

**NEWSLETTER OF THE INTERNATIONAL GEOTEXTILE SOCIETY**

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

**VOLUME 9 NO 2**

**JULY 1993**

## CALL FOR PAPERS



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

### **Deadline for abstracts extended to 30 August 1993!**

*Editors Note: As a special courtesy to those who may not have heard of the conference or were otherwise delayed in preparing their abstracts, the Organizing Committee has extended the deadline for abstracts from 31 July to 30 August 1993.*

The 5th International Conference on Geotextiles, Geomembranes and Related Products (5–9 September 1994) is taking shape in Singapore – the marvel city of Asia. Don't be late submitting your abstracts – send them now! See the call for papers on the next page.

The Conference and Exhibition will be held at the Raffles City Convention Centre, which is located on the 4th Level of the Westin Stamford and Westin Plaza Hotels (both adjoined at level 4). The whole event including technical sessions, posters and other visual displays, exhibition, hospitality suites, meeting rooms etc. will take place on a single floor, which will enhance communication between attendees and provide maximum exposure to exhibitors and participants presenting papers or posters. Efficient Singapore is preparing for an efficient conference! The event hotel is the tallest hotel in the world and it can house virtually all the delegates if bookings are made early enough. Rates and booking dates etc. will be published in Bulletin 2 of the conference which will be issued in December 1993. With more than 1300m<sup>2</sup> of floor space, the exhibition will be the largest geosynthetics exposition in the eastern hemisphere ever, encompassing the fastest growing market for the decade. The cost of participating will be far less than the cost of not participating!

All delegates, participants and especially exhibitors are strongly encouraged to stay at the event hotel. A full day at the conference can be quite tiring and there is nothing

like being just an elevator away from your rest point. The same goes for exhibitors who will surely find it very convenient to also have a free storage point for literature, samples etc. not needed for the day. Nevertheless, supporting hotels are also being arranged within walking distance and/or with convenient subway connections to the event.

Enjoy life in Singapore by sneaking into the LongBar of the breathtaking Raffles Hotel just across the road and have an absolutely refreshing Singapore Sling – where it was invented! Raffles is one of the legendary hotels of the world and its drink has grown with its international popularity. If you are here on a Sunday morning, either before or after the conference, take your accompanying person to have brunch at the Raffles. It is a time tunnel to a colonial experience! Of course there are plenty of other interesting places to visit as well. The event hotel has a subway station underground and, using the cleanest and safest subway in the world, you can get to several places within minutes. Orchard Road is the famous shopping and entertainment area in Singapore and you can get there with the subway in just 7 minutes at a cost of S\$0.80 (US\$0.50).

To ensure that everything goes well, the Singapore Committee has engaged a Professional Conference and Exhibition Organiser. This group is putting together an exciting programme for accompanying persons including pre and post conference tours.

Is it really expensive to travel to Singapore? NO—our next press release will show how relatively inexpensive it can be to travel to one of the best airports in the world with one of the best airlines in the world – Singapore Airlines.

Some important points:—

1. You should have already received Bulletin 1 which includes the call for abstracts. However, in case you did not receive Bulletin 1, the call for papers is repeated below.
2. All Corporate Members of the International Geotextile Society should have received an invitation to book exhibit space, in the 1st priority round in June 1993. If you did not receive an invitation please contact the Conference Secretariat.

#### CALL FOR PAPERS

Scientific papers presenting novel and innovative ideas, practical applications and new technologies, are invited. Three copies of abstracts (300 to 400 words) of the proposed papers, typewritten in English, preferably on A4 size (297mm x 210mm) paper with a 25mm all round margin, should be mailed to reach the Conference Secretariat not later than 30 August 1993. The title of the paper (maximum 100 characters long), names of the authors, mailing address, fax/telephone numbers and the session theme, centralized at the top of the front page, should be provided.

Paper acceptance and guidelines for paper preparation will be sent to the authors in November 1993.

Session Themes are:

- A. Bank and Bed Protection; Erosion Control
- B. Soil Reinforcement
- C. Roads and Railways
- D. Drainage and Filtration
- E. Dams, Canals and Reservoirs
- F. Waste Containment and Pollution Control
- G. Long Term Experience
- H. Special Applications
- I. Materials, Properties, Testing and Installation
- J. New Solutions and Directions

You need to wait for nothing else to send in your abstracts to:

Conference Secretariat  
5th Int'l Conference on Geotextiles, Geomembranes  
and Related Products (5th IGC)  
Thompson Road  
P.O. Box 0177, Singapore 9157

Tel: (65) 3535511  
Fax: (65) 3532424 Attn: Mr. R.S. Douglas

reported by  
G.P. Karunaratne

## Geosynthetics'93 – The largest yet!

by  
**R.J. Bathurst, Editor IGS News**

Geosynthetics'93, the 5th Regional North American Conference on Geosynthetics, was held at the Vancouver Trade and Convention Centre, Vancouver, British Columbia, Canada from 30 March to 1 April. The conference is the largest conference ever held in North America dedicated to geosynthetics and attracted 1418 registrants and 99 exhibiting companies. The conference was co-sponsored by the North American Geosynthetics Society (NAGS) and Industrial Fabrics Association International (IFAI) and held under the auspices of the International Geotextile Society.

The conference comprised 120 papers presented in 24 technical sessions and a poster session. The conference was begun on Tuesday morning with an invited paper by Mr. Joe Fluet titled "Geosynthetics in North America: A Rigorous Attempt to Make A Short Story Long". The paper traces the history of geosynthetics growth in North America. Mr. Fluet delivered a light-hearted presentation that included an amusing look at the initial efforts of a number well-known geosynthetics experts.

The technical presentations were given in a series of three parallel sessions in order to give as many authors as possible the opportunity to present their results in a lecture format. The technical sessions were held on Tuesday and Thursday with Wednesday morning dedicated to the NAGS General Assembly followed by a panel session titled "Installation Regulations versus Reality". Wednesday afternoon was dedicated to exhibits and a poster session of papers not presented in the technical sessions. The

winner of the poster session were D.C. Adolphe, J.Y. Drean, B. Burkle and T. N'Guyen for their paper titled *Highlighting Process Defects by means of Mass Per Unit Area Analysis*.

Thursday evening completed the formal schedule with the annual NAGS banquet. Plaques were presented to the Organizing Committee of Geosynthetics'93 by Dr. R.D. Holtz and an opening address was made by Dr. R.K. Rowe, President of IGS. The most excitement was generated by the Award of Excellence presentations for the best papers at the conference (see article on p.4). The Award of Excellence program was introduced by Mr. R.G. Carroll who explained the history of the program.

#### NAGS General Assembly

The NAGS General Assembly was called to order by the Dr. R.D. Holtz, President of NAGS. Highlights of the meeting included a motion which was passed to form a Past-Presidents Committee with the objective to look into ways that NAGS can use its financial resources to the benefit of the geosynthetics industry in North America. In addition, the following appointments to the board of Directors of NAGS for the period 1993–95 were made by acclamation:

President—Elect: Mr. B.R. Christopher  
Vice Presidents: Dr. R.J. Bathurst  
Mr. R.G. Carroll  
Mr. R. Denis  
Treasurer: Mr. J.N. Paulson

In accordance with the by-laws of NAGS, President-Elect Dr. J. Beech became President of NAGS and Dr. R.D. Holtz became Immediate Past-President. Mr. B. Christopher, the new President-Elect, advised the membership that President Clinton (also in Vancouver at a summit with the Russian President Boris Yeltsin) had been invited to address the NAGS General Assembly. Regrettably, it appears that the invitation must have gone astray since the United States President did not make an appearance at Geosynthetics'93 much to the disappointment of those attending. Dr. Holtz gave the membership a state-of-the-society report that highlighted the increase in membership and NAGS support of Geosynthetics'93 and the 1992 ASCE Specialty Conference in New Orleans. At the time of this IGS News, NAGS membership stands at 475 full members and 52 student members (SNAGS). These are the largest numbers since the chapter was founded in 1987 at which time the membership stood at less than 40. Dr. Holtz was pleased to report that the IGS had invited NAGS to submit a proposal for the 6th International Conference on Geotextiles, Geomembranes and Related Products to be held in 1998 in North America. Preparation of the proposal was underway.

