

IGS NEWS

NEWSLETTER OF THE INTERNATIONAL GEOTEXTILE SOCIETY
VOLUME 8 NO 1

MARCH 1992

President's Report

by

Professor R. Kerry Rowe

The past few months have been quite active on the part of the IGS. The following is intended to brief you on some recent developments.

New Chapters

I am delighted to announce the formation of two new IGS Chapters: The Dutch and Indonesian Chapters. This issue contains more details concerning the formation of the two chapters, however, it is important to note that the formation of these chapters has brought many more members to the IGS. The Dutch Chapter is expected to have over 150 members making it the second largest chapter in terms of the number of individual members. The Indonesian Chapter will begin with 23 initial members. This represents a very important step in a region where there is very great potential for the use of geotextiles, geomembranes and related products. I hope that with a viable local chapter to organize local activities, we will see a continual growth in both membership and knowledge concerning the use of geotextiles and related materials. The development of a strong Indonesian Chapter should also be a boost for the organizers of the 5th International Conference to be held in Singapore in 1994.

Japanese Chapter

While being delighted at the formation of new chapters, it is worth recognizing the very substantial growth of the Japanese Chapter. In particular, Professor Fukuoka and the members of the Japanese Chapter are to be congratulated for leading all IGS Chapters in terms of the number of Corporate Members and Student Members. In 1992, the Japanese Chapter has added 6 new Corporate Members giving a total of 17 (representing 37% of all IGS Corporate Members). I challenge the other chapters to follow the lead of the Japanese Chapter in terms of encouraging both corporations and students to become IGS members.

Elections

This issue of IGS News contains a list of six (6) candidates for the six (6) vacant positions on the IGS Council. I

am delighted to see that these candidates are highly respected and very hard working members of the IGS. It bodes well for our Society that such highly qualified individuals are prepared to commit their time and energies to the IGS. The election for Council Members will be held in May 1992 if the number of candidates exceeds the number of vacant positions. In the event that there are no more candidates by 21 April 1992, the current nominees will be declared elected by acclamation. If you wish to be a candidate, please send a nomination to Mr. Wim Voskamp with a statement of qualifications not exceeding 12 lines by 21 April 1992.

Associate Corporate Members

The last issue of IGS News introduced the concept of the new membership category of Associate Corporate Member. This issue contains an article by Mr. W. Voskamp and Mr. P. Stevenson outlining the reasons for the new class of membership and the by-law changes required to initiate this membership class. In order to move in a timely fashion, the IGS Council has proposed that a mail ballot be held concerning these changes together with the election for the six vacant Council positions. I would urge all members to review the proposed changes and, if you have any proposed amendments or comments, to forward them to Mr. P. Stevenson (Chairman of the IGS By-laws Committee) by 21 April 1992.

Name of Society

A task force that includes the Chairman of the By-laws Committee, Mr. P. Stevenson and IGS Past-President J-P. Giroud, has been set up to explore options and prepare a recommendation to the membership. A report on the work of this task force, in the form of an article from Dr. Giroud, is included in this issue of IGS News.

Officers Meeting

The next IGS Officers Meeting is scheduled for 16 June 1992. It is expected that all IGS committees will submit reports on their activities to be reviewed by the officers at that meeting.

Toward a Solution for the Name of the Society

The name of our society has been the subject of much debate in the past four issues of IGS News, with letters and articles from R. Denis (November 1990, pp. 2–3), R.K. Rowe (March 1991, p. 3), J–P. Giroud (March 1991, pp. 3–4), S.D. Ramaswamy (July 1991, p. 2), and J.S. Horvath (November 1991, p. 2).

The general theme: how to indicate in the name of our society, which was selected in 1983 at a time when we had only geotextiles in mind, the fact that our discipline now encompasses a variety of products often called geosynthetics? (see “From Geotextiles to Geosynthetics: a Revolution in Geotechnical Engineering”, Proceedings of the Third International Conference, Vienna, 1986, pp. 1–18).

After so many ideas have been exchanged and positions stated (which clearly demonstrates the effectiveness of IGS News as a means of communication between IGS members), it is now time to move toward a solution. To that effect, at the last IGS Council meeting in November 1991, a task force, chaired by P.E. Stevenson and comprising D. Price, D. Fayoux and myself, was appointed by President Rowe to discuss the subject and propose a solution. I suggested as a basis for discussion to the members of this task force that:

- the acronym remain IGS regardless of how we modify the name; and
- the official name of the society comprise the acronym followed by an explanation.

Examples illustrating the suggested concept are: “IGS, the International Society for Geotextiles, Geomembranes, and Geosynthetics”, “IGS, the International Society for Geosynthetics and Related Products”. There are many other possibilities as discussed below.

President Rowe and Committee Members who sent me comments agreed with:

- the concept, i.e., the intangible acronym, IGS, followed by an explanation;
- the presence of the following three words “International Society for” in the explanation; and
- the presence of the word “Geosynthetics” in the explanation.

There also seems to be a tendency among those who gave me comments to consider that the word “Geosynthetics” should not be used alone in the explanation, hence the following possibilities:

- (a) IGS, the International Society for Geosynthetics and Related Products;
- (b) IGS, the International Society for Geotextiles and Geosynthetics;
- (c) IGS, the International Society for Geotextiles, Geomembranes and Geosynthetics;
- (d) IGS, the International Society for Geotextiles, Geosynthetics and Related Products; and
- (e) IGS, the International Society for Geotextiles, Geomembranes, Geosynthetics, and Related Products.

Of course, there are many other possibilities, including more radical options such as:

- (f) International Geotextile Society (i.e., keep the existing name, as advocated by S.D. Ramaswamy); or
- (g) International Geosynthetic Society (as initially proposed by R.Denis).

From various comments and discussions, I noted the following:

- The expression “and Related Products” is considered cumbersome; however, it may be the only way to encompass metallic reinforcement. Another possibility is “and Related Technologies” as suggested by J.S. Horvath.
- The presence of the word “Geotextiles” is advocated by President Rowe and others who want to show the continuity with the current name of the society. I personally believe it is a very important point. Also, as pointed out by Professor Ramaswamy, excluding the word “Geotextiles” from the name of the society would appear to exclude geotextiles made from natural fibers, since those are not geosynthetics (dictionaries are positive: when synthetic is used as a noun, it means “product of chemical synthesis” and nothing else).
- If the word “Geotextiles” appears in the name, it seems appropriate that the word “Geomembranes” also appear. One advantage would be to clearly recognize a rapidly growing sector of our industry and discipline (and D. Fayoux told me that members of the geomembrane industry would feel left out if they see “Geotextiles” but not “Geomembranes” in the name of the society, a situation they do not like with the present name of the society). Another advantage would be to promote the terminology geomembrane, which is still not used by a number of people (whom I like to call the “hard liners”). Also, having both “Geotextiles” and “Geomembranes” in the name of our Society would clearly encompass non-synthetic products, such as geotextiles made with natural fibers and geomembranes made with bituminous compounds.

