

## President's address



I am very pleased to provide you with the latest news concerning the organization of the Foundation.

To improve our efficiency, our offices are now split between two locations:

- Lausanne, where our head office is housed, thanks to the invitation of Bonnard et Gardel SA,
- Lyon, thanks to the invitation of CETU, who have offered to house the operational secretariat and the new secretary on their premises. This organization will facilitate collaboration with the ITA-CET Committee secretariat, also based at CETU.

I am delighted with the results of this new organization, as we have already been able to note the Foundation's increased efficiency since the beginning of the year.

Eng. A. Al-Mogbel

ITACET Foundation President

## Editorial



The global tunnelling industry is gearing up for the future. If you look at the innovations of the past two decades, you see many groundbreaking advances in technology and fascinating civil engineering milestones in tunnelling internationally. Groundbreaking projects like the Gotthard Base tunnel, Crossrail London or the Eurasia Tunnel in Istanbul underpassing the Bosphorus attracted lots of interest around the world. For the mega projects Grand Paris and Brenner Base Tunnel, the main excavation works are just starting. My impression is that we are now entering an even more exciting phase in the construction of highly efficient underground infrastructures. Our industry is an ideal playground for young, ambitious, cosmopolitan and forward-striving engineers and professionals to conquer the underground for future use by people, nations and business. The creation of the ITACET Foundation, supported by the industry and the ITA, is an excellent platform for preparing our young talents in a targeted, comprehensive and practical manner for the coming golden age of tunnelling. At international industry events, it gives me enormous pleasure to find that more and more young, passionate engineers and experts are recognizing the huge potential of this industry and gladly becoming members of the global ITA family.

As established players and today's drivers of the international tunnelling industry, we hold full responsibility not only for advancing the state-of-the-art in technology but also for laying the foundations for the future in a smart and visionary way. To this end, the ITACET Foundation was created as a professional continuing education and training facility that we should all actively support in the best interests of the industry. In doing so, we should take care to ensure a balanced mix of engineering theory and relevant practical aspects. We should

bravely lead our successors to the diverse, promising and visionary challenges they will face in the practical planning, design and realization of underground space. In this vein, I wish all proponents and supporters of the ITACET Foundation tangible successes moving forward, in keeping with my personal motto: "Think positive. Together we are building our future!"

Dr.-Ing. E.h. Martin Herrenknecht, Founder and Chairman of the Board of Management Herrenknecht AG

Founder and Council Member of the ITACET Foundation

## Session reports

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### PRINCIPLES OF TUNNEL DESIGN

Date: 20/04/2017 to 21/04/2017

Location: Kuala Lumpur, Malaysia



A two-day training session on the "Principles of Tunnel Design" was held on 20th & 21st April 2017 at the P J Hilton, Petaling Jaya, Selangor, Malaysia. This short course was organized as a post conference event of the SEACETUS 2017, held on 18th and 19th April 2017, which met with great success.

The training session was organised by the Tunnelling & Underground Space Technical Division (TUSTD) of The Institution of Engineers, Malaysia (IEM) and the Foundation for Education and Training on Tunnelling and Underground Space Use (ITACET). It was managed by IEM Academy Sdn Bhd, a subsidiary company of IEM.

The training session provided an introduction to the principles of tunnel design throughout a project cycle, from planning, design and construction, through to implementation of a tunnel or underground project. It was aimed at owners, decision-makers, consulting engineers, contractors and others with an interest in tunnel design activities.

The two-day training session consisted of four sessions: Session 1: Introduction and Overview on Tunnel Design, Session 2: Choosing the Appropriate Construction Method during Design, Session 3: Design and Calculation Methods and Session 4: Specific Aspects of Tunnel Design. The lectures were delivered by ITA and SEA including Malaysian tunnelling experts. The presence of esteemed overseas and Malaysian experts who shared their invaluable global and local experiences, insights and comments helped to enrich the knowledge of IEM members and others in the engineering profession.

