Workshop & Short course on Geosynthetics and Ground Improvement

Organised by: **Centre for Infrastructure Engineering and Management and School of Engineering, Griffith University Gold Coast Campus**

Date: July **14 – 16, 2010**

Venue: Griffith University Gold Coast Campus G30 1.09
See "Registration form" for daily registration

PLEASE NOTE THAT ONLINE REGISTRATION IS NOW AVAILABLE
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For additional information please contact (preferably by e-mail)

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INTRODUCTION

Following the April 6-9 Workshop, the July Workshops are arranged in two topics. One on Eurocode 7 from July 12-13, 2010. This will be followed by a three day Workshop & Short course on Geosynthetics and Ground Improvement. This Workshop will be conducted by Chris Lawson and Prof. Jie Han who are internationally recognised experts in this field. Following the types, functions and applications and the properties and testing of geosynthetics, the separation, filtration and drainage characteristics of geosynthetics would be described. The use of geosynthetics in reinforced unpaved and paved roads, and reinforced slopes will then be presented. Basal reinforcements for embankments over soft soils and design of stone columns, deep mixed soil columns as well as the design of geosynthetic reinforced column supported embankments will also be covered. Several case histories on these subjects will be presented. The geosynthetic applications in hydraulic and coastal structures, geotextile tubes for dewatering slurry wastes and landfills are also covered in a comprehensive manner. These Workshops are now well received and have the strongest support of our industry colleagues. Participants are not only from SE Queensland, but are also from all other States in Australia.

Day 1, Wednesday July 14, 2010

09:00 - 10:15am	**Geosynthetics - types, functions and applications (Chris Lawson)**
10:15 - 10:45am	**Coffee break**
10:45 - 12:00pm	**Geosynthetic properties and testing (Jie Han)**
12:00 - 01:00pm	**Lunch**
01:00 - 02:30pm	**Separation, filtration, and drainage (Chris Lawson)**
02:30 - 03:00pm	**Coffee Break**
03:00 - 04:00pm	**Design of Geosynthetic-reinforced unpaved roads (Jie Han)**
04: 00 - 05:00pm	**Design of Geosynthetic-reinforced paved roads (Jie Han)**

Day 2, Thursday July 15, 2010

09:00 - 10:15am	**Design of geosynthetic-reinforced slopes (Jie Han)**

10:15 - 10:45am	**Coffee break**
10:45 - 12:00pm	**Basal reinforcement for embankments over soft soil (Chris Lawson)**
12:00 - 01:00pm	**Lunch**
01:00 - 02:30pm	**Design of stone columns (Jie Han)**
02:30 - 03:00pm	**Coffee Break**
03:00 - 04:00pm	**Design of deep mixed columns (Jie Han)**
04: 00 - 05:00pm	**Geosynthetic-reinforced column-supported embankments (Chris Lawson)**

Day 3: Friday July 16, 2010

09:00 - 10:15am	**Design of geosynthetic-reinforced earth retaining walls (Jie Han)**
10:15 - 10:45am	**Coffee break**
10:45 - 12:00pm	**Case histories of geosynthetic-reinforced earth structures (Chris Lawson)**
12:00 - 01:00pm	**Lunch**
1:00 – 2:30 pm	**Hydraulic and coastal structures (Chris Lawson)**
2:30 – 3:00 pm	**Coffee break**
3:00 – 4:00 pm	**Geotextile tubes for dewatering slurry waste (Chris Lawson)**
4:00 – 5:00 pm	**Landfills (Chris Lawson)**

ON LINE REGISTRATION AND PAYMENT:

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(A) SIMPLY FOLLOW THE LINK; YOU WILL BE REQUIRED TO FILL IN YOUR DETAILS AS BELOW:

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***Please note that password is also required. You will use this password to log into the User Admin area and modify your registration if necessary.**

(B) BY CLICKING "NEXT STEP", YOU WILL BE ABLE TO SELECT THE MODULE YOU INTEND TO ATTEND.

- □ **AUD $ 480 –Wednesday, 14th July, 2010**
- □ **AUD $ 480 –Thursday, 15th July, 2010**
- □ **AUD $ 480 –Friday, 16th July, 2010**

By ticking the box, you are now registered for the days you selected.

(C) PLEASE CLICK "NEXT STEP" AGAIN, YOU WILL NOW ABLE TO SELECT THE PAYMENT METHOD YOU WANT TO USE. THESE INCLUDE:

- □ **CREDIT CARD (VISA/ MASTERCARD/ AMEX)**
- □ **CHEQUE**
- □ **DIRECT DEPOSIT (EFT)**

(D) AFTER YOU FILLED IN ALL THESE DETAILS, YOU ARE NOW REGISTERED IN THE WORKSHOP BY CLICKING THE "SUBMIT" BUTTON. AN INVOICE WILL BE SENT TO YOUR EMAIL DIRECTLY.