Finally, to be complete, there has been some discussion on using or not using the article “the” after “IGS” (e.g., “IGS, the International Society for ...”, or “IGS, International Society for...”). At this point, this is a secondary question.

I hope that many will want to express an opinion or make a comment. Please write to Dr. R.J. Bathurst, Editor of IGS News, or to me (addresses are given on page 14) before 30 May 1992. Your contributions will help the task force prepare its recommendations to the IGS Council. The final decision will be made by the General Assembly. I hope that, as I wished at the beginning of this report, we are now moving toward a solution. May I suggest that, in our quest for the best name, we try to encompass more than restrict, we respect minority viewpoints and do not impose a preference, and we see the future of our discipline and not only its present status.

Thank you in advance for your cooperation on this important subject.

*J–P. Giroud
Past–President of the IGS*

Proposed Change in the IGS By-laws Associate Corporate Member

by

W. Voskamp – IGS Secretary

P. Stevenson – Chairman, IGS By-laws Committee

Background

At its meeting on 11–12 October 1991 the IGS Council decided to recommend the creation of a new membership category: Associate Corporate Member. This new membership category was initially proposed by a number of the Corporate Members at a committee meeting held in February 1991. The opinion of all Corporate Members was sought, by means of a letter, and their responses were discussed at the Corporate Members Committee meeting held in October 1991. At this meeting it was decided to recommend that the IGS Council approve this new membership category. The IGS Council voted to recommend this proposal to the Members.

Since a new membership category can only be created by a change to the by-laws, the Council decided that the approval of the by-laws would be requested together with the postal ballot for new Council Members in 1992.

Purpose

The membership category “Associate Corporate Member” is intended for distributors or companies associated with the Corporate Members. These companies will generally operate in one country and because of their relationship with an existing Corporate Member, do not consider it appropriate to become a full Corporate Member themselves. Some companies intend to use this category to honour some of their distributors for outstanding performance. The Corporate Associates are nominated by an existing Corporate Member and can vary from year to year. It is up to the Corporate Members to decide which companies they wish to nominate to become their Associate Corporate Member(s).

The Council approved the following rules relating to Associate Corporate Membership:

1. Associate Corporate Members are companies which are proposed as such by an IGS Corporate Member for a specific year.
2. Existing or previous Corporate Members cannot become Associate Corporate Members.
3. The Corporate Members must pay the membership fee for their Associate Corporate Members.
4. The Associate Corporate Members will be listed in the Corporate Member summary section of the IGS Membership Directory together with their nominating Corporate Member.

5. The Associate Corporate Members will also get a small, separate entry in the IGS Membership Directory.
6. The Associate Corporate Members have the same rights and benefits as the Corporate Member except for voting rights; they will have one vote.
7. The Associate Corporate Members will receive a written certificate of their membership. Corporate Members can also commission a special plaque in lieu of a certificate at additional cost.
8. The fee for the Associate Corporate Membership is for 1992: US\$ 200/ year.

By-Law Changes Required

To incorporate this new membership category in the IGS By-laws some of the existing articles must be changed. The IGS Council at its meeting in October 1991 decided to seek membership approval of these changes in a postal ballot. The postal ballot will be organized in accordance with Article 7.01.06 of the by-laws.

The proposed changes of the IGS By-laws are as follows: (changes/additions are in italics)

- 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 fees for those Associate Corporate Members associated with them.*
- 6.01.04 *Associate Corporate Members have one vote.*

Conclusion

The IGS Council very firmly believes that the addition of this membership category will aid in the promotion of the IGS, the profession, and the industry. They seek your support for these changes in the by-laws. A copy of the by-laws is available to all members from the IGS Secretariat (on request).

Results of Call for Candidates for IGS Council

A call for candidates for six(6) vacant IGS Council Member positions was issued in IGS News, November 1991. The following candidacies for Council Member were received at the IGS Secretariat by 29 February 1992:

Toshinobu Akagi (Japan), Richard J. Bathurst (Canada),

Barry R. Christopher (U.S.A.), Richard Jewell (Belgium), Colin Jones (U.K.), Chris Lawson (U.K.).

Further candidacies can be submitted by writing to the IGS Secretariat prior to 21 April 1992. Each nomination should be accompanied by a statement of qualifications not exceeding 12 lines.

The Candidates for IGS Council

Editors Note: The following items are printed exactly as received from the Secretary of the IGS. They have not been edited.

Toshinobu Akagi (Japan)

P.E., Dr. Eng., Prof. of Geotech Eng., BSCE (U. of Tokyo, '57), MSCE (U. of Illinois, '60), Dr.Eng (U. of Tokyo, '77). Soils Engineer; Shannon & Wilson, Seattle ('60-'64) and Mueser, Rutledge, Wentworth & Johnston, New York ('64-'65). Dept of Civil Eng., Toyo University, Japan ('66-Present). Geotech Consultant in Japan and abroad. Served as Prof. at Asian Institute of Technology, Bangkok while on leave ('78-'80). Assoc. Editor of IGS News and Liaison Secretary of Japan Chapter of IGS. Chairman, Comm. on Earth Structures and Foundations of JSCE. Formerly Director of JSSMFE. Interested mainly in settlement and stability aspects of soft ground, stabilization and improvement of soft ground, practical application of geosynthetics, etc.

Richard J. Bathurst (Canada)

Richard Bathurst is Editor of IGS News. When not working on the newsletter, he is Professor of Civil Engineering and Director of Research at the Royal Military College of Canada. Professor Bathurst has a Ph.D. (1985) from Queen's University in Kingston and was formerly a Geotechnical Engineer with Golder Associates for three years. He continues to be active in research and consulting. Dr. Bathurst is Technical Chair of Geosynthetics'93 to be held in Vancouver, Secretary of the Geosynthetics Committee of the Canadian Geotechnical Society, Member of the Canadian General Standards Board for geosynthetics and serves on a number of other North American and international committees related to geosynthetics. As an IGS Council Member and Editor of IGS News Dr. Bathurst will be able to more effectively serve IGS members.

Barry R. Christopher (United States of America)

Mr. Barry R. Christopher, P.E. is Vice President, Technical Services for Polyfelt, Inc. in Atlanta, Georgia. He has a BSCE from U.N.C.C., a MSCE from Northwestern University, and is pursuing a Ph.D. from Purdue University. He is a registered Professional Engineer with 15 years experience in geotechnical and geosynthetics application and design. He has performed extensive geosynthetics research and authored numerous technical papers, including four published geosynthetic design manuals. He has given many presentations and taught over 50 short courses on various aspects of geotextiles. Other geosynthetics activities include past Chairman, ASTM Committee D35 on Geosynthetics; technical chairman, Geosynthetics '91; co-chairman, Geosynthetics '93; Vice President, North American Geosynthetics Society; and, member IGS.