An Award of Merit was made to Professor J.R. Bell in recognition of Prof. Bell's pioneering technical contributions to geosynthetics and leadership in the advancement of the geosynthetics industry. The award, in the form of a plaque, was presented by Dr. R.M. Koerner on behalf of the NAGS membership. The meeting was closed by Dr. Holtz after first thanking Dr. Koerner for his contributions to NAGS as he completed his last term on the NAGS Board of Directors. The NAGS General Assembly gavel was passed to Dr. Beech who, in his first official action as the new President of NAGS, presented Dr. Holtz with a plaque in appreciation for his efforts and outstanding leadership as president of the society for the past two years.

#### **Panel session: "Installation Regulations versus Reality"**

Following a tradition established at earlier Regional North American Conferences on Geosynthetics, a panel session was held after the General Assembly to discuss issues of importance to the geosynthetics community. The purpose of this program is to provide an open forum that maximizes audience participation in a discussion of current industry-wide issues. This year a "theatre in the round" approach was adopted modelled on the television talk show format that is popular in North America. The panel session was capably organized Mr. B. Denis who also acted as the moderator. In order to stimulate discussion Mr. Denis provided all attendees with a handout containing excerpts from 28 geosynthetics specification clauses. The excerpts were heavily annotated with Mr. Denis' humorous assessment of the reasonableness of the clauses. The session discussion was begun with opening

### **Dr. J-P. GOURC to give MERCER LECTURE**

The second Mercer Lecture will be given by Dr. J-P. Gourc of Grenoble University, France. The topic of the lecture will be "Geosynthetics and the Environment". The lecture will be presented in Asia, North America and Europe. Dr. Gourc will give the Asian presentation of the Mercer Lecture at the 13th International Conference on Soil Mechanics and Foundation Engineering to be held in

statements by a number of invited speakers who addressed the theme of the session from the point of view of CQC/CQA, consultant, manufacturer and government agency. The session was a great success with lively participation from an audience estimated to be at least 400 in number. Some of the discussion was centered on what the balance should be between the need to regulate and the need to allow flexibility for engineered solutions. Opinions on the responsibilities of the designer, regulator, installer and CQC/CQA were also varied amongst participants. A number of speakers complained that specifications are often product rather than performance oriented. The topic of regulation of installers and consultants also generated a number of opposing views. The result of the discussion and debate left this writer with the observation that in North America there is still a need to achieve a consensus approach to design, installation and quality assurance and to carefully define the responsibilities of all parties involved, particularly in waste containment projects that employ geosynthetics.

#### **Short Courses**

Three different pre-conference short courses organized by IFAI were held on the Monday preceding the conference and were given by Dr. J-P. Giroud, Dr. R.M. Koerner and Mr. Joe Fluet. These courses attracted a total of 158 participants and were a valuable opportunity for many of those who later attended the conference technical sessions to fully appreciate the high quality technical presentations. A post-conference short course co-sponsored by the Canadian Geotechnical Society Committee on Geosynthetics and IFAI was held on the Friday and attracted 44 registrants. The organizers of this course were Dr. R.J. Bathurst and Dr. G.P. Raymond. One session was dedicated to geosynthetics in waste containment applications (Dr. R.K. Rowe and Dr. A. Rollin) and a parallel session devoted to non-waste containment applications (Dr. R.J. Bathurst, Dr. G.P. Raymond, Dr. R.J. Fannin, Dr. A. Rollin and Mr. R.E. Crowe). The course was offered in part to introduce practicing geotechnical engineers in Canada to the recently introduced 3rd edition of the Canadian Foundation Engineering Manual that contains for the first time a chapter dedicated to geosynthetics.

#### **Geosynthetics'95**

Geosynthetics'95 is tentatively scheduled to be held 21-23 March 1995 in Nashville Tennessee. The Organizing Committee under the Chairmanship of Dr. R.J. Bathurst has accepted the challenge to surpass Geosynthetics'93. The Technical Committee Chair will be Dr. Y. Grace Hsuan of Drexel University. The Organizing Committee invites all NAGS and IGS members to consider submitting an abstract and to attend Geosynthetics'95 in order to meet this challenge (see call for papers on p.13). Mark your calendars!

New Delhi in January 1994. The lecture will be delivered at 6:15 p.m. on Sunday 9 January 1994. The European and North American lecture venues have yet to be determined.

*reported by P.M. Jarrett*

# Geosynthetics '93 Awards of Excellence Winners

Authors of four papers presented at Geosynthetics '93 were named winners in the Awards of Excellence program sponsored by the North American Geosynthetics Society (NAGS). The program is designed to recognize innovation, creativity and outstanding contributions in engineering, design, testing, technology, research and development with geosynthetics. The Awards of Excellence program was established by NAGS in 1989 and the first awards were given at Geosynthetics '91 (see IGS News Vol 7, No.1 1991). The winners of the 1993 awards were announced at the closing banquet held on 1 April as part of Geosynthetics'93. They are:

- **Environmental Technology** award category: **Richard S. Thiel** and **Michael G. Stewart** for their paper: *Geosynthetic Landfill Cover Design Methodology and Construction Experience in the Pacific Northwest*.

The other finalists in this category were: **I.D. Peggs, T. Dewijn** and **D.R. Lewis**— *Geomembranes for the Containment of Pulp Mill Hot Black Liquors: Problems and Remediation*.  
**J-P. Giroud, K.L. Soderman** and **M. Monroe**— *Mechanical Design of Geomembrane Applications*

- **Research and Development** award category: **Gary Yim** and **Marc Godin** for their paper: *Long-Term Heat Aging Stabilization Study of Polyethylene and its Relationship with Oxidative Induction Time (OIT)*.

The other finalists in this category were: **R.W. Thomas** and **C.R. Ancelet**— *The Effect of Temperature, Pressure and Oven Aging on the High-Pressure Oxidation Induction Time of Different Types of Stabilizers*.

## Geosynthetics '93 Conference Proceedings Now Available

Complete proceedings of Geosynthetics'93, held 30 March to 1 April 1993 in Vancouver, British Columbia, Canada, are now available from the Industrial Fabrics Association International (IFAI).

The proceedings come in a three-volume, 1606 page set containing a total of 120 technical papers organized in eight categories:

- Roads and Pavements
- Walls, Slopes, Embankments and Foundations
- Geotextile Filtration Design and Testing
- Geosynthetics Testing
- Durability and Long-Term Performance of Geosynthetics
- Technical Advances, Innovations, Challenges
- Waste Containment Case Histories
- Landfill Design, Performance and CQA

Comprehensive author and subject indexes are included. The cost is \$(US)85 per set, plus postage (\$6 USA and Mexico, \$19 Canada, \$34 Central America and the

**J. Nobert**— *The Use of Multi-Axial Burst Test to Assess the Performance of Geomembranes*.

- **State-of-Practice Technology** award category: **Scott M. Luetlich** and **Joseph E. Fluet** for their paper: *Geotextile Filter Design Using Flow Nets*.

The other finalists in this category were: **J.E. Fluet** and **S.M. Luetlich**— *Geotextile Filter Criteria for Gap-Graded Silty Sands*.  
**U. Siva** and **S.K. Bhatia**— *Filtration Performance of Geotextiles with Fine-Grained Soils*.

- **Geotechnical Engineering Technology** award category: **Djan Chandra, Gary C. Lay** and **David L. Thielen** for their paper: *Geogrid Reinforcement for Massive Shear Key Applications*.

The other finalists in this category were: **D.W. Armour Jr.** and **C.M. Avery**— *Design, Construction and Performance of a Test Embankment on Hydraulically Placed Ash*.  
**S.K. Ho** and **R.K. Rowe**— *Finite Element Analysis of Geosynthetic-Reinforced Soil Walls*.

