is pleased to report that the number of members has increased from 30 to 34 this year so far. A greater number of members is anticipated over the balance of the year.

reported by A.R.G. Rao

IGS President Profiled in Canada's National Newspaper (denies allegations)



The following excerpt is taken from an article published in the Globe and Mail on 9 September 1992.

A Western Renaissance

The University of Western Ontario has just published its new resource book of faculty members and their areas of expertise. A selection of entries:

- Karen Harburn (occupational

- therapy): geriatrics, volunteerism, mime, clowning.
- Robert Disalle (philosophy): skepticism, atheism and fanaticism, urban bicycle transportation policy.
- R. Kerry Rowe (engineering): artificial heart valves, mushroom hunting, car racing.

In an exclusive interview with the editor of IGS News Prof. Rowe denied that his institution has become a haven for academic eccentrics and stated that the article was very unfair since he has not picked a mushroom in a very long time.

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The IGS News is published 3 times per year. Material for publication should be submitted to the Editor or one of the Associate Editors by 16 February, 16 June, 16 October for the March, July and November issues respectively. Short articles and/or good quality photos (with a caption) are always very welcome.

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The IGS Council

Elected in 1990: A. Arman (USA); D. Cazzuffi (Italy); S.D. Ramaswamy (Singapore); J-M. Rigo (Belgium). Elected in 1992: T. Akagi (Japan); R.J. Bathurst (Canada); B.R. Christopher (USA); R.A. Jewell (Belgium); C.J.F.P. Jones (UK); C. Lawson (UK). Co-opted in 1991: D. Price (Austria); D. Fayoux (Belgium); F. Goussé (France). Co-opted in 1992: M. Fukuoka (Japan). The IGS Council also includes the five IGS Officers elected for the period 1990-94.

List of Corporate Members of the IGS

Akzo Industrial Systems B.V. - Netherlands (1986)
Amoco Fabrics and Fibres Co. - USA (1987)
Asahi Chemical Industry Co. Ltd. - Japan (1984)
Associate Suisse Des Professionnels De
Géotextiles-Suisse (Aspg/Svg)-Switzerland(1984)
Belton Industries Inc. - USA (1989)
Bidim Geosynthetics - France (1984)
Bridgestone - Japan (1992)
C.I. Kasel Co., Ltd. (1992)
Daito Kogyo Co., Ltd. - Japan (1992)
Don & Low Ltd. - UK (1984)
Du Pont De Nemours Int. S.A. -Switzerland(1984)
Exxon Chemical Geopolymers Ltd. - UK (1988)
Fibertex Aps - Denmark (1984)
Fritz Landolt Ag - Switzerland (1985)
Geotextiles (M) Sdn Berhad - Malaysia (1991)
Geotechnics Holland BV- Netherlands (1991)
Gundle Lining Systems, Inc. - USA (1988)
Hoechst Celanese Corporation - USA (1984)
Huesker Synthetic GmbH & Co. - Germany (1987)
Industrial Fabrics Association International (IFAI)
- USA (1985)
James Clem Corporation - USA (1992)
Japan Spunbond - Japan (1984)
Kajima Corporation - Japan (1985)
Kumagai Gumi Co. Ltd. - Japan (1987)
Kuraray Co. Ltd. - Japan (1989)
Maeda Corporation - Japan (1988)

Maeda Kosen Co., Ltd. - Japan (1992)
Mitsubishi Yuka Industrial Products Co., Ltd.
- Japan (1992)
Mitsui Petrochemical Industrial Products Ltd.
- Japan (1992)
Naue Fasertechnik GmbH & Co. KG
-Germany (1987)
National Seal Company - USA (1992)
Netlon - UK (1989)
Nicolon B.V. - The Netherlands (1984)
Ohbayashi Corporation - Japan (1988)
Okasan Kogyo Co. Ltd. - Japan (1984)
Pavco S.A. - Colombia (1991)
Polyfelt GmbH - Austria (1984)
Shimizu Co. - Japan (1990)
Synthetic Industries Inc. - USA (1991)
Taisei Corporation - Japan (1992)
Taiyo Kogyo Corporation - Japan (1992)
Tenax S.P.A. - Italy (1991)
The Tensar Corporation - USA (1989)
The Reinforced Earth Co. - USA (1989)
The Zenitaka Corporation - Japan (1992)
Tokyu Construction Co. - Japan (1984)
Uco N.V. - Belgium (1985)
Zeon Kasei Co., Ltd. - Japan (1992)

Dates indicate earliest year of continuous membership.