Richard A. Jewell (Belgium)

Dr. Richard Jewell has been a member and has actively supported the aims and objectives of IGS from the outset, having participated at the founding meeting of the Society in Las Vegas (1982), and of the UK Chapter in London (1987). His main contributions to date have been (1) work to advance the knowledge of geotextiles and other geosynthetics and the design methods for their application to reinforce soil, and (2) work to establish the successful UK Chapter, latterly as chairman (1989-91). Richard is in a position now to bring this technical background and the experience from the UK chapter to assist the continuing growth and development of IGS. He travels extensively between Europe, North America and the Orient; he will therefore be able to attend all Council meetings and help promote international cooperation.

Colin Jones (United Kingdom)

Colin Jones took his first degree at Durham University and it was whilst working on a variety of motorway schemes that he was awarded his Ph.D. by the University of Leeds for his work on earth retaining structures. In 1974 he joined the newly formed West Yorkshire Metropolitan County initially in charge of computing, and later as Assistant Director responsible for Structural Engineering. He was appointed to the Chair of Geotechnical Engineering at Newcastle in 1986 and in 1987 was elected Postgraduate SubDean of the Faculty of Engineering. Professor Jones has been a representative on various national bridge and geotechnical committees and is a pioneer in reinforced soil. He was a member of the original steering committee of the Joint SERC/Netlon research on Tensar geogrids and is currently Chairman of the UK section of IGS.

Chris Lawson (United Kingdom)

Chris Lawson graduated from the University of New South Wales, Sydney, Australia with a civil engineering degree specializing in geotechnical engineering. For almost 20 years he has been involved with geotextiles and has worked in many parts of the world with them. Until 1986 he worked as a consultant throughout Australia and South East Asia specializing in geotextiles. Between 1986 and 1988 he was employed as technical manager by ICI Fibres Ltd, U.K. with responsibilities for the technical marketing of their high performance geotextiles. Since 1988 Chris has held positions of technical and marketing manager for Exxon Chemical Geopolymers Ltd, U.K. Chris has published numerous papers on the subject of geotextiles over the past 15 years and has been a member of IGS since its inception.

Dutch Chapter of the IGS being formed through the initiative of The Netherlands Geotextile Organization (NGO)

by

Wim Voskamp

In 1991 there were approximately 30 individual members of the IGS in the Netherlands. The formation of a Dutch Chapter had been discussed for many years, however, until recently no decision had been made. The main reason for this was the fact that the Netherlands Geotextile Organization (NGO) is a well established group with about 70 individual and 75 corporate members. Therefore it would be very inefficient to form a chapter of the IGS that would simply duplicate the activities of the NGO.

In December last year the Council of the Netherlands Geotextile Organization made an important decision. All Dutch NGO members, individual as well as corporate members, will become IGS members. Further, the NGO will initiate the formation of a Dutch Chapter of IGS. This Dutch Chapter will be managed and operated in close cooperation with the NGO to co-ordinate activities. In fact, the two organizations will cooperate as shadow organizations.

Part of the revenues from the 4th International Con-

ference on Geotextiles, Geomembranes and Related Products, held in The Hague in 1990 will be used to finance the chapter. In this way the NGO members will be able to keep in contact with the international geosynthetics world. Often, local geosynthetics organizations are focused on the promotion of geosynthetics in their own country and other local issues. For many of the local members there is no perceived need for international contacts. However, this lack of apparent need can often result in local organizations (and its members) being isolated from the international geosynthetics community. Luckily we can break this pattern in Holland and give the IGS membership to our NGO members as an additional benefit. This benefit may be regarded in part as thanks for all the activities of our members in the organization of the 4th International Conference held in The Hague in 1990.

We expect that the new Dutch Chapter of the IGS will have at least 150 members.

NEWS OF MEMBERS

Peter E. Stevenson has joined Synthetic Industries, Chickamauga, Ga., U.S.A as marketing manager for technical textiles. Stevenson is Treasurer and Chairman of the By-laws Committee of the International Geotextile Society).

Laurie Honnigford, formerly the staff director of the Geomembrane/Geotextile Division of the Industrial Fabrics Association International (IFAI), St. Paul, Minn., U.S.A and Secretary General of the North American Geosynthetics Society (NAGS) has accepted a position with Environmental Protection Inc. (EPI) as regional sales manager.



The recent marriage of Swi Kwin and Pietro Rimoldi in Italy was also an IGS event as this wedding photograph illustrates. From left to right: R.K.Rowe (Canada), J.M.Rigo (Belgium), Swi Kwin Rimoldi (Italy), P.E.Stevenson (USA), Pietro Rimoldi (Italy), D.Cazzuffi (Italy), J-P. Giroud (USA), B.Myles (UK)

Report on the Indian Chapter of the IGS

The Indian Group on Geotextiles (IGG) functions as the Indian Chapter of the IGS. The IGG and the Central Board of Irrigation and Power (CBIP) recently organized a National Workshop on the Role of Geosynthetics in Water Resources Projects. The workshop was held in New Delhi from 20–24 January 1992. Eighteen (18) theme papers covering the following aspects were presented and discussed:

1. Types and Manufacturing Methods, Testing and Evaluation of Geosynthetics
2. Role of Geosynthetics in Water Resources Projects. Papers on soil reinforcement and stabilization; reinforced walls and slopes; filtration and drainage; channel lining; and tunneling.

Two special Sessions on i) Natural Materials and Case Studies and ii) Standardization were also held during which five (5) papers were presented and discussed. A to-

tal of 61 delegates from all over the country participated in the workshop. After the in-depth discussions the following recommendations emerged from the workshop:

1. Guidelines on the use of geosynthetic materials (including natural fibres) and standard specifications for geosynthetic materials should be developed for channel lining, filtration, separation, and reinforcement applications.
2. A national laboratory should be identified for testing of geosynthetic materials.
3. The Bureau of Industrial Costs and Prices should be requested to study the high cost of geosynthetic materials in India. At present the cost of geosynthetic materials serves to inhibit their use in water resources projects.

reported by A.R.G. Rao

IGS welcomes the Indonesian Chapter

A Geosynthetics Committee of the Indonesian Geotechnical Engineering Association was established in 1990 as a result of the tremendous growth in the use of geosynthetics in the country. In September 1991 a proposal was forwarded to the IGS Council to set up an Indonesian Chapter of the IGS. On 3 December 1991 a meeting was held in Jakarta, during which the draft by-laws of the chapter were discussed and accepted. The name of the chapter is Masyarakat Geosintetik Indonesia or The Indonesian Chapter of the International Geotextile Society.

The following provisional officers were elected:

- President: Mr. Soekrisno Rammelan
- Vice President: Mr. Nurtantio Kartanegara

- Secretary: Mr. K. Oetomo
- Treasurer: Mr. Gunawan W. Suradi

The draft by-laws, together with the minutes of meeting have been sent to the officers of the IGS for final approval. It is expected that the IGS Council will approve officially the formation of the chapter at its next meeting.