Entries were judged on the scope of the project, the benefits of using geosynthetics, the basis for geosynthetic selection, and engineering rationale.

A grant of \$10,000 will be given to a research institute of each award winner's choice for geosynthetics research.

This special NAGS program is funded by contributions from leading geosynthetics manufacturers, distributors, related organizations and individuals.

reported by R.J. Bathurst

Caribbean, \$58 Europe and South America, \$70 Australia, Asia and Africa).

### Additional IFAI publications

Also new to the IFAI resource library is MQC/MQA and CQC/CQA of Geosynthetics (Manufacturing Quality Control/Assurance and Construction Quality Control/Assurance), a compilation of 26 papers presented at the 6th Annual GRI Seminar held 10-11 December, 1992 in Philadelphia, PA. The book presents an overview of MQC/MQA and CQC/CQA, and covers quality control of the manufacturing of geosynthetic materials; construction quality assurance of the installation of geosynthetic materials; and the role of specific advanced laboratory tests.

The cost of this 300 page book is \$(US)75, plus postage (10% North America, 20% all other countries).

These and many other technical references may be ordered by contacting IFAI at:

Industrial Fabrics Association International  
345 Cedar Street, Suite 800  
St. Paul, MN 55101 USA  
Tel: (612) 222-2508 Fax: (612) 222-8215

# **Report of the CIGSI**

## **Committee for International Geotextile Society (India)**

by  
**A.R.G. Rao**

The Indian chapter of IGS has been recently registered under the Societies Act under the name of "Committee for International Geotextile Society (India) – (IGS)". Henceforth, the committee will act as the Chapter of IGS in India. The aims and objectives of the committee are:

- a) To collect, evaluate and disseminate knowledge on all matters relevant to geotextiles, geomembranes and related synthetic and natural materials.
- b) To promote seminars, symposia, conferences, etc.
- c) To publish or sponsor papers and books.
- d) To maintain reference libraries and collections which relate to the scientific and technological objectives of the Committee for International Geotextile Society (India).
- e) To improve communication and understanding regarding geotextiles and their applications.
- f) To provide, through meetings and published proceedings, a means of communication and understanding between designers, manufacturers and users of geosynthetics, especially between the textile, civil engineering and plastics communities.
- g) To establish liaison with other bodies which have or could have interest in geotextiles and their applications.
- h) To promote the advancement of the science and technology of geotextiles and their applications.

The executive body of the committee shall consist of President, Vice President and 16 members (including the Secretary/Treasurer) whose terms shall be two years.

The official address of the committee shall be:

Committee for International Geotextile Society  
(India)–CIGSI  
C/O Central Board of Irrigation and Power  
Plot No. 4, Institutional Area  
Malcha Marg, Chanakyapuri, New Delhi–110021, India  
Tel: 011–3015984 Fax: 011–3016347  
Telex: CENBIP–ND

At the first General Body Meeting of the committee held 8 December 1992 at New Delhi it was decided to publish a news letter "IGS News Bulletin". The first issue of the News Bulletin Vol.1, No.1, January 1993 has since been published. 3500 copies of the News Bulletin were printed and sent to individuals and institutions engaged in civil and geotechnical engineering in the country.

A one day workshop on "Geotextile Applications in Civil Engineering" co-sponsored by the committee was organized by the Punjab State Council for Science and Technology on 8 January 1993 at Chandigarh. The papers

covering various aspects of geotextiles including: Overview; Materials and Manufacturing Methods; Geotextile Testing; Geotextiles in Reinforcement; Bearing Capacity Improvement with Geotextiles; Geotextiles in Roads; Geotextiles in Erosion Control; and Standardisation & Specifications. The recommendations that followed from the workshop were:

1. Preparation of Indian standards, specifications, design criteria and construction manuals by the Bureau of Indian Standards or similar organizations on the use of geotextiles, geogrids, geomembranes and geocomposites, etc.
2. Proper documentation of pilot or experimental projects carried out by state departments/undertakings/manufacturers, etc. that use new construction materials such as geotextiles.
3. Committees comprising chief engineers with departments such as PWD (B&R), Public Health, Irrigation etc. to consider inclusion of new building materials/technologies in specifications and schedules of rates.
4. Formation of information, demonstration and consultancy centres by manufacturers/suppliers to provide consultancy, design assistance and other relevant data related to the use of geotextiles.
5. Introduction of "Geotextiles" as a subject in engineering colleges/institutes.
6. Organize workshops/seminars/conferences to bring more awareness and knowledge among engineers, builders, technologists and consultants, etc.

An international short course titled "Reinforced Soil—Principles and Applications" was co-sponsored by the committee and organized by the Indian Institute of Technology, Delhi and held 17–19 March 1993 in New Delhi. The following speakers delivered lectures:

1. Dr. R.A. Jewell, GeoSyntec Consultants, Belgium.
2. Mr. Blair Rawles, AKZO Industrial Systems, The Netherlands.
3. Dr. S.R. Kaniraj, Indian Institute of Technology, Delhi.
4. Prof. G.V. Rao, Indian Institute of Technology, Delhi.

The committee has decided to bring out a document titled "Directory of Manufacturers/Consultants/Testing Laboratories of Geotextiles in India". IGS members are invited to provide data for inclusion in the directory to ensure completeness. The Committee has also decided to bring out an introductory publication on geotextiles to be made available to practising geotechnical/civil engineers in the field. We hope that this publication will help in promoting the use of geotextiles in India.

# **The 3rd German Meeting of the “Geosynthetics in Geotechnical Engineering” Division German Society of Soil Mechanics and Foundation Engineering by G. Bräu Technical University of Munich**

On 15–16 March 1993, the 3rd National Conference and General Assembly meeting of the “Geosynthetics in Geotechnical Engineering” Division of the German Society of Soil Mechanics and Foundation Engineering (DGEG) was held at the Technical University of Munich. More than 220 students, consultants, contractors, research workers, representatives of the government and producers of geosynthetics attended. A technical exhibition of new products and case studies was provided by Amoco Fabrics, Bermüller & Co., DuPont de Nemours GmbH, Evergreen GmbH, Frank Deponietechnik, Gundle GmbH, Hoechst AG, Hüls Troisdorf, Naue Faser-technik, Polyfelt GmbH, and Rehau AG&Co.

The main topics of the conference sessions were filtration (5 papers), lining systems (6 papers), reinforcement (10 papers) and other geosynthetic topics (4 papers). The papers will be published in German in the autumn of 1993 and will be available from: Technical University of Munich, Prüfamt für Grundbau, Baumbachstraße 7, 81245 München, Germany.

The papers on filtration dealt with selection of proper thickness of geotextiles and the influence of soil and hydraulic conditions on correct design. The limitations of design parameters based on some laboratory test methods carried out on samples in-isolation were discussed.

The session on lining systems reviewed current German regulations for geomembranes in waste containment applications as well as advice on the selection of design parameters and appropriate design methods. Practical experience with geomembranes in waste containment applications including leak detection was presented. The use of geotextile bentonite clay liners in road applications was also presented.

In the reinforcement session papers were presented on: statically loaded two-layer systems; dynamically loaded railroad track support, practical experience with the design and construction of reinforced railroad track support, and road and retaining wall construction. Two papers presented the results of tests that may be used to select design parameters for the prediction of the deformation behaviour of geosynthetic reinforced systems at working load and at ultimate state. The session concluded with a summary of the presented papers.

A special session on chemical resistance of geosynthetics was held and recent Germany experience on this topic reviewed particularly with regard to potential hydrolysis of polyester materials. Short reports were given on current research directed at better defining the in-situ chemical and stress/strain environment for buried geotextiles. There was a general agreement that there are still some unanswered questions related to chemical resistance but despite these questions geosynthetics are performing very well.