***For additional information please contact (preferably by e-mail)**
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Additional details on each topic

(1) Geosynthetics - types, functions and applications
Chris Lawson
The types of geosynthetics are reviewed along with their functions. Some geosynthetics can perform multi-functional roles while others perform a single function only. The wide range of applications where geosynthetics can be used is demonstrated. Today, it is impossible to effectively practice geotechnical, hydraulic and civil engineering without knowledge of geosynthetics.

(2) Geosynthetic properties and testing
Jie Han
Geosynthetic properties mainly include physical (density, thickness, surface, texture, etc.), hydraulic (permittivity, transmissivity, etc.), and mechanical properties (tensile strength, interface shear strength, connection strength, creep, installation damage, etc.). Test methods to determine these properties will be discussed.

(3) Separation, filtration, and drainage
Chris Lawson
Separation, filtration and drainage consume the largest proportion of geosynthetics. The practical application of these three important geosynthetic functions in pavements and subsurface drainage will be covered, along with the benefits to be gained. The use and advantages of geocomposite sheet drains also will be covered.

(4) Design of geosynthetic-reinforced unpaved roads
Jie Han
Unpaved roads include low-volume gravel roads, construction platforms, haul roads, and temporary roads for heavy trucks. Geosynthetics have been successfully used as separators and reinforcement for unpaved roads to ensure trafficking and minimize rut depth and re-surfacing/re-grading. Design methods will be discussed for the selection of geosynthetics and the determination of base course thickness.

(5) Design of geosynthetic-reinforced paved roads
Jie Han
Geosynthetics are used in flexible (asphalt) pavements to provide separation, drainage, and reinforcement for the pavement system. The benefits of using geosynthetics in the pavement system are to prolong pavement life, reduce pavement thickness, and produce cost-effective design. Design methods will be presented to demonstrate these benefits.

(6) Design of geosynthetic-reinforced slopes
Jie Han
Limit equilibrium methods for unreinforced slope stability will be first presented. Different facing options for geosynthetic-reinforced slopes and their advantages/disadvantages will be discussed. Design methods for

geosynthetic-reinforced slopes will be covered, including limit equilibrium and numerical methods.

(7) Basal reinforcement for embankments over soft soil
Chris Lawson
The fundamental mechanics of bearing capacity improvement using basal reinforcement will be presented. Design/analysis procedures covering plasticity solutions, limit equilibrium methods and continuum methods will be presented along with the advantages and limitations of each. The use of prefabricated drains (PVD's) as a means of accelerating consolidation will be covered along with the effect they have on the resulting basal reinforcement tension. The various methods of construction will be reviewed. Several case studies of basal reinforced embankments over soft soils will be presented.

(8) Design of stone columns
Jie Han
Stone columns can be installed using vibro-compaction, vibro-replacement, and vibro-displacement methods. They have been successfully used to increase bearing capacity, slope stability, and liquefaction resistance, reduce settlement, and accelerate consolidation. Different failure modes of stone columns will be discussed. Installation, design, and quality control methods will be covered.

(9) Design of deep mixed columns
Jie Han
Deep mixed columns can be installed by dry (powder) and wet (slurry) methods. Different types, construction techniques, and applications of deep mixing will be presented. Properties of soil-cement/lime will be discussed. Design considerations of deep mixed columns for different applications (bearing, sliding, lateral support, consolidation, etc.) will be covered. Quality assurance and control for deep mixed columns will be discussed.

(10) Geosynthetic reinforced column-supported embankments
Chris Lawson
The practical applications where column-supported embankments are used to control stability and settlement will be presented. Comparison between the various embankment analytical arching models will be reviewed. The determination of geosynthetic tension and stiffness, as well as the required geosynthetic reinforcement layout will be given. Several case studies will be presented.

(11) Design of geosynthetic-reinforced earth retaining walls
Jie Han
This lecture will address the construction, applications, and design of geosynthetic-reinforced earth retaining walls. The design will cover external stability, internal stability, and local stability analyses. The U.S. Federal Highway Administration (FHWA) design method will be followed.

(12) Case histories of geosynthetic reinforced soil structures

Chris Lawson

This part of the course will cover a series of case studies featuring reinforced soil walls and slopes. Fundamental features in the classification of reinforced soil walls and slopes will be presented as well as the roles, and levels of contribution, of the various components in reinforced soil walls and slopes. Also, lessons to be learned from wall and slope failure cases will be covered.

(13) Hydraulic and coastal structures

Chris Lawson

This part of the course will be focused on two areas. First, will be the use of geotextiles as filters in revetments, containment dykes and breakwaters. The use of geotextile filters in conjunction with rock, gabion and mattress, and concrete armour will be covered in detail. Second, will be the use of geotextile tubes, geotextile bags and geotextile containers as mass gravity structures in hydraulic and coastal engineering. In addition, several case studies will be presented.