Many thanks to the ITA Vice President Prof Jinxiu Yan, Dr. Noppadol Phienwej, Mr. Thorsten Tatzki, Mr. Gus Klados, Mr. Emmanuel Humbert, Mr. Alain Poloni, Mr. Senthilnath and Dr. Leo Suhaendi (who presented the Design Philosophy of Tunnels for KVMRT on behalf of Mr. Andreas Raedle) for dedicating their time to give the excellent lectures.

As a professional institution dedicated to promoting the science and profession of engineering and to facilitating the exchange of related information and ideas, IEM is indeed proud to be associated with the ITACET Foundation and hopes that more courses can be organized in Malaysia in the future.

The training sessions attracted more than eighty registered participants including the lecturers and organizers. The event was a great success with about 66 participants from suppliers, contractors, consultants, government agencies, students and lecturers of universities who attended the training sessions delivered by eight (8) lecturers with their respective specific expertise covering the following topics:

1. Design philosophy for KVMRT
2. Geological and geomechanical surveys
3. Settlement design
4. Specific parameters affecting design
5. Conventional tunnelling in hard rock
6. Conventional tunnelling in soft ground
7. Mechanized tunnelling (TBM and support systems)

8. Health and safety issues and impact on tunnel design
9. Rock engineering design
10. Analytical and numerical methods
11. Risk Management – Contractor's perspective
12. Design of face pressure, soil conditioning and backfilling for TBM
13. Monitoring and control for conventional and mechanical tunnelling
14. Case study of a complex urban tunnel: Monaco
15. Case Study 1: SMART Design Experience
16. Case Study 2: Urban tunnelling in Singapore

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## PLANNING, CONSTRUCTION AND OPERATION OF COMMON UTILITY CORRIDORS

Date: 25/04/2017 to 26/04/2017  
Location: Chengdu, China



The ITACET Foundation recently collaborated with the China Railway Group Ltd and the Tunnel and Underground Works branch of the China Civil Engineering Society (CCES) within the scope of an international exchange summit on the subject of urban utility tunnels. The summit, co-organized by China Railway Academy co. Ltd and several other Chinese sponsors, was held on April 25-26 in Chengdu, China and attracted over 400 participants. Many of the attendees were senior level engineers and managers who came to better understand how the planning, design, financing, operation and management of common utility tunnels are handled in different countries and to share the already significant experience in China in creating such tunnels (by the

end of 2016 more than 2000 km of utility tunnels had been built in 147 cities across China). This continues to be a "hot" topic in China since the Chinese government has laid out guidelines for Chinese cities to start the construction of another 200km of common utility tunnels in 2017 and made available significant financial resources to help the cities implement the plans.

As with typical ITACET programmes, the ITA-CET committee worked with the local organizers to create the right technical program and the ITACET Foundation helped to facilitate the program and to make the formal arrangements for the international speakers. The international speakers came from Czech Republic, France, Germany, Singapore, UK, and USA. Chinese speakers came from major companies and academic institutions with extensive design, construction and research experience.

Both international and Chinese delegates were impressed with the high quality of the information shared on worldwide experiences with common utility tunnels. While critically important to the functioning of many cities, it is difficult to find good information, guidelines and standards for such installations and the information is quite piecemeal. This summit provided a concentrated collection of experiences and detailed design issues and the format of longer presentations, specific Q&A sessions and a wrap-up round table discussion helped make it a successful event.

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## MECHANIZED TUNNELLING IN SOFT SOIL

Date: 13/09/2016  
Location: Buenos-Aires, Argentina



The aim of this one-day training session was to give young engineers an introduction to issues surrounding mechanized tunnelling in soft soil, whilst providing up-to-date information and concrete examples through case studies. This session, which gathered more than 170 attendees, followed on from the annual AATES congress and took place at the Techint Training and Convention centre in Buenos Aires. The session was organized by AATES (Asociación Argentina de Túneles y Espacios Subterráneos) in collaboration with the ITACET Foundation.