At the General Assembly reports were given by the leaders of the working groups of the DGEG dealing with geosynthetics. Prof. S. Kohlhasse reported on the activities of the AK 14 A Committee “Geosynthetics in Geotechnical Engineering and Hydraulic Applications” and introduced two new guidelines: “Anwendung von Geotextilien im Wasserbau, 221/1992” and “Anwendung von Kunststoffdichtungsbahnen im Wasserbau und Grundwasserschutz, 225/1992”. Dr. B. Thamm reported on behalf of the AK 14 B Committee “Calculation and Design Methods for Earth Reinforcement with Geosynthetics”. Dr. W. Wilmers reviewed modifications to the updated guidelines “Anwendung von Geotextilien und Geokunststoffen im Straßenbau” prepared by the AK 14 C Committee. Dr. E. Gartung presented the current activities of the Geotextiles Sub-committee of the AK 11 “Geotechnical Aspects of Waste Disposal and Contaminated Soil”.

## **German Chapter of the IGS**

The general report on the activities of the division was given by Prof. R. Floss (Chairman). Prof. Floss, who is also Vice President of the IGS, was pleased to report that the DGEG has decided to form a German chapter of the IGS. The chapter will formally start on 1 January 1994. All members of the geosynthetics division of the DGEG will be invited to join the IGS chapter. There are currently 210 members of this DGEG division.

The activities of the DGEG/German Chapter of the IGS will continue to promote the use of geosynthetics through its membership. The members representing producers of geosynthetics are challenged to demonstrate the advantages of geosynthetics in civil engineering applications through progress in design methods and case histories.

## **News of Members**

Dr. Peter Rankilor, Managing Director of Manstock Geotechnical Consultancy Services Ltd., has been appointed as a Visiting Professor to the Bolton Institute,

with particular interest in the development of research into Civil Engineering Applications for Geotextiles and Geogrids.

# ASTM COMMITTEE D35 ON GEOSYNTHETICS

by  
**L. David Suits**

The work of ASTM Committee D35 on Geosynthetics is a little over fifteen years old. The activity had its beginnings under the ASTM Committee D13 on Textiles, then forming a joint subcommittee with Committee D18 on Soil and Rock, and then becoming a full Main Committee in 1984.

Over the last fifteen years the field of geotextiles has expanded to include other geosynthetic products and to applications other than the transportation industry, such as landfills, and other environmental applications. With these increased areas of application, the growth of the numbers of geosynthetics in use, and the length of time that many of these materials have been in use, the key issues of the Committee have turned from index properties for comparison of one material to another, to performance properties for use in design, and evaluation of material durability. The difficulty that has arisen in this work is the fact that when talking about design testing, site specific conditions must be known with provisions made in the test method for their incorporation. The question then arises as to who has the responsibility for performing these tests.

The increased number of geosynthetic products on the market has meant that the scope of Committee D35 has had to be expanded to include work in the areas of geomembranes, geogrids, geonets, geosynthetic clay liners, and other geocomposite materials. Regarding geosynthetic clay liners, a new subcommittee has been created—D35.04 on Geosynthetic Clay Liners. This subcommittee will be working closely with the ASTM Committee D18 on Soil and Rock to ensure that all aspects of these systems are covered in the development of standardized testing.

The expansion of the use of geosynthetics into the waste management area has necessitated the development of a battery of test standards and practices aimed at design and evaluation of their performance in these environmentally sensitive areas. These include protocols for field and laboratory immersion of all geosynthetics for evaluating the effect of various leachates on the materials, and a test method for evaluating the biological clogging of geotextiles. Under development in this area are standards for determining the chemical resistance of the various geosynthetic products, oven aging of geomembranes to evaluate embrittlement, and a method to evaluate the effect of oxidation. Also included in this battery is the permeability of geomembranes.

The other major area of concern relates to the fact that many of these materials have been in service for fifteen to twenty years. As a result, questions as to their durability and service life are coming to the forefront. Tests are needed which will in effect predict their durability and service life. There are a number of durability studies either underway or nearing completion in organizations outside of ASTM which have pointed to the need for test standards in this area. Stated in another way, the Committee is at a turning point in its work. The efforts are turning from

those of identifying the materials and their in-isolation properties, to those of design and interaction with the surroundings in which they are placed. This presents the Committee with an entirely new set of challenges, as we are looking at a complicated set of tests which are not concerned with just the geosynthetic. Tests are being developed which incorporate site conditions and materials other than geosynthetics into the new protocols. This necessitates cooperative work with other committees within ASTM such as D18 on Soil and Rock, F17 on Plastic Pipe, and several of the environmental committees. Communication is also maintained with trade organizations through committee members in these groups.

Committee D35 stays abreast of what is taking place internationally through a number of members from outside of the United States. Currently there are twenty-four members from thirteen countries outside the USA. Plans are underway for D35 to co-host a meeting of the ISO TC-38/SC-21 on Geotextiles with the Canadian General Standards Board and the Standards Council of Canada in conjunction with the June 1994 meeting of D35 in Montreal, Canada. More details will be made available as plans become finalized.

Due to complexity of the tests discussed here, and the need to communicate with those groups mentioned above, the time schedule for test development and approval may slow down somewhat. In the past, since becoming a Main Committee, the average rate of new standards has been about four a year. This may reduce to around three per year given the complexity of the work.

At the June 1993 meeting of the Committee in Atlanta, Georgia, 36 working task groups met. At the January 1994 meeting in San Francisco, California, this number will expand to between 40 and 45. Each group is responsible for a particular test method or practice dealing with each of the above issues and others.

ASTM Regulations require that its Committees involved in work such as ours maintain a membership where the number of producers may not exceed the number of users and general interest members. As of June 1993 our total memberships was 291. There are 95 producer, 58 user, 115 general interest, and 23 unclassified members as of this report.

The third edition of "ASTM Standards on Geosynthetics" has recently become available. Copies of the compilation are available from ASTM Headquarters at 1916 Race Street, Philadelphia, PA 19103-1198, USA. In addition to this compilation, the geosynthetic standards currently appear in Volume 04.08 of the Annual Book of ASTM Standards. As of 1994 they will be appearing in Volume 04.09, Soil and Rock (II), Geosynthetics. A list of the approved D35 standards is included at the end of this article.

Along with the work of the Committee in developing standards, a number of symposia have been sponsored related to various aspects of testing geosynthetics. The

works of these symposia have been published in the following ASTM Special Technical Publications:

- STP 952 – **Geotextile Testing and the Design Engineer**  
Editor – Joseph Fluet, 11 papers
- STP 1076 – **Geosynthetics: Microstructure and Performance** Editor – Ian Peggs, 13 papers
- STP 1081 – **Geosynthetic Testing for Waste Containment Applications**, Editor – Robert Koerner, 26 papers
- STP 1190 – **Geosynthetic Soil Reinforcement Testing**  
Editor – Jonathan Cheng, 17 papers  
(available July 1993)

Committee Officers, and subcommittee chairpersons are:

- |                        |                     |
|------------------------|---------------------|
| Chairman –             | L. David Suits      |
| Vice Chairman –        | Ronald Frobel       |
| Vice Chairman –        | Robert Carroll, Jr. |
| Recording Secretary –  | Jack Hodge          |
| Membership Secretary – | David Wyant         |

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Geosynthetic Clay Liners Subcommittee, D35.04  
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For further information regarding the work of Committee D35 contact:

L. David Suits  
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or telephone 1 (518) 457-4704 between 7:30 AM and 3:30  
PM Eastern United States Time.

For information regarding membership in ASTM and Committee D35, and future meeting dates, contact Robert Held, Committee D35 Staff Manager, ASTM, 1916 Race Street, Philadelphia, PA 19103-1187, USA.

