AUSTRALIAN GEOMECHANICS SOCIETY

AUSTRALIAN TUNNELLING SOCIETY

A technical society of ENGINEERS AUSTRALIA

AGS SA-NT SYMPOSIUM 2019
TUNNELLING UNDER ADELAIDE

australiangeomechanics.org

NATIONAL WINE CENTRE
CORNER OF BOTANIC AND
HACKNEY ROADS, ADELAIDE

MONDAY 28TH
OCTOBER 2019
8.30AM–5.00PM

The South Australian-Northern Territories Chapter of the Australian Geomechanics Society (AGS) and the Australian Tunnelling Society (ATS) are pleased to announce the 2019 AGS Symposium titled "Tunnelling under Adelaide" which is to be held on Monday 28th October 2019.

The symposium forms part of the continuing programme of events organised by the SA-NT Chapter of the AGS and aims to provide the engineering profession with a comprehensive introduction to the geotechnical aspects of tunnelling in soil in urban areas, including best practice techniques and recent developments.

Keynote Speakers:
Michael King (MK Tunnelling Limited),
Oskar Sigl (Geoconsult Asia Singapore),
Address by Stephan Knoll (MP, Minister for Transport, Infastructure and Local Government)

Event Contact:
Abbas Taheri
abbas.taheri@adelaide.edu.au

CPD:
Engineers Australia (EA) members participating in AGS technical sessions can record attendance on their personal Continuing Professional Development (CPD) logs. Members should refer to EA's CPD policy for details on CPD types, requirements and auditing guidelines.

Overview of the 2019 Symposium

South Australia has seen significant investment in transport infrastructure in recent years. The development of a dedicated non-stop North-South Corridor for Adelaide is a direct result of a strategic objective to reduce Adelaide's urban road congestion. The North-South Corridor is one of Adelaide's most important transport corridors and is the major route for north and south bound traffic including freight vehicles running between Gawler and Old Noarlunga, a distance of some 78 km. Many of the associated projects involve complex geotechnical challenges.

The South Australian Government is currently considering the viability of tunnelling options for the remaining sections of the strategic North-South Corridor between River Torrens and Darlington. Design and construction of the remaining sections will be the biggest single infrastructure project in South Australia's history.

This symposium will present overviews of current design practice, state of-the-art practices, novel technologies and innovative solutions, and case studies demonstrating applications of advanced techniques and cost-effective solutions in the design and construction of TBM tunnels in clay, with a focus on the geotechnical challenges associated with the completion of the North-South Corridor between the River Torrens and Darlington. The symposium will bring together professional engineers, researchers, specialist contractors, regulators, educators and students to share and discuss their experiences on the topic of the design and construction of TBM tunnels and their associated challenges and opportunities.

Topics:

Planning and Investigation

- Procurement models
- Risk management
- The role of ground investigation and Geotechnical Baseline Reports
- Ground conditions in Adelaide including geotechnical and hydrogeological hazards

Geotechnical Design

- Management of ground movements impacts on existing infrastructure
- Groundwater control in high risk urban environments
- Instrumentation and monitoring
- Ground treatment

Excavation and Construction Methods

- Large diameter TBM selection, design and performance
- Sprayed concrete lining and membrane construction
- Cross passage construction
- Crossover structures
- Waterproofing of cross passages, shafts and caverns
- The role of tunnel engineers during construction and the use of the observational method

Case histories

- TBM tunnelling projects in Adelaide, London and Auckland will be presented

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About The Keynote Speakers

Dr Oskar Sigl
Geoconsult – Asia Singapore

Dr. Sigl graduated as Diploma Engineer (MSc) in 1985 from the Technical University of Graz (Austria), in geotechnics and soil mechanics and in 1991 achieved the PhD in mining engineering at the Mining University of Leoben (Austria). Oskar's 30 years of experience cover a wide range of projects such as subways, railways, roads, power transmission cables, sewerage mains, underground storage schemes and caverns. Oskar has been working in Singapore since 1997, where he was involved in the detailed design of almost all major underground infra structure projects. This includes the MRT lines, high voltage transmission cable tunnels, underground expressways and deep sewer tunnels. Outside of Singapore, Dr. Sigl was involved in leading roles in the design of underground transportation systems in Dubai, Perth, Brisbane, Sydney, Hong Kong, Kuala Lumpur as well as the design of underground oil and fuel storage cavern schemes in Saudi Arabia, India and the UAE.

Presenting:
Design and construction issues which are critical but receive less attention.