Meanwhile, the number of IGS members has increased from 7 in 1991 to 23 this year. The chapter will organize its first seminar on 27–28 April 1992.

reported by K. Oetomo

International Symposium on Permanent Geosynthetic Reinforced Soil Retaining Wall Structures 6–7 November 1992, Tokyo, Japan

An international symposium on "Permanent Geosynthetic Reinforced Soil Retaining Wall Structures" will be held at and sponsored by the Institute of Industrial Science, University of Tokyo, Tokyo, Japan, on 6–7 November 1992. The symposium will be followed by a field trip to sites in Nagoya and Osaka on 9–10 November 1992. The sites to be visited are described in the companion article on page 8 of this issue of IGS News. Readers may note that the symposium will be held immediately before IS-Kyushu'92 which is scheduled for 11–13 November 1992.

The case record reporters and panelists will be:

Bathurst, R. (Canada), **Leshchinsky, D.** (USA), **Miki, H.** (Japan), **Christopher, B.R.** (USA), **Murata, O.** (Japan), **Collin, J.G.** (USA), **Tatsuoka, F.** (Japan), **Gourc, J.P.** (France), **Wu, J.T.H.** (USA), **Jewell, R.A.** (Belgium), **Wichter, L.** (Germany), **Jones, C.J.F.P.** (UK), **Matichard, Y.** (France)

A hardcover copy of the proceedings will be published by A.A. Balkema Publishers after the symposium. Everyone is welcome to contribute to the panel discussion. Participants who wish to contribute to the panel discussion are requested to send an abstract of approximately 250 words in length to Prof. F. Tatsuoka before 15 October 1992.

More detailed information can be obtained by contacting:

Prof. Fumio Tatsuoka
The Institute of Industrial Science,
University of Tokyo
22-1, Roppongi 7-chome, Minato-ku
Tokyo, 106, Japan
Tel 03-3402-6231, Ext 2570, Fax 03-3479-0261

reported by F. Tatsuoka

Permanent Geosynthetic–Reinforced Soil Retaining Walls for Railway Embankments In Japan

by

Professor Fumio Tatsuoka

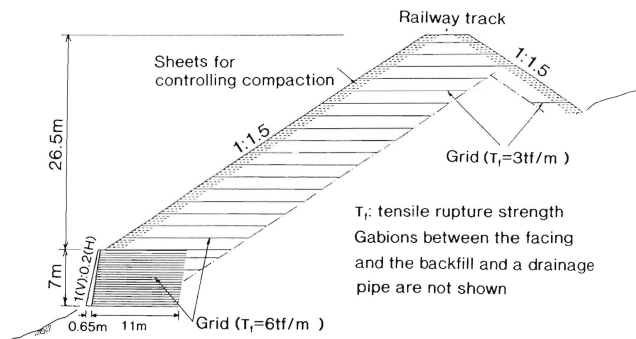
Institute of Industrial Science, University of Tokyo

A new system of geosynthetic–reinforced soil (GRS) retaining wall has been used for the reconstruction of a total of 6 km of railway embankment at several sites in Japan. The system has been used in the reconstruction of existing slopes to create space for new tracks at Nagoya and at Amagasaki. The system has also been used as part of the construction of several full sections of embankment at Mt. Aso.

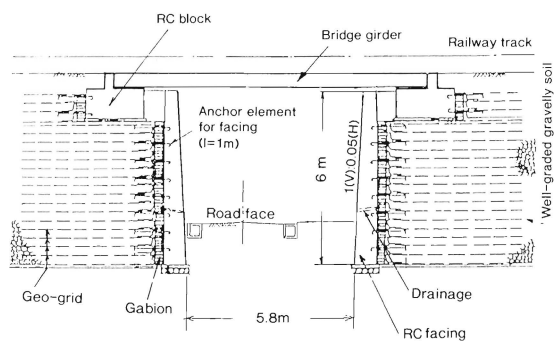
The GRS walls are now replacing conventional Reinforced Earth (RE) retaining wall systems for the construction of permanent railway structures in Japan. The characteristic features of the GRS walls are:

1. Many poor quality on–site soils can be used for the backfill and hence the requirement for expensive imported cohesionless soil eliminated. Polymer grid reinforcement is used for cohesionless backfill materials while a non–woven/woven geotextile (composite) is preferred for near–saturated cohesive soils where they can perform the dual function of drainage and reinforcement.
2. Continuous rigid facings are used to reduce the deformation of the walls and to increase the ultimate stability of the structures. These facings also increase the durability of the wall surface and give a better appearance to the wall face. In some cases, the facing surface has a decorative pattern.
3. The GRS retaining walls use a relatively short reinforcement length, typically 60% of the wall height. The short lengths are possible due to the combined effect of planar reinforcement and a continuous rigid facing. An added benefit is that the amount of excavation can be kept to a minimum when reconstructing an existing slope.
4. Stage construction is used in which a full height wall is constructed using gravel–filled bags placed at the shoulder of each soil layer, followed by the construction of a cast–in–place concrete facing at a later date. This two–stage construction is required to avoid the potential damage due to relative settlement between a rigid facing and a deformable backfill soil and to develop sufficient tensile strain in the reinforcement during placement and compaction of the backfill.

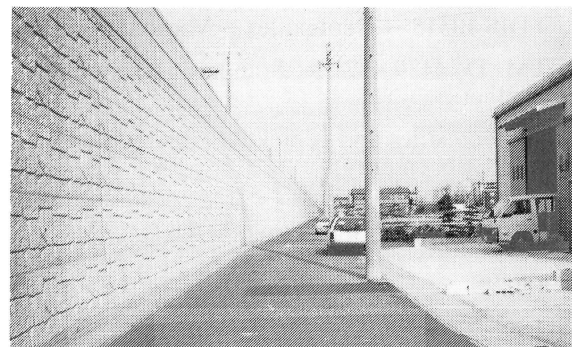
The GRS retaining wall system has been used for important permanent structures such as retaining walls supporting railway tracks and bridge abutments for railways. In the case shown in the second figure the reinforced concrete blocks supporting a bridge girder were placed directly on the backfill. For the several abutments of this type no settlements due to train loading have been reported.



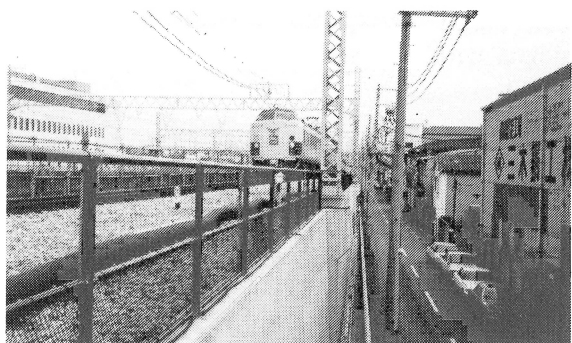
Reinforced embankment at Mt Aso



GRS wall supporting bridge abutments



GRS wall at Nagoya



GRS retaining wall supporting railway tracks

GEO WHAT ?