**ASTM COMMITTEE D35 ON GEOSYNTHETICS  
APPROVED STANDARDS JUNE 1993**

Designation	Title
D4354	Practice for Sampling of Geosynthetics for Testing
D4533	Test Method for Index Trapezoid Tearing Strength of Geotextiles

D4595	Test Method for Tensile Properties of Geotextiles by the Wide Width Strip Method
D4632	Test Method for Grab Breaking Load and Elongation of Geotextiles
D4759	Practice for Determining Specification Conformance of Geosynthetics
D4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
D4884	Test Method for Seam Strength of Sewn Geotextiles
D5261	Test Method for Measuring Mass per Unit Area of Geotextiles
D5321	Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by Direct Shear Method
D1987	Test Method for Biological Clogging of Geotextile or Geotextile/Soil Filters
D4355	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xeneon-Arc Type Device)
D4594	Test Method for Effects of Temperature on Stability of Geotextiles
D4873	Guide for Identification, Storage and Handling of Geotextiles
D4886	Test Method for Abrasion Resistance of Geotextiles (Sandpaper/Sliding Block Method)
D5262	Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
D5322	Practice for Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids
D4491	Test Method for the Water Permeability of Geotextiles by Permittivity
D4716	Test Method for Constant Head Hydraulic Transmissivity (in-Plane) Flow of Geotextiles and Geotextile Related Products
D4751	Test Method for Determining the Apparent Opening Size of a Geotextile
D5101	Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio
D5141	Test Method for Determining the Filtering Efficiency and Flow Rate of a Geotextile for Silt Fence Application Using Site Specific Soil
D5199	Test Method for Determining the Nominal Thickness of Geotextiles and Geomembranes
D3020	Specification for Polyethylene and Ethylene Copolymer Plastic Sheeting for Pond, Canal, and Reservoir Lining
D3083	Specification for Flexible Polyvinyl Chloride Plastic Sheeting for Pond, Canal and Reservoir Lining
D4437	Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
D4545	Practice for Determining the Integrity of Factory Seams Used in Joining Manufactured Flexible Sheet Geomembranes
D4885	Test Method for Determining the Performance Tensile Strength of Geomembranes Using Wide Strip Testing
D5323	Practice for Determination of 2% Secant Modulus for Polyethylene Geomembranes
D5397	Test Method for Notched Constant Tensile Load Test for Polyolefin Geomembranes



# OVERVIEW OF THE GEOSYNTHETIC RESEARCH INSTITUTE

by Robert M. Koerner

The Geosynthetic Research Institute (GRI) was created at Drexel University, Philadelphia, Pennsylvania, USA in 1986 after approximately 10 years of varied university research and development on different types of geotextile and geomembrane materials. Since the establishment of GRI, research has been focused exclusively on geosynthetics—polymeric materials used in below-ground construction in the fields of transportation, environmental, and geotechnical engineering. Current research includes studies on geotextiles, geomembranes, geogrids, geonets, geocomposites, geosynthetic clay liners, and geopipe (buried plastic pipe). Activities under way at GRI include generic research projects, new-product evaluation, provision of temporary test methods and standards, professional courses, and a graduate degree program in geosynthetic engineering.

## Organization and operation

Compared to many research institutes, GRI is small. Three faculty, three full-time research associates, three doctoral students, four master's degree students, and two staff members are involved in its operation. The group occupies one wing of a four-story building on Drexel's campus in Philadelphia, Pennsylvania, USA.

GRI is operated and maintained through three funding sources: a consortium of organizations, federal and state research contracts, and miscellaneous funds from courses, seminars, and publications. At this time the consortium comprises 55 organizations: 7 government agencies, 5 private facility owners, 8 geotextile manufacturers, 9 geomembrane manufacturers, 8 other geosynthetic manufacturers, 5 resin and raw material suppliers, and 13 design consultants and testing laboratories.

## Current activities

### Generic research projects

Developing generic research is the major task at GRI. Research results are circulated initially to member organizations and are eventually published in the open literature in a sanitized format. Major research projects are described below:

- *Accelerated aging of polymeric materials.* In one test series polyvinyl chloride geomembranes are being evaluated under relaxed and constant tensile stress modes; in another, high-density polyethylene geomembranes are being evaluated under relaxed and constant compressive stress modes. Using time-temperature superposition, the data for each test series are analyzed using the Arrhenius model to predict geomembrane lifetimes at site-specific service temperatures.
- *Evaluation of the analytic and experimental behaviour of anchored geogrids used in stabilization of reinforced walls and steep slopes.* This evaluation has led to a finite element program and has been corroborated by

many large-scale experiments. Experiments are both short-term and long-term (creep).

- *Stress-cracking evaluation of semi-crystalline polyethylene.* This project has led to a notched constant tension load test that has been accepted by ASTM. Use of the method should help avoid brittle failures of semicrystalline geomembranes. A related test under development is a seam constant load test to challenge long-term behaviour in the seam region. This study is sponsored by the Environmental Protection Agency (EPA).
- *Stress relaxation behaviour of geosynthetic materials.* In an area that traditionally has received little attention, this GRI study involves a constant strain test (instead of the customary constant stress, or creep, test) to provide insight into polymeric behaviour for subsequent viscoelastic analysis.
- *Puncture protection of geomembranes on various types of soil subgrades.* A constant stress hydrostatic chamber is used for this evaluation. Various types of geotextile and geocomposite protection layers are used to note the efficiency and degree of improvement provided. Both short-term and long-term (creep) tests are being evaluated.
- *Filtration tests.* Various tests are being developed to rapidly assess the possibilities of geotextile clogging, soil retention (piping), or equilibrium behaviour. Test methods include long-term test columns, fine fraction filtration, and dynamic filtration tests. The latter two methods are part of a National Cooperative Highway Research Program (NCHRP) project.
- *Field exhuming studies.* A major component of GRI's work is to exhume geosynthetics from the field. These studies are being conducted to investigate geosynthetic installation damage, the biological clogging area, the highway drainage area and the effect of geomembrane wrinkles on leachate collection and geomembrane performance.
- *Side slope stability.* Finite element modelling is being used to analyze multi-lined side slope stability for various environmental situations. The results require significant laboratory test values and are being compared to the more conventional limit equilibrium results at failure.
- *Creep shear strength of hydrated GCLs.* This study is essentially aimed at understanding the complex shear strength behaviour of mechanically strengthened GCLs via needling, stitching or other means (with its contained bentonite clay). All types of GCLs are being evaluated.

### New product evaluation

GRI is not a commercial testing laboratory. Rather, it evaluates new materials for use by member organizations in development of their products. Among recent activities are enhancement of the anchorage behaviour of geogrids, guidance in increasing the shear strength of geosynthetic

clay liners, and characterization of the uniformity of textured surfaces on polyethylene geomembranes.

#### **Provision of temporary test methods and standards**

In the USA, ASTM, AASHTO and EPA are clearly the leading and authoritative agencies for the establishment of test methods and standards. However, in geosynthetics, an area in which technology is advancing rapidly, the time from inception to adoption of a test method or standard is often long. Consequently, GRI has embarked on an effort to establish temporary test methods and standards; 35 are currently available. When an established group, such as ASTM, adopts a method, GRI no longer distributes its version of that test or standard. For example, GRI ceased distribution of its biological clogging test for geotextile landfill filters when ASTM standardized its version of the test (ASTM D1987-91).

#### **Professional courses and related activities**

Because few practising engineers have had formal classroom training in geosynthetics, professional courses are a viable part of GRI's activities. To date, more than 150 such courses (lasting 1 to 3 days) have been offered. They often occur in conjunction with the technical meetings of professional societies, such as the American Society of Civil Engineers and the North American Geosynthetic Society (NAGS).

The latest effort in this type of GRI's outreach program is a certification training manual for the manufacture and installation of geosynthetics. This offering is in conjunction with the new certification program of the National Institute for Certification in Engineering Technologies for field inspectors of geosynthetic installation activities. We are also currently looking into the possibility of forming a geosynthetic testing laboratory certification program.

## ***Constitutive Assembly of the Italian Chapter of the IGS (Rimini, 12 May 1993)***

***by Daniele Cazzuffi, Associate Editor of IGS News (Europe)***

The Constitutive Assembly of the AGI-IGS Section met during the 18th Italian Conference on Geotechnics (held in Rimini, 11-13 May 1993). The activities of the Section shall allow the Italian Geotechnical Society (i.e. Associazione Geotecnica Italiana (AGI)) to act as the Italian Chapter of the International Geotextile Society (IGS).