The presentation is intended to highlight and discuss the solution to major challenges of planning underground projects in urban environments, which are not in the forefront of attention. This is related to the construction of entrances, cross passages and other critical structures, which very often do not receive the technical attention they would deserve. These discussions are presented in the form of examples from the viewpoint of a practitioner, who is deeply involved in the actual design for the implementation of such projects. Infrastructure in large cities is getting denser over time. Actual geotechnical challenges often relate to the application of innovative methods of construction in order to minimize potential construction impact or disruption. The presentation will focus on the application of "unusual" design considerations and construction methods and related design and construction challenges.

Michael R King
Director - MK Tunnelling Limited

Michael King is an independent consultant who has been involved in tunnelling projects for over 35 years, including segmentally lined tunnels, sprayed concrete linings and diaphragm wall and piled structures. He has worked directly for both contracting and consulting organisations and has also been seconded into Client organisations on major projects. His international project involvement includes the Channel Tunnel (UK/France), the Arrowhead water project (USA), Lisbon Metro (Portugal), Los Angeles Metro (USA), Sao Paulo Metro (Brazil) and the Jubilee Line Extension (UK). Mike has also been involved in Expert Witness cases and recently completed 7 years as Head of Underground Construction on the Crossrail project. In 2019 Mike was awarded the James Clark Medal for his contributions to, and achievements in tunnelling by the British Tunnelling Society.

Presenting:
Crossrail tunnelling in the London Clay formation

The Crossrail project in London (UK) spent 7 years excavating and lining tunnels and shafts within the London Basin. Construction activities encountered and dealt with a range of geological strata, including recent deposits of Made Ground, Alluvium and River Terrace Gravels, over-consolidated London clay, variable mixed sediments of sands gravels and clays, uniform and fine-grained sands, and the underlying sedimentary Limestone (Chalk). Approximately 42km of segmentally lined bored tunnel were completed using pressurized Tunnel Boring Machines (TBM), and over 12km of tunnel were supported utilising Sprayed Concrete Lining (SCL) with spans of up to 17m, along with sprayed concrete, diaphragm wall and piled shafts and underground structures.

This presentation provides an outline of the project, concentrating on the central tunnelled section. The broad geological/hydrogeological setting of the central tunnelled area is described, with an examination in more detail of the perception and reality of tunnelling in the over-consolidated London Clay. This material has often been described as the ideal tunnelling material, but it is variable and not risk free, and offers challenges for both design and construction. The London Clay has been compared with the similar Keswick and Hindmarsh Clays that underlie much of the Adelaide city area. Tunnel construction utilising TBM and traditional excavation coupled with the use of SCL for support through the London Clay will be discussed. The presentation will consider in particular the influence of the historical experience of tunnelling in London Clay on modern approaches and risk perceptions.

Sponsorship

Platinum Sponsors: WSP, normet

Gold Sponsors: GEOFABRICS Smarter Infrastructure, SMEC Member of the Surbana Jurong Group, GOLDER, Government of South Australia Department of Planning, Transport and Infrastructure, JACOBS, CPT SOUTH AUSTRALIA, HERRENKNECHT Tunnelling Systems, KELLER, aurecon, WGA WALLBRIDGE GILBERT AZTEC

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Programme

08.30 – 09.00	*Registration and Coffee*
09:00 – 09:05	**Welcome by AGS SA/NT Chapter and ATS Chairs**
09:05 – 09:10	**Platinum Sponsor presentation by WSP**

SESSION 1 – PLANNING, INVESTIGATION & PROCUREMENT

09:10 – 09:50	**Mike King - Crossrail tunnelling in the London Clay Formation**
09:50 – 10:05	**Dr Doug Maconochie - Road tunnels in Australia & New Zealand - getting the best value for money**
10:05 – 10:20	**Stuart Simmonds - Sydney Metro**
10:20 – 10:30	*Questions*
10:30 – 10:45	*Morning tea & coffee*