Three expert ITA lecturers were invited to give presentations: Mrs Karin Böppler, Mr Piergiorgio Grasso and Mr Lars Babendererde. After the opening speech given by Messrs. Oscar Vardé and Martin Böfer, respectively Chairman and Secretary General of AATES (pictured left), the morning was devoted to the basic concepts of mechanized tunnelling. After an introduction to the main tunnelling methods and their respective fields of application, the session took a look at the main advantages and disadvantages of mechanized tunnelling, the necessary geotechnical investigations prior to choosing the choice of method, face support and ground improvement techniques, along with issues surrounding segmental lining and backfilling.

The afternoon was devoted to operation and logistic aspects of mechanized tunnelling. The different cutting tools and cutter head designs were briefly presented, followed by a presentation on TBM chamber access and compressed air work. Issues surrounding tunnel and site logistics and risk management and safety during the works were also dealt with.

Case studies presented to the participants notably focused on multi-mode TBMs, with a presentation given by Mr Terbovic (Robbins) on the use of earth pressure balance and crossover TBMs in difficult ground.

The session rounded off with a question and answer session, enabling lively interaction between the lecturers and the attendees.

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## MECHANIZED TUNNELLING: CHALLENGING CASE HISTORIES

Date: 01/12/2016  
Location: Rome, Italy



The Società Italiana Gallerie (Italian Tunnelling Society) and the ITACET Foundation organized a one-day training session in Rome on 1st December 2016. This short course, held at the Astaldi company headquarters, focused on challenging conditions experienced in mechanized tunneling. Through case studies from around the world (Turkey, Norway, Denmark, Italy, Hong Kong, Egypt .....), the 15 lecturers highlighted the most important and challenging aspects of the projects presented.

More than 150 participants attended the training session. 20 students from the University of Rome and 10 from the Politecnico di Torino were invited to take part in the event.

The training session was recognized by the Italian Board of Engineers as a training event in the national programme of continuous education for engineers.

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## HEALTH & SAFETY & LOGISTICS IN TUNNEL CONSTRUCTION

Date: 15/11/2016 to 16/11/2016  
Location: Santiago de Chile



More than 35 people participated in the two-day workshop on "Health, Safety and Logistics in Tunnel Construction" organized by the Chilean Tunnels and Underground Space Committee (CTES) and the ITACET Foundation on the 15th and 16th November 2016. This workshop was held at the premises of the "Mutual de Seguridad" in Santiago de Chile. The presentations will be made available at [www.ctes.cl](http://www.ctes.cl).

Among the highlights of this session were the lectures given by Dr. Donald Lamont, who has more than 40 years experience in health and safety issues in tunnel construction. Representatives of Codelco, Metro and Mutual de Seguridad also gave lectures.

"Once more, our Committee has provided

professionals with a high-quality technical workshop. We would like to thank the International Tunnelling Association for the continuous support from the ITACET Foundation, which has helped develop activities of this type" says Alexandre Gomes, President of CTES.

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## RISK MANAGEMENT IN TUNNELLING

Date: 13/11/2016 to 14/11/2016  
Location: Kuala Lumpur, Malaysia



The Tunnelling and Underground Space Technical Division of the Institution of Engineers (IEM), Malaysia, organized a two-day training session on the topic of Risk Management in Tunnelling on 13th-14th November 2016. This training session, supported by the ITACET Foundation, took place at the Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, Petaling Jaya, Selangor, Malaysia.

The aim of the training session was to provide the participants with an introduction to the risk management process throughout a project life cycle, from the planning, design, and construction of a tunnel or underground project, to its actual operation. The session was aimed at owners, decision-makers, consulting engineers, contractors and others with an

interest in risk management activities. The training session was opened by ITA President, Mr Tarciscio Celestino, pictured left receiving a token of appreciation from Dr Ooi Teik Aun, the organizing chairman. Lectures kicked off with a general overview of risk management from former ITA President, Mr Soren Eskesen. Lecturers Davorin Kolic (President of ITA Croatia) and Harald Wagner (TUGS and former ITA Vice President) then went on to present the various tools used to identify and manage risks.