A motion by the AGI Council that most of AGI-IGS Council members be elected through a referendum was approved unanimously by the Assembly. This is the same procedure used by the AGI to renew the terms of its officers. The Assembly decided that AGI-IGS Council members shall be elected to office for a four year term with elections held every two years as is the current practice with the IGS Council. There will be a total of five Council members. Hence, two or three positions on the Council will be up for election every two years. In this first transition period, however, all five members shall be elected. The three members receiving the highest number of votes

#### **Graduate degree program**

GRI, as part of Drexel University, offers graduate courses in geosynthetics. The program has grown from a single course in 1982 to seven courses, including courses on: test methods; designing with geotextiles, geogrids, and geonets; designing with geomembranes, geocomposites, and geopipe; polymeric composition; polymer processing; and polymer identification.

Each course is worth 3 credits; together they provide 21 of the 45 credits necessary for a master of science degree in geosynthetics engineering. The balance of the required courses is available in related subjects (geotechnical engineering, environmental engineering, transportation engineering, and hydraulics) or in thesis work. Doctoral programs spring from this base and lead to specific research topics in geosynthetics.

#### **GRI and the future**

Clearly there is no lack of research and development in the area of geosynthetics. Activities are planned for the near term in the following areas: aging, durability, and life-time prediction; filtration, soil retention, and clogging evaluation; and tension creep and stress relaxation. These efforts will likely spin off related activities in compression creep, freeze/thaw behaviour, and soil/geosynthetic composite behaviour.

Long-term research and development could conceivably branch out into other aspects of polymeric materials in civil engineering. The use of polymeric materials in bridge and building construction certainly pose interesting and formidable challenges. Whatever the case, GRI aspires to be positioned to play a meaningful role in the professional and academic development of polymeric materials in transportation, environmental, and geotechnical engineering.

shall remain in office up to 1996, while the remaining two shall end their terms in 1994. Should two or more members receive the same number of votes the candidate with the longest membership shall be the winner. If equal membership time results then the younger of the two candidates will be declared the winner.

In conformity with the provisions of Article 6 of the Statutes, the AGI-IGS Council shall consist of the five members elected as above and Italian members of the IGS Council, if any. Therefore, Daniele Cazzuffi, current Italian member of the IGS Council, shall be the sixth member of the AGI-IGS Council.

Under Article 6, the activities of the AGI-IGS shall be coordinated by a delegate chosen from amongst those AGI Council members who are members of both AGI and IGS. The responsibilities of this member shall be to report the activities of the AGI-IGS Chapter on a regular basis to the AGI.

# 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.

## Daito Kogyo Co., Ltd.

by

Fuminori Hashizume

1-38-6, Kameido, Kotoku, Tokyo 136, Japan

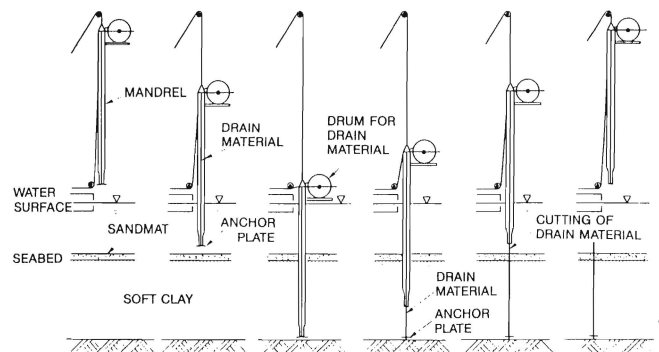
Daito Kogyo Co., Ltd. was founded in 1923 and was initially involved in many of the dredging and reclamation projects in the bay of Tokyo.

Today the company is a large general contractor specializing in port and harbour construction. In addition to these large-scale construction projects the firm is involved in the planning, research, design, construction, management and operation of some resorts and recreational facilities as the general developer. The firm has more recently entered the industrial solid waste recycling business and carries out research in this area.

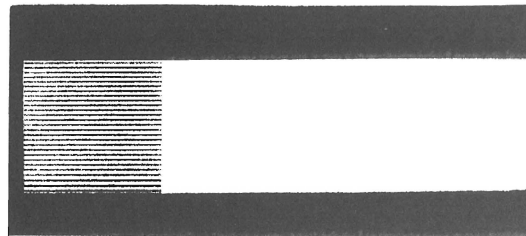
The vertical sand drain method is commonly used in Japan for off-shore land reclamation over soft soils. Because it is often difficult to obtain high quality sand for sand drains the company has developed the "off-shore plastic board drain method". The method involves using board drain materials called "Geodrain" in lieu of sand drains. Geodrain is a plastic board type drain material marketed by Terrafigo AB of Sweden. After establishing the suitability of this product for off-shore works the company now manufactures the product in Japan. Geodrain has a unique plastic core that is wrapped with a special nonwoven polyester geotextile and can slide freely within the structure. This patented system has the following features:

1. Since water suction is possible from the entire surface of the drain material, the area of the permeable section is large and drainage flows are high.
2. Since the core and geotextile can move independently there is less damage to the system due to soil subsidence during consolidation.
3. Since both the core and filter used are made of plastic, there is no danger of corrosion.
4. Mass production quality control ensures uniformity of properties including high permeability.
5. Geodrain is especially suited for improving soft clay in very deep deposits of soft soil in coastal works. The schematic illustrates the installation procedure.

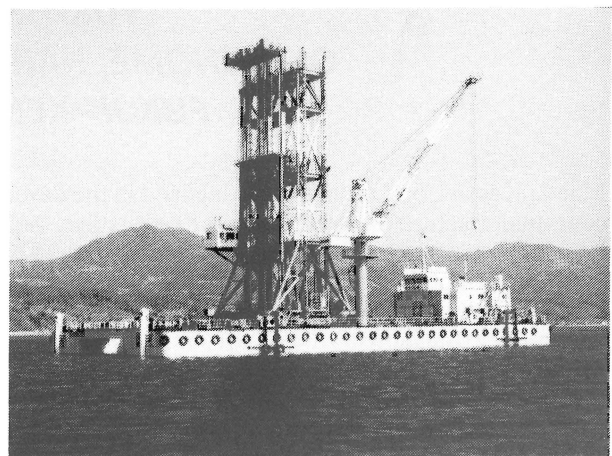
The Daito Kogyo Co. Ltd. has been a Corporate Member of the IGS since 1992.



Construction sequence



Geodrain plastic drainage board



Marine foundation improvement vessel "G.O.D. No. 1"

# MITSUBISHI YUKA INDUSTRIAL PRODUCTS CO., LTD.

by

**NOBUO TSUNODA**

**SUMITOMO SEISEN SHIBAURA BLDG., 12-3, SHIBAURA 1-CHOME,  
MINATO-KU, TOKYO 105 JAPAN**

Mitsubishi Yuka Industrial Products Co. Ltd., a subsidiary of Mitsubishi Petrochemical Co., Ltd., was established in 1976 to manufacture and market a wide range of industrial products. Mitsubishi Yuka manufactures, processes and markets materials and products needed in civil engineering, construction, distribution systems, agriculture, forestry, fishery and stock farming.

The principal geosynthetic products for civil engineering applications are:

**TENSAR GEOGRIDS:** Tensar geogrids are high strength polymer grid structures manufactured using oriented long chain polymers. Tensar geogrids are used to reinforce soils in the construction of steep slopes, embankments, foundations, road bases, soil retaining walls and for landslide remediation works.

**GOBIMAT:** Erosion control systems for river banks, canals, sea coasts, lake shores, roads, railroads and other construction sites. The system consists of concrete Gobi blocks supported by a carrier geotextile of nonwoven polypropylene reinforced with polyester fibre. This system offers easy vegetation, high permeability, and efficient installation with a minimum of labour.