SESSION 2 – DESIGN

10:45 – 11:00	**Mark Drechsler - What lies beneath Adelaide? What we know so far about potential subsurface risks that lie in wait for tunnellers**
11:00 – 11:15	**Jack Muir - Groundwater control for underground construction in high risk urban environments**
11:15 – 11:30	**David Lees – Grouting for groundwater control and mitigation of ground movements**
11:30 – 11:45	**Joshua Barry - Managing ground movement impacts for Australian road tunnels**
11:45 – 11:50	*Comfort Break*
11:50 – 12:05	**Chris Lyons - Ground movement impact assessments and instrumentation and monitoring in complex urban environments**
12:05 – 12:20	**Chin Cheah - Design of the TBM retrieval shaft for the West Gate Tunnel Project in Melbourne**
12:20 – 12:35	**Dr Karin Bappler - TBM design and tunnelling experiences with a large diameter TBM operation for the Waterview Connection Tunnels in Auckland**
12:35 – 12:50	**Abbas Taheri - Tunnelling boom in Australia: prospect of educating tunnelling engineers**
12:50 – 13:00	*Questions*
13:00 – 14:00	*Lunch*
14:00 – 14:05	**Address by Stephan Knoll, MP & Minister for Transport, Infrastructure and Local Government**
14:05 – 14:10	**Platinum Sponsor presentation by Normet**

SESSION 3 – EXCAVATION & CONSTRUCTION

14:10 – 14:50	**Dr Oskar Sigl - Design and construction issues which are critical but receive less attention**
14:50 – 15:05	**Harry Lyle - The application of permanent shotcrete and sprayed membrane in soft ground tunnels**
15:05 – 15:20	**Daniel Bosco - Engineering waterproofing solutions for underground civil infrastructure**
15:20 – 15:30	*Questions*
15:30 – 15:50	*Afternoon Tea and Coffee*

SESSION 4 – CASE HISTORIES

15:50 – 16:05	**Luke Drowley - Adelaide Desalination Project - tunnelling review**
16:05 – 16:20	**Alexandre Gomes - Experiences with the use of the conventional mined excavation method in the Santiago Metro-Chile**
16:20 – 16:35	**GT Senthilnath - Role of tunnel engineers in implementing observational method at site**
16:35 – 16:55	*Questions*
16:55 – 17:00	*Closing remarks and thanks*
17:00	*Close*
17:00 – 19:00	**Unwined: please join us for refreshments at the National Wine Centre bar (optional)**

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Speaker Biographies

Dr D J Maconochie

Doug has a successful track record influencing the design of multi-billion dollar road and rail tunnel projects over a lifetime career in tunnelling in Australia and internationally. His achievements were recognised in 2014 with the Alan Neyland lifetime achievement award in the tunnelling industry by the Australasian Tunnelling Society and by the Institution of Engineers' Sir John Holland Civil Engineer of the Year award for 2015. Dr Doug Maconochie is WSP's Technical Director for Tunnels (International). He has had major design and construction management roles on some of the world's most significant recent transit projects including:- Kuala Lumpur Putra Light Rail; MRTA Blue Line, Bangkok; East Side Access, New York; Epping Chatswood Rail Line, Sydney; Lane Cove road tunnel, Sydney; CLEM 7 and Airport Link road tunnels, Brisbane; Waterview Connection, Auckland; M4East Tender, Sydney; Harbour Link Concept design, Sydney; East West Link and Western Distributor tender designs, Melbourne. His project experience encompasses leadership of construction supervision and design teams for these projects.

Stuart Simmonds

Stuart is the Senior Design Manager for John Holland CPB Ghella Joint Venture (JHCPBG) on the Sydney Metro Program and will share technical elements of tunnel design and construction, insights into tunnelling under Sydney Harbour and provide an update on the progress of tunnelling and excavation works undertaken between Chatswood and Sydenham.

Joshua Barry

Josh is a tunnel engineer with extensive experience in concept and detailed design, impact assessment, construction monitoring, and project management of large-scale civil engineering infrastructure projects. Josh's technical experience includes projects in Australia, Hong Kong, New Zealand, and Thailand. Recently, Josh has managed the ground movement and impact assessment reports for two of Australia's largest road tunnels, West Gate Tunnel Project in Melbourne and WestConnex Stage 3A in Sydney.

Mark Drechsler

Mark has over 35 years' experience as an engineering geologist involved in investigation, design and construction of mining, civil and transport infrastructure projects throughout Australia. Mark has developed technical expertise in quarrying, earthworks and construction materials and has gained considerable design and construction experience in sourcing construction materials and track formation design for rail projects in Australia, resulting in being a co-author of the recently updated ARTC earthworks materials and construction specifications. Mark is a Geotechnical Subject Matter Expert for the Inland Rail Project which involves three tunnels through the Toowoomba Ranges in Qld. Mark was involved in the North South Tunnel studies.

Jack Muir

Jack is a tunnel engineer with broad tunnelling experience and has practical experience working within contractor's teams both in the design and construction phase of projects. Jack has managed the underground design of the West Gate Tunnel Project in Melbourne for the last 18 months. Prior to that Jack led the Aurecon Hong Kong tunnel team providing technical, administrative and commercial leadership. Jack has sourced and been the first point of contact for work both in Australia and overseas having to develop deep professional relationships with clients and other Aurecon offices around the world.