Terms and Definitions Worldwide

by

Professor J.M. Rigo

GRC-LMC – Liège University, Belgium
Chairman of the IGS Standards Committee

Many experts have been working for several years to prepare standards on terms and definitions for geotextiles, geomembranes and related products. The major efforts have been carried out by ISO, ASTM and CEN committees.

In order to ensure free circulation of goods, uniform certification procedures for materials and a correct understanding of the types of products available, it is necessary that manufacturers, designers and others have a consistent terminology for generic geosynthetic products. The writer has attended meetings where experts had very strong discussions and disagreements only because their understanding of terminology was different.

In order to contribute to a better knowledge in this field I have prepared a review of terms and their definitions as they are defined in ISO, ASTM and CEN standards.

In this article, terms and their definitions related to geosynthetic materials are reviewed. A second article will follow in the next issue of IGS News that will address terms and their definitions as they relate to functions.

The basic documents for this review are:

- ISO DIS 10318 – Geotextiles – Vocabulary
- ASTM D 4439-87 – Standard terminology for geosynthetics
- CEN Geotextiles and geotextile-related products (at level of CEN enquiry)

Standard Terminology on Geosynthetics

Geosynthetic

- ISO –
- ASTM – a planar product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering related material as an integral part of a man-made project, structure, or system
- CEN –

Geotextile

- ISO – a permeable, polymeric, woven, nonwoven or knitted material used in geotechnical and civil engineering applications
- ASTM – any permeable textile material used with foundation, soil, rock, earth, or any other geotechnical

engineering related material, as an integral part of man-made product, structure, or system

- CEN – a permeable, polymeric (synthetic or natural) textile used in contact with soil and/or other materials in civil engineering for (and) geotechnical applications

Geotextile-related products

- ISO – permeable, polymeric, sheet or strip-like construction materials used in geotechnical and civil engineering applications
- ASTM –
- CEN – permeable, polymeric (synthetic or natural) planar materials used in contact with soil and/or other materials in civil engineering for (and) geotechnical applications

Geogrid

- ISO – a polymeric, planar structure consisting of a regular open network of integrally connected tensile elements and used in geotechnical and civil engineering applications
- ASTM –
- CEN – a polymeric, planar structure consisting of a regular open network of integrally connected elements with tensile strength

Geonet

- ISO – a polymeric, planar structure, used in geotechnical applications, whose openings are much larger than the constituents and in which the mesh is linked by knots
- ASTM –
- CEN – a polymeric, planar structure consisting of a regular open network whose constituent elements are linked by knots and whose openings are much larger than the constituents

Geomesh

- ISO –
- ASTM –
- CEN – a geonet whose constituent elements are chemically or thermally bonded

IGS Education Committee

List of Reference Documents

The list of publications given in this document has been compiled by the Members of the IGS Education Committee under the guidance of D. Cazzuffi and Anna Anzani. The list does not purport to be complete but is offered as a starting point for those readers interested in acquiring recognized high-quality publications on geotextiles, geomembranes and related products.

The list of reference documents include conference proceedings, textbooks and magazines and have been grouped into the following categories:

- General Topics
- Material Characteristics and Testing
- Reinforcement Applications
- Dams
- Bank Protection
- Waste Containment Applications

In each category the reference documents have been listed in chronological order (except for General Topics, where Conference Proceedings have been grouped first, followed by textbooks and magazines).

This list has been reviewed by all Members of the IGS Education Committee.

General Topics

Proceedings of the International Conference on the Use of Fabrics in Geotechnics – First International Conference on Geotextiles (1977) – Paris (3 volumes, 532 pages).

Order from: ENPC, Service Formation Continue, 28 Rue des Saints Peres, 75006 Paris, France.
(Price: US\$ 60 plus postage)

Proceedings of the Second International Conference on Geotextiles (1982) – Las Vegas (4 volumes, 1024 pages).

Order from: IFAI, 345 Cedar St., Suite 800, St. Paul, MN 55101, USA.
(Price: US\$ 72 plus postage)

Proceedings of the Third International Conference on Geotextiles (1986) – Wien (5 volumes, 1550 pages).

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Proceedings of the Fourth International Conference on Geotextiles, Geomembranes and Related Products (1990) – The Hague (2 volumes, 884 pages plus a third volume in print).

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Proceedings of the International Conference on Geomembranes (1984) – Denver (2 volumes, 511 pages).

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(Price: US\$ 40 plus postage)

Proceedings of Geosynthetics '87 (1987) – New Orleans (2 volumes, 639 pages).

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Proceedings of Geosynthetics '89 (1989) – San Diego (2 volumes, 600 pages).

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(Price: US\$ 55 plus postage)

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(Price: US\$ 55 plus postage)

Rankilor, P.R. (1981), **Membranes in Ground Engineering**, John Wiley and Sons Ltd., Chichester, UK (377 pages).

Order from: J. Wiley, Baffins Lane, Chichester, West Sussex, PO19 1UD, UK.

Giroud, J-P. (1985), **Geotextiles and Geomembranes. Definitions, Properties and Design**, IFAI, St. Paul, MN, USA (404 pages).

Order from: IFAI, see address above.
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John N.W.M. (1987), **Geotextiles**, Blackie and Son Ltd., Glasgow and London, UK.

Order from: Blackie and Son Ltd., 7 Leicester Place, London W2CH 7BP, UK.

Koerner R.M. (1990), **Designing with Geosynthetics**, Prentice Hall, Englewood Cliffs, NJ, USA (652 pages).

Order from: IFAI, see address above.
(Price: US\$ 70 plus postage)

Venkatappa Rao G. and Raju G.V.S.S. – Editors (1990), **Engineering with Geosynthetics**, Tata McGraw-Hill, New Delhi, (316 pages).

Order from: Tata McGraw-Hill Publishing Company Ltd., 4/12 Asaf Ali Road, New Delhi – 110 002
(Price: Rs. 215/-)

Hausmann M.R. (1991), **Engineering Principles of Ground Modifications**, McGraw-Hill, New York, USA (632 pages).

Order from: McGraw-Hill Book Company, International Group, 1221 Avenue of the Americas, New York, NY 10020, USA.

Geotextiles and Geomembranes (Editor T.S. Ingold), an official journal of the IGS published by Elsevier in six issues per year.

Order from: Elsevier Science Publisher Ltd., Crown House, Linton Road, Barking, Essex IG11 8JU, UK.