**EPS:** EPS is a block of expanded polystyrene used as a fill material for bearing capacity and settlement problems. The unit density of EPS is about 100 times lighter than ordinary fill materials while exhibiting mechanical proper-

ties suitable for road, embankment and retaining wall construction.

**MY FENCE:** A barrier system for water pollution control of dredged materials in maritime civil engineering works. It consists of polystyrene foam and polyester canvas sheets.

Mitsubishi Yuka Industrial Products Co., Ltd. has been a Corporate Member of the IGS since 1992.



*Gobimat erosion control system*

## **MAEDA KOSEN CO., LTD.**

by

**YUKITOSHI MAEDA**

**OKINUNOME, HARUE-CHO, SAKAI-GUN,  
FUKUI-KEN 919-04, JAPAN**

Maeda Kosen Co., Ltd. has been engaged in the development, manufacture and marketing of geotextiles, geogrids, geocomposites and related products since 1972. The predecessor of the company was founded in 1919 as a weaving mill in Fukui Prefecture, traditionally a centre of the Japanese textile industry. With the long and rich experience in the textile industry inherited from the former firm, the new company, Maeda Kosen was founded in 1972 for the development of geotextiles which had just started in Japan. Thus Maeda Kosen has grown with the rapid expansion of the Japanese geotextile industry for the last two decades.

The first product of Maeda Kosen in 1972 was ENDREN, a geocomposite made of polyester monofilament pipe structures wrapped in a polyester nonwoven geotextile filter. ENDREN has been used extensively in base and retaining wall drainage applications.

Following the development of ENDREN, various other geosynthetic products were developed and substantial quantities of those products have been used in geotechnical and civil engineering applications. The range of products includes woven and nonwoven geotextiles, geogrids, geocomposites and related products for drainage, rein-

forcement, filtration, separation, or a combination of these functions.

Some of our major geosynthetics products are as follows:

**ADEAM:** Geogrid, for reinforcement of embankments, including embankments over soft soils. There are two types of ADEAM. The G-type is an HDPE geogrid reinforced lengthwise with aramid fibre commercially known as TECHNORA, which gives ADEAM high tensile strength and low elongation. The F-type is a woven polyester geogrid coated with PVC resin and reinforced with TECHNORA. ADEAM is especially suited for reinforcement of steep-sloped embankments using wrap-around face construction.

**DOBOKU SHEET:** Woven polyester geotextile used in base applications over soft soils, scour resistance and as a filter medium behind walls.

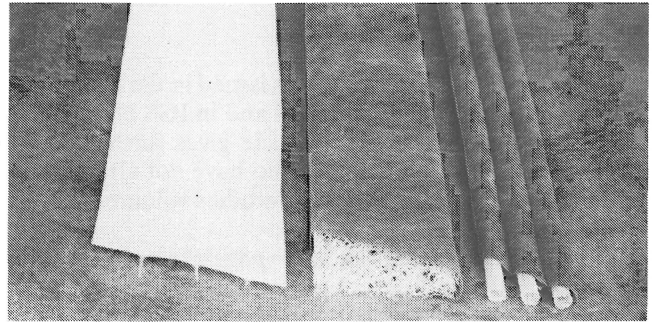
**SANDOFF, KEEPER:** Needle-punched nonwoven polyester geotextile used mainly in filtration and separation applications. It has also been used for protection of geomembranes used in waste containment and water reservoir applications.

**MONODREN, ENDREN MAT, ENDREN FILTER:** Improved versions of above mentioned ENDREN. These products are geocomposites made of polyester monofilament pipe structures wrapped in nonwoven polyester geo-

textile used in drainage applications. MONODREN was used in the Seikan Tunnel, the world's longest undersea tunnel between Honshu and Hokkaido.

Maeda Kosen has enjoyed a close connection with Teijin Limited, a leading polyester fibre manufacturer in Japan, since the days when the predecessor of Maeda Kosen was working for Teijin as a weaver of the Teijin acetate fabric. The polyester fibre "Teijin Tëtoron" and the aramid fibre "Technora" are supplied by Teijin. The cooperation between the two companies has resulted in successful diversification of technology and creation of new geosynthetics products.

Maeda Kosen Co., Ltd. has been a Corporate Member of the IGS since 1992.



(left to right) Endren Filter, Endren Mat, Monodren

## Call for Papers GEOSYNTHETICS '95 Nashville, Tennessee 21-23 March 1995 Abstracts due 1 December 1993

The North American Geosynthetics Society (NAGS) and the Industrial Fabrics Association International (IFAI) under the auspices of the International Geotextile Society (IGS) announce a "Call for Papers" for Geosynthetics'95. This 5th North American Regional Conference on Geosynthetics, scheduled for 21-23 March 1995 in Nashville, Tennessee, will focus on current applications for geosynthetics as well as the latest technical advancements affecting the industry.

### Guidelines for submitting abstracts:

- One typewritten page including the title of the proposed paper, names of authors, and the abstract itself in 300 words or less.
- Company or organization names, addresses, telephone and fax numbers for each author.
- A maximum of one additional page of supporting data and typical results, if the information will assist in evaluating the abstract.

### Awards of Excellence Program

In addition, all papers accepted for publication in the proceedings of the conference will be considered as an entry in the Awards of Excellence Program, a program de-

signed to recognize innovation, creativity, and outstanding contributions in engineering, design, testing, technology, research and development with geosynthetics. Monetary awards will be given to a research institute of each award winner's choice, for the purpose of fostering the advancement of geosynthetics.

### Deadlines

Authors will be notified by 15 February 1994 of acceptance or rejection of their proposed paper. Full texts of the paper will be due no later than 30 May 1994 and will be subject to peer review. Only original papers will be accepted for publication and presentation, similarly, only original papers will be eligible for the Awards of Excellence program.

Abstracts should be mailed to:

Geosynthetics'95 Technical Committee  
c/o Industrial Fabrics Association  
International  
345 Cedar St, Suite 800  
St. Paul, MN 55101, U.S.A.

For abstract entry form and more information contact Joseph A. Dieltz at the above address or telephone: 1 (612) 222 2508 or fax: 1 (612) 222 8215.

# NAGS Members: Publish your Case History in the

## Geosynthetics Case Studies Book for North America

(Case Studies from Geosynthetics Conferences welcome!)

by R.J. Bathurst (Editor, IGS News)

The Geosynthetics Case Studies Book for North America continues to grow but there is still room for more high quality case studies. The case studies book is a joint effort of NAGS and the Canadian Geotechnical Society Subcommittee on Geosynthetics.

An original call for papers was issued in the September 1990 issue of Geotechnical News and in IGS News Vol. 7 No. 3 November 1991. This article gives further details and important dates for those who have not already submitted a contribution to the case studies volume.

The book will comprise *two-page* executive summaries of case histories describing completed civil engineering projects in which a geosynthetic(s) was an important component.

Case studies that are a synthesis of previously published papers in conference proceedings and journals are particularly welcome. Indeed, it is hoped that the case studies book will serve as a valuable reference to previously published work such as the many excellent case studies that have appeared in the Regional North American Geosynthetics Conferences (e.g. Geosynthetics '87, '89, '91 and '93).

It is planned to publish a minimum of 100 case studies that give a balanced review of the state-of-practice in North America for all geosynthetics applications in civil engineering works. This book will be a timely continuation of the ISSMFE case studies book which has just been published and contains projects reflecting the international state-of-practice in geosynthetics (see IGS News Vol. 9 No. 1 1993, p. 10).

**Format: No abstracts are required.** Send the full paper. All final contributions will be typeset. Authors are asked to submit the text of their contributions on a diskette in DOS ASCII format or WP5.0/5.1 for DOS together with one hard copy. As a rough estimate, each contribution should not exceed 2300 words with each photograph

or figure equivalent to 150 words. All photographs and line drawings must be supplied in original form. Photographs must be glossy black and white. The minimum letter size for figures is 10pt assuming no reduction is required (10pt is the size of print in this paragraph). Photographs and figures will be reduced to 75mm (3 inches) wide if required to fit within a single column of the two-column page format. As a guide, one or two illustrations (i.e. figures and photographs) per contribution is recommended.