Chin Cheah

Chin Cheah is a Senior Structural Engineer with Jacobs and is the Tunnel Portals Design Manager of the West Gate Tunnel Project for the Aurecon Jacobs Joint Venture (AJJV). Chin has extensive experience in design management and delivery of large multi-disciplined transport infrastructure projects from working on West Gate Tunnel and WestConnex New M5 to the award-winning Legacy Way project. During his 24-month secondment to Melbourne, Chin led and guided the Retrieval Shaft design from feasibility and planning through to design and construction support, ensuring that innovative and best value solutions were realised.

Chris Lyons

Chris is Technical Lead in the Geotechnical Team of Arup's Melbourne office. Over the last 20 years, he has been involved in numerous major projects around the globe, taking part in all stages of project works ranging from investigations, detailed design for construction and high-level project coordination. Chris has extensive experience covering the design of various types of deep and shallow foundations, ground improvement, retaining walls and slope stabilisation works. Chris has spent a significant part of his career working on ground movement predictions, impact assessment and mitigation measures on multiple projects including Crossrail in London and most recently Melbourne Metro.

David Lees

David Lees is a Principal Tunnel Engineer with Jacobs and has over 35 years' experience in the design and construction of underground works, both in mining and civil tunnelling, with particular expertise in grouting and ground treatment. He has worked in over 14 countries around the world as both consultant and contractor. David was responsible for the development of the design of grouting and ground treatment for Southwark Station for the Jubilee Line Extension, supervision of surface and underground grouting for the Elgas LPG Cavern in Sydney, construction of foundation grouting for Shannon Creek Dam, dams at Ranger Mine and West Cliff Colliery, and permeation grouting for TansGrid Cable 41 and a Gas Power Station at Pelican Point in Port Adelaide. More recently he has been providing assistance to grouting design and application for WestConnex in Sydney and has been appointed Grouting Expert for an International Panel of Experts for Phase II of the Lesotho Highlands Water Project.

Speaker Biographies Continued

Dr Karin Bäppler

Karin graduated as a civil engineer from the Technical University of Karlsruhe, Germany (today KIT, Karlsruhe Institute of Technology) and completed post graduate studies with her PhD at the Colorado School of Mines, USA. She joined Herrenknecht in 1997 and since then has specialized in geotechnology, research and development. Since 2008 Karin has managed the Geotechnical and Consulting department for the Traffic Tunnelling Division at Herrenknecht's head office in Schwanau, Germany and is responsible as Head of Business Development. She is an invited lecturer for postgraduate degrees at Universities in France, Germany, Italy and the USA on the topic of Tunnelling and Tunnel Boring Machines.

Abbas Taheri

Abbas has over 18 years of industry, research and teaching experience in the field of mining engineering, rock mechanics and geotechnical engineering. Abbas earned a PhD in geotechnical engineering from Yokohama National University, Japan in 2008. In 2008 he was awarded a postdoctoral fellowship from Japan Society for the Promotion of Science (JSPS) and joined Tokyo University of Science. In 2011 he was appointed as a lecturer at the University of Adelaide, where he is now a senior lecturer. He is a member of editorial board and guest editor of several international journals and has produced more than 110 refereed publications. Abbas has worked for 4 years in industry and been involved in several tunnel design, construction, and geotechnical engineering projects.

Harry Lyle

Arguably the longest serving and most senior Tunnelling General Superintendent in Australia with over 40 years' experience. It is safe to say there is nothing that Harry hasn't seen or done in the tunnelling industry. He has completed multiple leadership and supervisory programs and is the recipient of several Safety Excellence Awards. With many years of experience, Harry has developed a unique and tested understanding of the "big picture", an unnegotiable stance on safety, and unequivocal importance of respect and comradery and how these factors impact a project.

Daniel Bosco

Daniel Bosco is Director and Founder of Bluey Technologies Pty Ltd., has a Bachelor of Engineering (Civil) from the University of Technology Sydney and has also completed post graduate studies in concrete technology and rehabilitation. Following completion of his studies, Daniel worked on a number of large infrastructure projects such as Airport Link Tunnel in Sydney, Taiwan High Speed Rail and other significant tunnel projects built around the region over the past 25 years. In 2003 Daniel started product supply company Bluey Technologies. Bluey specialises in polymer, cementitious and resin-based products for concrete protection and repair. The company has grown rapidly and has since become a supplier to some of the largest construction companies throughout Australia, New Zealand and South-East Asia. Bluey Technologies has completed approximately 5,000,000sqm of waterproofing supply and application across the region.