(14) Geotextile tubes for dewatering slurry waste

Chris Lawson

Many industrial processes generate slurry waste as part of their production process. Also, the removal and treatment of contaminated sediments involves the handling of large quantities of slurry materials. Commonly, these slurry materials have to be dewatered and rendered into solid, or semi-solid, form before they can be disposed of, recycled, etc. Geotextile tubes provide a means of dewatering slurry wastes. The lecture will present the fundamental principles involved in geotextile tube dewatering, will look at the use of dewatering accelerants, and will cover the design process that needs to be undertaken for these dewatering applications. Several international case studies will be presented where geotextile tube dewatering has been successfully performed.

(15) Landfills

Chris Lawson

The presentation of geosynthetics in landfills will be covered from a systems perspective, where combinations of geosynthetics are used to provide effective fluid flow (both liquids and gases) management in landfill structures. The effective and long term management of fluid flows involves the use of barrier materials, protection materials and drainage materials at various locations in the base of landfills and in their caps. The geosynthetic properties of importance for landfill design will also be presented.

LECTURERS BIO-DATA

(1) Chris Lawson

Chris Lawson is the International Director for Soil Reinforcement and Geosystems of Ten Cate Geosynthetics Group. Chris received his Bachelor of Engineering and Master of Engineering degrees from the University of New South Wales, Australia. Chris is a member of the Institution of Engineers Australia where he is a Chartered Professional Engineer and a member of the American Society of Civil Engineers. He has worked in the field of geosynthetics for 30 years in Australia, Europe, North America and Asia. During this period he has served on numerous international organizations developing geosynthetics Standards and Codes of Practice. He was a member of, and later editor of, BS 8006 a Code of Practice for Reinforced Soil and other Fills. Chris has acted as technical advisor on many large scale geosynthetics projects in Australia, Asia and Europe. He is the author of over 50 technical papers on the subject of geosynthetics, geotechnical engineering and hydraulic and marine engineering. He has been the keynote speaker at numerous conferences and symposia. He gave the Keynote Lecture at IS Kyushu 2001, the conference organised by the TC9 Reinforced Soil Committee of ISSMGE. Chris is an ex-Council Member of the International Geosynthetics Society. In 2006 Chris gave the Third Giroud Lecture at the occasion of the 8th International Conference on Geosynthetics in Yokohama, Japan.

(2) Prof. Jie Han

Dr. Jie Han is an Associate professor at Department of Civil, Environmental, and Architectural Engineering at the University of Kansas in the United States. He received his Ph.D. degree in Civil Engineering from the Georgia Institute of Technology in 1997 and has been a professional engineer in Georgia since 1998. Dr. Han was a senior engineer and manager of technology development at Tensar Earth Technologies, Inc., a leading geosynthetic manufacturer in the world, from 1997 to 2001. Prof. Han's research and practical experiences have dealt with geosynthetics-reinforced earth structures, ground improvement, pile foundations, and pavement applications. He has received more than 2 million U.S. dollar research grants from the National Science Foundation, the Federal Highway Administration (FHWA), Kansas Department of Transportation, the University of Kansas, and industries. The design method developed by Dr. J.P. Giroud and Prof. Han for geosynthetic-reinforced unpaved roads has been adopted by FHWA and the geosynthetics industry and the solution for consolidation rate of stone column foundations has been widely adopted by the ground improvement industry. Prof. Han has coauthored three technical books, edited two ASCE Geotechnical Special Publications, and published more than 150 peer-reviewed journal papers and conference papers (a large portion on geosynthetics). Dr. Han has given a number of keynote or invited lectures

(mostly on geosynthetics-related topics) in Australia, China, Israel, Japan, Malaysia, Mexico, Panama, Peru, the United Kingdom, and the USA. Prof. Han is currently serving as the Technical and Proceedings Co-chair for the GeoFrontiers 2011 Conference to be held in Dallas, Texas, USA from March 13 to 16, 2011, which is jointly organized by the ASCE Geo-Institute, the Industrial Fabrics Association International, the North American Geosynthetic Society, and the geosynthetic industry. Prof. Han serves as a member on the editorial boards for four major international journals in geotechnical engineering, the ASCE Geosynthetic and Ground Improvement Committees, and TRB A2K07 Committee on Geosynthetics. He was the Secretary General and Technical Committee Co-Chair for the GeoShanghai International Conference held in Shanghai, China in 2006; the co-chair of the US-China Workshop on Ground Improvement Technologies held in Orlando, the USA in 2009; and an international advisory board member, technical committee member, or session chair for a number of international conferences.