All headings should be capitalized.

**Content:** The case study should state clearly the purpose of the structure or project, engineering considerations and generic features of the geosynthetics. Within the limited space allowed the authors should describe construction aspects and performance of the completed structure. The authors should also include a list of reference papers or reports that are available to the reader who wishes to pursue further details of the project.

**Project Eligibility:** Members of NAGS, engineers, consultants manufacturers/distributors of geosynthetics and researchers from Canada, United States and Mexico are eligible. However, the case studies *are restricted to projects in Canada, United States and Mexico*. To avoid duplication, case studies found in the ISSMFE book will not be considered.

**Due Date:** Case studies are due **December 31, 1993**.

The papers will be reviewed by a committee of NAGS members. Authors will be notified early in 1994 if their contribution has been accepted. The case studies book will be published once a sufficient number of contributions have been gathered (e.g. 100).

**Contact:** Enquiries and submissions can be made to:

Dr. R.J. Bathurst  
c/o Civil Engineering Department  
Royal Military College of Canada  
Kingston, Ontario, Canada, K7L 5L0  
Tel: 1 (613) 541-6479 Fax: 1 (613) 545-3481

## New product category announced by students at Newcastle

Students at the University of Newcastle upon Tyne in the UK have found a new use for geosynthetics – “The Georaft”. Eight MSc students entered a charity raft race with a boat made from EPS, Tensar geogrid and soil nails. The boat measured approximately 2m x 3m and was constructed in 30 minutes, much less than any other craft

which were all “factory” built. Although very buoyant, the hydrodynamic properties of the Georaft are not spectacular and the crew finished fifth.

reported by  
C.J.F.P. Jones

# LETTERS TO THE EDITOR

## Re: "Name of the Society and Geosynthetics Terminology"

The last few issues of IGS News regarding name change and terminology were very interesting and clearly the IGS News is serving a valuable function in voicing the views and attitudes of its membership. Let me add my name to the growing list.

*On a name change of the Society:* I strongly endorse and encourage the membership to vote on a new name for IGS from International Geotextile Society to International Geosynthetics Society. This retains the IGS acronym and positively reflects on the breadth of the materials being used.

*On geosynthetics terminology:* The situation is less defined and much more subjective. While I generally agreed with the Gevers, den Hoedt and Voskamp article in the Vol. 8, No. 2 issue, it was the Rimoldi, Cazzuffi, Ionescu and Moraci article in the Vol. 9, No.1 issue which was very focused and suggested very positive rolls for IGS. I agreed with the authors on essentially all of their geosynthetics discussion, but felt that commentary was required with the endings of all of their "family" definitions. In this regard, every type of geosynthetic definition ends with the phrase:

"...used in geotechnical and civil engineering applications."

I feel that we must be careful with such a grouping because geotechnical engineering is a subset of civil engineering at all colleges and universities around the world and furthermore it is not the only subset that uses geosynthetics. Yet to leave off geotechnical and to only say civil engineering applications would not serve us well since many environmental engineers are neither civil nor geotechnical engineers. Furthermore, many transportation and structural engineers appear to distance themselves from both geotechnical and environmental engineers. Even further (and perhaps most important), many environmental programs are not within civil engineering and many are not even in engineering programs. While this is admittedly an academic concern, we cannot simply roll-over those who are not civil engineers, much less engineers at all. Thus my suggestion is to amend each of the family definitions given by Rimoldi, et al., to end with the following:

"used in environmental, geotechnical, hydraulic and transportation applications."

Finally, I would like to finish by congratulating the authors for some excellent ideas and initiatives which IGS might consider.

R.M. Koerner

## Response: Continuing to Play The Geosynthetics Terminology Game

We very much appreciate the comments by Prof. R.M. Koerner concerning the fields of application for geosynthetics. We would like to point out that our main goal in our article "Geosynthetics Please, Not Geoconfusion!" (IGS News Vol. 9 No. 1 March 1993) was to "...propose some general guidelines to play the the geosynthetics terminology game". We offered a set of comprehensive and consistent definitions for the different families of products in order to promote a discussion on this fundamental matter. Dr. Koerner's comments emphasize that the field of application is of fundamental importance for the development of our discipline. As a first proposal related to the field of application we adopted the same definition found in ASTM standards: "...used in geotechnical and civil engineering applications". Certainly, Dr. Koerner's proposal could be accepted subject to a general consensus agreement around the world. With regard to the prefix "geo" common to most of the terms related to the products present in our discipline, we suggest, as a definitive proposal, to put the term "geotechnical" before the others. Therefore, the definition of the fields of application should read: "...used in geotechnical, environmental, hydraulic and transportation engineering applications."

We would also like to take the opportunity to present some further comments on our article that we have received through discussion with Italian members of IGS:

1) Definition of extruded geogrid. The definition of extruded geogrid should be modified to be more general and include the different production processes currently used to manufacture this class of products, e.g.: "Extruded geo-

grid: A geogrid produced by stretching uniaxially or biaxially an extruded integral structure."

2) Definition of geocomposite: The definition of geocomposite should recognize the geotextile component(s), e.g.: "Geocomposite: An assembled polymeric material, in the form of manufactured sheet or strip, consisting of at least one geotextile or geotextile-related product among the components, used in geotechnical, environmental, hydraulic and transportation engineering applications."

Of course, in order to reach a final draft on geosynthetic terminology, it will be necessary to:

– introduce definitions for "geomembrane" and "geomembrane-related products";

– define the sub-families of such products as "geonets" and "geocells," as was done for "geotextiles" and "geogrids".

Finally, we must take into consideration the future development of IGS with respect to a careful and precise definition of "associated technologies", i.e. ("IGS, Dedicated to the scientific and engineering development of geotextiles, geomembranes, related products and associated technologies").

P. Rimoldi  
D. Cazzuffi  
A. Ionescu  
N. Moraci

# Geotextiles & Geomembranes: An Official Journal of the IGS

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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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An issue of the Journal Geotextiles and Geomembranes has been 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 below) or:

Prof. J.M. Rigo  
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Zeon Kasei Co., Ltd. - Japan (1992)

*Dates indicate earliest year of continuous membership.*

# Calendar of Events

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Kansas City, MO, 26–29 September 1993

Contact: ASDSO  
P.O.Box 55270  
Lexington, KY 40555 USA

Tel: (606) 257 5146 Fax: (606) 258 1958

## Geotextiles and Geomembranes: Rencontres 93 Paris, France, 29–30 September 1993

Contact: Dr. Philippe Delmas  
Chairman of the Organizing Committee  
Rencontres 93  
9, rue Marcel Paul – B.P. 100  
95873 Bezons CEDEX, France

Tel: (1) 34 23 53 96 Fax: (1) 34 23 53 98

## 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

## GRI Short Courses/Seminar:

### Short Courses:

#### Designing with Geosynthetics

Chicago, IL, USA, 4–5 November 1993

Atlanta, GA, USA, 11–12 November 1993

Philadelphia, PA, USA, 18–19 November 1993

### Seminar:

#### Innovation and Concerns with Geosynthetic Liner Systems Philadelphia, PA, USA, 14–15 December 1993

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

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

## 13th International Conference on Soil Mechanics and Foundation Engineering

New Delhi, India, 4–11 January 1994

Contact: Dr. Shashi K. Gulhati  
Civil Engineering Department  
Indian Institute of Technology  
Post Bag No. 28  
Hauz Khas, New Delhi 110016, India

Tel: 91 11 6852540 Fax: 91 11 6852541

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

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

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

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

Abstracts: 30 August 1993

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

Tel: (65) 353–5511 Fax: (65) 353–2424

## 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

## Geosynthetics'95 Nashville, Tennessee, USA 21–23 March 1995

Abstracts: 1 December 1993

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

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

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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.

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- Helps support the aims of the IGS, especially the development of geotextiles, geomembranes, and related products.
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