Luke Drowley

Luke leads a team of tunnel engineers working on a suite of projects across ANZ, including Snowy 2.0, Northconnex, Westconnex, North South Corridor Study in Adelaide, West Gate Tunnel, Melbourne Metro and Inland Rail. He is currently supporting DPTI as the tunnelling lead on the North South Corridor Study.

During his career, Luke has worked on a range of underground projects including hydropower, water, rail, road and utilities tunnels. Noteworthy projects include the $600M USD Ulu Jelai Hydroelectric Project in Malaysia, which included 26 kilometres of tunnels and caverns; the $1.8B AUD Adelaide Desalination Plant, where he was responsible for subsea TBM and mined tunnels; and the Lane Cove Tunnel in Sydney, where he was a site tunnel engineer as part of the construction team.

Alexandre Gomes

Alex Gomes is a civil engineer with over 27 years of experience in the planning, design and construction of tunnels and underground works and applied geotechnical and geomechanical engineering. Alex has been engaged in many major projects in Europe, Asia, Australasia and the Americas with experience on a widespread array of underground infrastructure projects, including Metro, Railway, Roads, Utility, Mining and Hydro. He has extensive experience in both soft ground and hard rock tunnelling with the use of both conventional and mechanised construction methods. Alex was the Managing Director of Geoconsult Latin America in Chile for 13 years before joining SMEC Australia in early 2017 in the position of Chief Technical Principal – Tunnels and Underground. He is past Vice-President of the ITA, and past adjunct professor of tunnelling at the University of Chile, having published many technical papers and articles, and delivering lectures and training activities for engineers worldwide.

Senthilnath GT

Senthilnath is a registered chartered civil engineer in multiple countries and professional engineer with over 10 years of experience in diversified geotechnical projects such as TBM and SEM/NATM tunnels, deep foundation and excavation support system for mining and urban development projects, site supervision and design management. Senthilnath gained his Masters degree in Geotechnical Engineering from the Indian Institute of Technology, India and TU Dresden, Germany and he pursued specializing masters in "Tunnelling and TBMs" at Politecnico di Torino, Italy. He has exposure to a wide range of tunnelling works (soft ground, hard rock, deep caverns) and project experience in multiple countries (Singapore, Australia, India, Indonesia, Malaysia & UAE). He was the recipient of the "Young Tunneller of the Year" award from NCE (official magazine of Institution of Civil Engineers, London, UK) in 2016 and has been shortlisted for International Tunnelling Association (ITA) Awards in 2016 and 2018 held in Singapore and China respectively.

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REGISTRATION FORM & TAX INVOICE

When: Monday 28th October 2019
Where: National Wine Centre, Corner of Botanic and Hackney Roads, Adelaide
Please return one registration form per delegate.

FORM SUBMISSION

Please complete the registration form and return to Peter Robinson via: secretary@australiangeomechanics.org

PERSONAL INFORMATION

Gender: ◯ Male ◯ Female
Title: First Name:
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Ph/Mob: Email:
Are you a member of the Australian Geomechanics Society? ◯ Yes ◯ No
Are you a full time student? ◯ Yes ◯ No Tertiary Institution:
Please advise of any dietary requirements:

Organisation:
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REGISTRATION FEES & PAYMENT

* The cost of AGS membership is $220 annually, please refer to: http://australiangeomechanics.org/membership/ All prices quoted are in Australian Dollars (AUD) and inclusive of Goods and Services Tax (GST). Please complete one form per person.

Fees (including GST)	Early Bird Fees	After 28/09/2019
Presenter	**FREE**	**FREE**
Author (non-presenter)	**$150.00**	**$200.00**
AGS or ATS Member	**$300.00**	**$350.00**
Engineers Australia Member	**$450.00**	**$500.00**
Non Member* (AGS membership fee: $220 / year)	**$520.00**	**$570.00**
Member - Full time Student / Concession† (Availability is limited, up to 20 persons)	**$100.00**	**$150.00**
Non Member* - Full time Student / Concession† (AGS membership fee for Undergraduate Students: Free) (AGS membership fee for Postgraduate Students / Retired: $110 / year)	**$200.00**	**$250.00**

* Use this link to be an AGS member: http://australiangeomechanics.org/membership/. † Proof of being full-time is student required. Please note that the venue capacity is approximately 100 persons.

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