Calendar of Events

6th GRI Seminar:

QC/QA and CQC/QCA of Geosynthetics
Philadelphia, PA, USA, 10–11 December 1992

Contact: Marilyn Ashley or Paula Koerner
Geosynthetic Research Institute
Drexel University
Philadelphia, PA 19104 USA

Tel: (215) 895 2343 Fax: (215) 895 1437

Clayey Barriers for Mitigation of Contaminant Impact: Evaluation and Design— R.K.Rowe/R.M. Quigley Short Course and Workshop

London, Canada, 10–11 December 1992

Contact: Dr. R.M. Quigley, Director
Geotechnical Research Centre
Faculty of Engineering Science
The University of Western Ontario
London, Ontario N6A 5B9

Tel:(519) 661–3344 Fax: (519) 661–3942

IFAI Gesynthetics Seminar: Cost–Effective Site Develop- ment Techniques— Use of Geosynthetics (R. R. Berg)

Anaheim, CA. 27–28 January 1993
Atlanta, GA. 10–11 February 1993
Baltimore, MD. 24–25 March 1993

Contact: Joseph Dieltz
IFAI
345 Cedar St., Suite 800
St. Paul, MN 55101, USA

Tel: (612) 222–2508 Fax: (612) 222–8215

**Second International Conference on Reflective
Cracking in Pavements:
State of the Art and Design Recommendations**
Liège, Belgium, 10–12 March 1993

Contact: Prof. J.M. Rigo
Civil Engineering Institute
L.M.C., University of Liège
Quai Banning, 6
B–4000 Liège, Belgium

Tel: 32 41 669203 Fax: 32 41 523395

Geosynthetics'93 Vancouver, British Columbia, Canada
30 March – 1 April 1993

Contact: Secretary General NAGS
345 Cedar St., Suite 800
St. Paul, MN 55101 USA

Tel: (612) 222–2508 Fax: (612) 222–8215

ASCE Specialty Conference: Geotechnical Practice in Dam Rehabilitation

Raleigh, NC, USA, 25–28 April 1993

Contact: Jodi Brill, ASCE
345 East 47th Street
New York, NY 10017–2398

Tel: (212) 705–7350 Fax: (212) 980–4681

Sardinia'93 4th International Landfill Symposium
S. Margherita di Pula (Cagliari), Sardinia, Italy
11–15 October 1993

Contact: Prof. Ing. Raffaello Cossu, CISA
Environmental Sanitary Engineering Centre
Via Marengo 34, 09123 Cagliari, Italy

Tel: 39 70 271652/281237 Fax: 39 70 271371

Eighth International Conference of the International Association for Computer Methods and Advances in Geomechanics

Morgantown, West Virginia, USA, 22–24 May 1994

Abstracts: 1 March 1993

Contact: Professor H.J. Siriwardane
Chairman for IACMAG 94
College of Engineering
637 Engineering Building
West Virginia University
Morgantown, West Virginia 26506–6101

Tel: (304) 293–3192 ext. 620 Fax:(304) 293–5042

ISF'94 International Symposium on Fiber Science and Technology

Yokohama, Japan, 26–28 October 1994

Abstracts: 30 November 1992

Contact: Prof. T. Uryu, Chairman ISF'92
Institute of Industrial Science,
The University of Tokyo
7–22–1, Roppongi, Minato–ku, Tokyo,
106 Japan

Tel: 81–3–3402–3067 Fax: 81–3–3402–5078

**5th International Conference on Geotextiles,
Geomembranes and Related Products**
Singapore, 5–9 September 1994

Abstracts: 31 July 1993

Contact: Conference Secretariat, 5th IGC
Thompson Road, P.O. Box 0177
Singapore 9157

Tel: (65) 353–5511 Fax: (65) 353–2424

Note: Highlighted items are organized under the auspices of the IGS or with the support of the IGS.

OBJECTIVES OF IGS (*)



The International Geotextile Society was formed with the following objectives:

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

WHY BECOME A MEMBER OF THE IGS?

First, to contribute to the development of our profession.

Becoming a member of the International Geotextile Society:

- Helps support the aims of the IGS, especially the development of geotextiles, geomembranes, and related products.
- Contributes to the advancement of the art and science of geotextiles, geomembranes, and related products, as well as their applications.
- Provides a forum for designers, manufacturers, and users, where new ideas can be exchanged and contacts improved.

Second, to enjoy the benefits.

The following benefits are available now to all IGS members:

- A directory of members, the IGS DIRECTORY, published every year, with addresses, telephone, telex and fax numbers.
- Newsletter, IGS NEWS, published three times a year.
- Reduced purchase price on all documents published by the IGS.
- Reduced registration fee and preferential treatment at all conferences organized under the auspices of the IGS.
- Reduced subscription fee for the journal "Geotextiles and Geomembranes".
- A central system for ordering selected publications.
- Possibility of being granted an IGS award.

MEMBERSHIP APPLICATION

Membership of the Society 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 Individual Members and (US) \$1000 for Corporate Members. Individuals or Corporations who voluntarily contribute a minimum of (US) \$200 annually to the Society, in excess of their membership dues, will be mentioned in the IGS Directory in a separate list as benefactors.

Send this completed form to:

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226 Sitton Road
Easley, SC 29642
U.S.A.

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Fax: 1 (803) 859-1698

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City _____ Province/State _____

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Telephone _____ Telex _____ Fax _____

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BODENMECHANIK UND FELDMECHANIK
Technische Universität München
Außenstelle Pasing
Baumbachstraße 7
D 8000 München 60

* A copy of the By-laws is available upon request.

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