(Price £ 160/year)

Elsevier Science Publishing Co., Inc., Journal Information Center, 655 Ave of the Americas, New York, NY 10010, USA (for North America) (Price: US\$ 296/year)

Material Characteristics and Testing

Fluet J. – Editor (1987), **Geotextile Testing and the Design Engineer**, ASTM, Philadelphia, USA (192 pages).
Order from: ASTM European Office, 27/29 Wilbury Way, Hitchin, Herts SG4 OSX, UK (for Europe).
(Price: £ 25 plus postage)
ASTM, 1916 Race Street, Philadelphia, PA 19103, USA.

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Order from: E & FN Spon, Marketing Dept., 2–6 Boundary Row, London SE1 8HN, UK.
(Price: £ 29 plus postage)

Peggs I.D. – Editor (1990), **Geosynthetics: Microstructure and Performance**, ASTM, Philadelphia, USA (170 pages).
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(Price: \$26 plus postage)

Rollin A. and Rigo J.M. – Editors (1991), **Geomembranes. Identification and Performance Testing**, Chapman and Hall, London (376 pages).
Order from: E & FN Spon, see address above.
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Reinforcement Applications

Jones J.F.P. (1984), **Earth Reinforcement and Soil Structures**, Butterworths, London (184 pages).
Order from: Butterworths, Borough Green, Sevenoaks, Kent TN15 8PH, UK. (Price: £ 30 plus postage)

ASCE (1987), **Soil Improvement – A Ten Year Up-To-Date**, ASCE Geotechnical Special Publication No. 12.
Order from: ASCE, 345 East 47th Street, New York, NY 10017, USA.

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Order from: Kluwer Academic Publisher Group, P.O. Box 322, 3300 AH Dordrecht, NL. (Price: 275 hFl plus postage)
Kluwer Academic Publisher, 101 Philip Drive, Norwell, MA 02061, USA.
(Price: US\$ 149 plus postage)

Mitchell J.K. and Villet W.C.B. (1987), **Reinforcement of Earth Slopes and Embankments**, National Cooperative Highway Research Program Report # 290, Transportation Research Board.

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Order from: Balkema, P.O. Box 1675, NL–3000 BR Rotterdam, The Netherlands.
(Price: 120 hFl plus postage)
Balkema, Old Post Road, Brookfield, VT 06036, USA (for North America). (Price: US\$ 59)

Rigo J.M. and Degeimbre R. – Editors (1989), **Reflective Cracking in Pavements. Assessment and Control**, Liège University.
Order from: Universite de Liège, Inst. du Génie Civil, Quai Banning, 6, B–4000 Liège

Shercliffe D.A. – Editor (1990), **Reinforced Embankments – Theory and Practice**, Thomas Telford, London (177 pages)
Order from: Thomas Telford Ltd., Thomas Telford House, 1 Heron Quay, London E14 4JD, UK.

McGown A., Yoe K.C. and Andrawes K.Z. – Editors (1991), **Performance of Reinforced Soil Structures**, Thomas Telford, London (485 pages)
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Dams

ICOLD (1986), **Geotextiles as Filters and Transitions in Fill Dams**, Paris (130 pages)
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(Price: Ff. 100 plus postage)

ICOLD (1991), **Watertight Geomembranes for Dams. State of the art**, Paris (140) pages.
Order from: CIGB, see address above.
(Price: Ff. 180 plus postage)

Bank Protection

Flexible Armoured Revetments Incorporating Geotextiles (1984), T. Telford, London (400 pages).
Order from: Thomas Telford Ltd., see address above.
(Price: £ 29.95 plus postage)

PIANC (1987), **Guidelines for the Design and Construction of Flexible Revetments Incorporating Geotextiles for Inland Waterways**, PIANC, Bruxelles (156 pages).
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(Price: £ 20 plus postage)

Hemphill R.W. and Bramley M.E. (1989), **Protection of River and Canal Banks**, CIRIA – Butterworths (200 pages).
Order from: Butterworths, see address above.
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Waste Containment Applications

Proceedings of the Second International Landfill Symposium, Sardinia 89, (1989) – Porto Conte (Alghero) (2 volumes, 1220 pages).
Order from: CIPA, Via Palladio 26, I–20235, Milano.
(Price: Lit 250000 plus postage)

Koerner R.M. – Editor (1990), **Geosynthetics Testing for Waste Containment Applications**, ASTM, Philadelphia (386 pages).
Order from: ASTM European Office, see address above.
(Price: £ 33 plus postage)

ISSFME – ETC (1991), **Technics of Landfills and Contaminated Land**, Technical Recommendations “GLC”, ed. by the German Geotechnical Society for the ISSMFE, Ernst, Berlin (76 pages).
Order from: Hans L. Jessberger, Ruhr University, Bochum, P.O. Box 102148, D–4630, Bochum 1, Germany.

Proceedings of the Third International Landfill Symposium, Sardinia 91 (1991) – Cagliari (2 volumes, 1816 pages).
Order from: CISA, Via Marengo 34, I–09123, Cagliari. (Price: Lit 400000 plus postage)

Knitted geotextile

- ISO – a geotextile produced by interlooping one or more yarns, fibres, filaments, or other elements
- ASTM –
- CEN – a geotextile produced by interlooping one or more yarns, fibres, filaments, or other elements

Nonwoven geotextile

- ISO – a geotextile produced in the form of a manufactured sheet, web or batt of directionally or randomly oriented fibres, bonded by friction, and/or cohesion and/or adhesion, excluding paper and products which are woven, knitted, tufted, stitch-bonded incorporating binding yarns or filaments, or felted by wet-milling, whether or not additionally needed. The fibres may be of natural or man-made origin. They may be staple or continuous filaments or be formed in situ (see ISO 9092)
- ASTM –
- CEN – a geotextile in the form of a manufactured sheet, web or batt of directionally or randomly oriented fibres, filaments or other elements, mechanically and/or thermally and/or chemically bonded (friction and cohesion and adhesion)

Woven geotextile

- ISO – a geotextile produced by interlacing, usually at right angles, two or more sets of yarns, fibres, filaments, tapes, or other elements (knitted fabrics are excluded)
- ASTM –
- CEN – a geotextile produced by interlacing, usually at right angles, two or more sets or yarns, fibres, filaments, tapes or other elements

Geocomposite

- ISO – an assembled material using at least one geotextile or geotextile-related product among the components
- ASTM –
- CEN – an assembled material using at least one geotextile or geotextile-related product among the components

Geomembrane

- ISO –
- ASTM – very low permeability synthetic membrane liners or barriers used with any geotechnical engineering related material so as to control fluid migration in a man-made project, structure, or system
- CEN –

Call for Abstracts

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

RILEM Technical Committee TC 97–GCR was established in 1986 to study problems related to the use of geotextiles and related products in preventing crack propagation in pavements. The objectives of the committee were to:

- establish a state of the art on the subject, and
- recommend on-site laboratory test methods to determine relevant parameters

A first conference was organized in Liège, March 1989, with the title "Reflective Cracking: Assessment and Control". Many valuable contributions to the general theme were presented including papers on laboratory and full scale experiments, modelling and case histories.

A second conference is now planned that will be focussed on:

- the state of the art, and
- design recommendations for field applications

The 1993 Conference will comprise a series of keynote lectures and case histories. Papers on new developments in pavement assessment, retarding measures, design aspects and case histories are welcome.

For case histories, the paper should address the following points:

- Problem description
- Field investigations performed
- Design procedure followed (material testing, existing recommendations, design procedures)
- Selection procedure to choose the right system
- Long term performance

The papers to be presented in the sessions will be selected by the RILEM TC 97–GCR on the basis of their completeness and compliance with the recommendations given above.

Abstract submission: deadline March 31 1992

For further information please contact:

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

The International Geotextile Society has given its support to the Second International Conference on Reflective Cracking.

ASCE Conference on Grouting, Soil Improvement & Geosynthetics, 25–28 February 1992 New Orleans

The American Society of Civil Engineers, Geotechnical Engineering Division held a speciality conference in New Orleans in February. The conference presented a review of the current state of the art in the U.S.A and abroad in design and practice of grouting techniques and materials, soil improvement technologies, geosynthetics engineering, and ground modification for geo-environmental applications. Out of a total of 105 papers there were 16 papers devoted to geosynthetics. These papers were given in three sessions that were focussed on: subgrade and road layer applications; embankments and slopes; and retaining walls. A summary and conclusions session was held on the last day of the conference in which Dr. E.D'Appolonia gave a review of conference highlights. Two papers on geosynthetics were singled out by the speaker as being of particular importance to the field: "Finite Element Analysis of a Geogrid Reinforced Soil Wall" by Bathurst, Karpurapu and Jarrett and "The Behavior of Reinforced Soil Walls Constructed by Different Methods" by McGown, Loke and Murray. The conference also featured four keynote

lectures. Of interest to IGS members was the Mercer Lecture delivered by Dr. Koerner on behalf of himself and co-authors Yick Husan and Arthur E. Lord, Jr. The lecture was titled: "Remaining Technical Barriers to Obtain General Acceptance of Geosynthetics". The lecture was focussed largely on technical issues but Dr. Koerner pointed out that acceptance of geosynthetics by the engineering community can also be the result of non-technical issues. Dr. Koerner has graciously agreed to share some of his thoughts on this topic in the following article.

The conference proceedings are in two volumes and have been edited by R.H.Borden, R.D.Holtz and I.Juran and appear as Geotechnical Special Publication No 30. Enquiries to purchase a set of the proceedings can be directed to: American Society of Civil Engineers, 345 East 47th Street, New York, New York 1017–2398, U.S.A.

reported by R.J.Bathurst
Editor, IGS News

Technical versus Nontechnical Issues Facing Further Acceptance of Geosynthetics in Civil Engineering

by
Robert M. Koerner

In preparing for the inaugural Mercer Lecture, my intention was to dwell on technical issues which have significant impact on the further acceptance of geosynthetics in transportation, geotechnical and environmental engineering applications. Indeed, the heart of the technical paper (to be published in *Geotextiles and Geomembranes* later this year) focuses on the following areas which are felt to be of considerable significance and technical concern.

1. Geotextile filtration/drainage materials when used with fine-grained cohesionless soils and/or when permeated with sediment and microorganism laden liquids. Still further complications are sometimes encountered when hydrodynamic or reversing flow conditions are involved.
2. Sustained load (creep) behaviour and the interrelated phenomena of stress relaxation for all geosynthetics used in long-term applications. Further studies into elevated temperature effects and synergistic effects including possible installation damage and aggressive surrounding liquid are also warranted.
3. Long-term polymer degradation mechanisms and the interrelated aspect of lifetime prediction of geosynthetics need clarification and quantification. In the latter regard, Arrhenius modeling seems to be quite relevant.

Yet, throughout writing on the above technical topics my thoughts went to those potential users and designers who were dismissing geosynthetics outright on the basis of *nontechnical* issues. Such thoughts as to prior-nonuse,

unfamiliarity of geosynthetics and their design techniques, relative newness of the technology, etc., are formidable obstacles which must be overcome **before** addressing any technical issue.

Still further, if fault were to be placed for the above listed nontechnical issues, it would not be completely on the designers, specifiers and owners, but would also involve in large measure those responsible for the formalized training of young Civil Engineers, i.e., *college and university faculty*. Indeed if the mandate of an Instructor or Professor is to train young men and women for their future professional life and geosynthetics are not being introduced in their formal coursework I feel that the students are not being properly served. Geosynthetics are a viable part of geotechnical, environmental and transportation engineering and must be taught at both undergraduate and graduate levels. While I certainly realize that the trend of compression of credits and technical courses currently ongoing at all academic institutions might preclude separate courses on geosynthetics, there is no reason not to include discussing and training on geosynthetics at the appropriate location in traditional and ongoing courses.

In my opinion, all geotechnical, environmental and transportation faculty members should be well informed in geosynthetics, should be aggressively obtaining information, should counterpoint traditional solutions and materials with their geosynthetic options and should present the information in an open and forthright manner. In this way, their students (which are our future professionals) can make knowledgeable and *technically-based* decisions as to the possible use of geosynthetics in their future careers.

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.

Obayashigimi Corporation

by

Kiyoshige Nishibayashi

640, Shimokiyoto 4-chome, Kiyose-shi, Tokyo 204, Japan

The Obayashi Corporation numbers among the world's leading general contractors and among the top five in Japan. Obayashi can offer a full range of services for construction projects including consultant, systems designer, engineer or architect. It can conduct feasibility studies, research, and analysis; plan and implement a wide range of civil engineering construction projects including heavy construction; and provide post-construction maintenance.

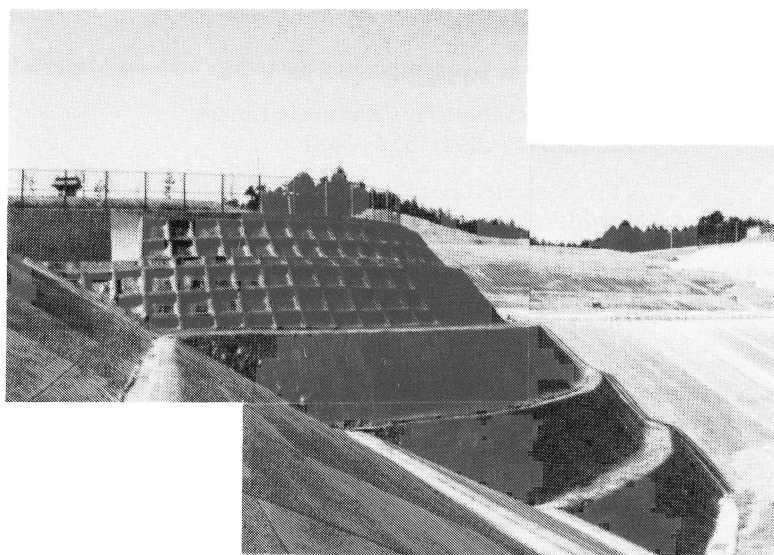
Obayashi has a head office, main office, nine branches and 78 business offices, a technical research institute, two machinery works and 29 subsidiaries in Japan. It has 14 branches and 23 subsidiaries overseas.

The first soil stabilization method using geotextiles developed by Obayashi Corporation was in 1966 and was called the "Sheet Method - Earth Covering Method for Soft Ground Surface Using Woven Fabric". This application was the first use of geotextiles in large quantity in Japan.

Other methods developed by Obayashi Corporation that use geotextiles include the "PVC Drain Method" which is a form of vertical drain method using porous poly-vinyl chloride, and the "OV Filter Method" which is a drainage method using nonwoven geotextiles for soil embankments.

In addition, there is the "In-situ Water Cut-off Method" which involves spraying a rubber-asphalt emulsion on the ground surface. The application of the method involves stretching a nonwoven geotextile over a slope and then spraying a S.B.R - asphalt emulsion over it. Solidification leads to an essentially impermeable water cut-off layer.

This technology has the advantage of making water cut-off possible even on surfaces with steep gradients or where the ground is irregular. The water cut-off layer has no joints and a tight bond with the ground surface is possible. Thus the spray method has advantages over other methods that use rubber-, asphaltic- or vinyl chloride-based materials that are pre-manufactured.



Example of "Sheet Method" of construction



Spraying of S.B.R. - asphalt emulsion

Geotextiles & Geomembranes: An Official Journal of the IGS

In 1992 the Journal continues with 6 issues per year in order to provide a more frequent service to subscribers and more timely publication for the authors. The subscription price for 1992 has been set at Pounds 160 (U.K.). The reduced subscription offer to individual IGS members represents a 40% discount off the full price, i.e. Pounds 96 (U.K.).

Reduced subscriptions are available directly from the publisher:

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

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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Graphic Symbols for Geosynthetics

In the last issue of IGS News (Vol 7 No 3), Dr. J-P. Giroud proposed a standardized set of symbols to represent generic geosynthetic products and functions in construction drawings, engineering reports and technical papers. Dr. Giroud reports that there has been a good response to his request for discussion and many valuable suggestions received. However, in order to give other IGS members an opportunity to review the tentative symbol set, the deadline for comments has been extended to 30 May 1992.

Readers are invited to send their comments to:

Dr. J-P. Giroud
GeoSyntec Consultants
1200 South Federal Highway, Suite 202
Boynton Beach, Florida 33435, USA,
Fax: 1 (407) 736 4998

The next issue of IGS News scheduled for July 1992 will contain an article by Dr. Giroud that reviews the comments that he has received. The article will contain a proposed final document giving the graphic symbols set for geosynthetics recommended by the International Geotextile Society.

LOST MEMBERS

The International Geotextile Society has lost track of some of its membership. The following list is compiled from mail returned to the IGS and appears to contain the names of members who have moved, changed jobs or otherwise disappeared from the IGS. Can you help the IGS renew our acquaintance with these members and colleagues? If so, please contact the treasurer of the IGS, Mr. P. Stevenson at the address given on page 14 of this issue or contact the Editor of IGS News.

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Calendar of Events

Reinforced Embankment Behaviour: Recent Advances: Lecture by R.K. Rowe
Hong Kong Institute of Civil Engineers, 23 March 1992

Contact: Mr. Philip Blacker
Managing Director
Fugro (H.K.) Ltd.
Park Commercial Centre, 11/F
2-12 Shelter Street
Causeway Bay, Hong Kong

K-Geo 93: 2 INTERNATIONALER KONGRESS KUNSTSTOFFE IN DER GEOTECHNIK
20-22 Mai 1992, Luzern, Schweiz

Unterlagen sind erhältlich beim:

Tagungssekretariat K-Geo 92
c/o Frau Ottilia Zweifel
Auernweg 12B, CH-8752 Nafels
Tel: 058 34 45 93
Fax: 058 34 42 32

GEO-FILTERS '92 International Conference on Filters and Filtration Phenomena in Geotechnical Engineering, Karlsruhe, Germany, 20-22 October 1992

Contact: Dr. M.H. Heibaum
Bundesanstalt für Wasserbau
P.O. Box 210253
D-7500 Karlsruhe, Germany

Third Geosynthetics Symposium of China
Yizheng, Jiangsu Province, 30 October - 4 November 1992

Contact: Mr. Ni Chengming
Yizheng Amoco Fabrics Company Ltd.
Yizheng, Jiangsu Province 211451
P.R. China

Fax: 25 716098/711445

International Symposium on Recent Case Histories of Permanent Geosynthetic-Reinforced Soil Retaining Wall
Tokyo, Japan, 6-7 November, 1992

see page 6

International Symposium on Earth Reinforcement Practice (IS Kyushu'92)

Kyushu, Japan, 11-13 November 1992

Contact: Secretariat of IS Kyushu'92
Department of Civil Engineering (Suiko)
Kyushu University
Hakozaki, Fukuoka 812, JAPAN

Tel: (092) 641 1101 ext: 5212 or 5232

Fax: (092) 641 5195

Second International Conference on Reflective Cracking in Pavements:

State of the Art and Design Recommendations
Liège, Belgium, 10-12 March 1993

Abstracts: 31 March 1992

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

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

Contact: Prof. S.D. Ramaswamy
National University of Singapore
Dept. of Civil engineering
Kent Ridge Crescent
Singapore 0511

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

List of Corporate Members of the IGS

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Du Pont De Nemours Int. S.A. - Switzerland (1984)
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Fibertex Aps - Denmark (1984)
Fritz Landolt Ag - Switzerland (1985)
Geotextiles (M) Sdn Berhad - Malaysia (1991)
Geotechnics Holland BV - Netherlands (1991)
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Japan Spunbond - Japan (1984)
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Taiyo Kogyo Corporation - Japan (1992)
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Texsol - France (1989)
The Tensar Corporation - U.S.A. (1989)
The Reinforced Earth Co. - U.S.A. (1989)
The Zenitaka Corporation - Japan (1992)
Tokyu Construction Co. - Japan (1984)
Uco N.V. - Belgium (1985)
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Dates indicate earliest year of continuous membership.

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) \$40 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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U.S.A.

Telephone: 1 (803) 855-0504
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In this area, write a short description of your activities as you wish it to appear under your address in the next IGS Directory (e.g. "Consulting Engineer", or "Salesperson for XYZ Geotextile Company"). If the name of your company already appears in the above address, you need not repeat it in this area.

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Eligibility (i.e. connection with geotextiles, geomembranes, or related products):

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Mode of Payment

A check is enclosed

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* Benefactor's contribution (at least (US) \$200.00): _____

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

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