The second day started with a look at the risks from various stakeholders' perspectives with lectures on client and contractors' risks provided by Davorin Kolic and Glus Klados (MMC Gamuda). A round table discussion with the lecturers followed and took a look at the border lines between parties. The second day also focussed on procurement and contractual aspects with lectures and case studies presented by Messrs. Seng Tiok Poh (Mass Rapid Transit Corporation) and Dr Ooi Lean Hock (MMC Gamuda).

There were active discussions from the floor and the trainees were awarded a certificate at the end of the event which was a great success.

A visit was also made to the MMC-Gamuda Tunnelling Academy the following morning.

The organizing chairman, Dr Ooi Teik Aun, Hon FIEM, CEng, FICE, FMIArb, FMSA, ACPE, Peng, thanked the ITA-CET Foundation and the lecturers: "The presence of esteemed overseas and Malaysian experts who shared their invaluable global and local experiences, insights and comments has added to the enrichment of IEM members and others in the engineering fraternity. Thanks are due to the ITA President, Prof T. Celestino, Immediate Past ITA President Mr. S. Eskesen, Dr. H. Wagner, Dr. D. Kolic, Mr. G. Klados, Er. Seng Tiok Poh and Ir. Dr. Lean Hock Ooi for dedicating their time to give the lectures.

As a professional institution dedicated to promoting science and the profession of engineering and to facilitating the exchange of information and ideas, IEM is indeed proud to be associated with the ITACET Foundation and hopes that more courses can be organized in the future in Malaysia".

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## Forthcoming sessions

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WTC 2017 and ITACET have the pleasure of inviting you to the ITACET training course that has become a traditional part of the annual World Tunnel Congress. The 2017 WTC training course will focus on "Excavation and Support in Soft Ground Conditions" and will take place on the Friday and Saturday before the WTC, on the 9th-10th June.

The prime goal is to attract young professionals and students, with an interesting and useful programme and world class speakers. The issues discussed will be of interest to professionals internationally.

### **A WORLDWIDE DEVELOPMENT IN SOFT GROUND TUNNELLING**

Tunnelling in Norway is dominated by typical hard rock conditions and unlined tunnels supported with sprayed concrete and rock bolts as the prime rock support methods. Despite this, hard rock tunnelling sometimes encounters soft ground conditions in weak zones which can be tens of meters wide, requiring support methods as though the tunnel were fully excavated in soft ground.

There has been an incredible worldwide development in soft ground tunnelling and it is not a bold claim that the majority of ongoing tunnels worldwide is excavated in such circumstances.

### **THE EASY TUNNELS ARE ALREADY BUILT – LEAVING THE CHALLENGING AND INTERESTING ONES TO YOU!**

There is a global trend towards increasingly longer tunnels and underground projects are becoming more complex, often with a combination of hard rock and softer ground. This is both due to the higher requirements and expectations from society, the removal of technology limits and the fact that the geology is what it is when the tunnel alignment or cavern location has been decided. This is also seen in the Scandinavian tunnelling industry, with some projects with extremely challenging geology coming up in the next years, including the world's deepest subsea tunnel and new urban infrastructure projects in mixed ground conditions.

Traditionally, there are two schools of tunnelling, where one is associated with hard rock tunnelling and the other with tunnelling in soft rock/soil conditions. However, hard rock tunnelling does not always involve hard rock and good rock conditions. Certain sections can be disrupted by much softer ground conditions which are the extreme opposite to that of rock. Such varying conditions and extreme situations could benefit from experience gained from the school of soft ground tunnelling. Consequently, tunnel engineers require knowledge of a variety of ground conditions that could occur during tunnelling works, including excavation and support in soft ground conditions.

### **TOP INTERNATIONAL SPEAKERS!**

This course will bridge the gap between the schools of hard rock tunnelling (which prevails in Norway and Scandinavia and many places around the world) and soft ground tunnelling, by taking experience from soft ground conditions and applying it to the extreme needs that appear in hard rock tunnelling from time to time.

To keep the lectures on a top international level, ITACET has invited speakers from major internationally recognized universities within the tunnelling industry.

### **THEY WILL SHARE THEIR EXPERIENCE WITH YOU!**

These international speakers have been invited to share their experience with you. Together with some of the most respected experts within their field, representing owners, suppliers and contractors, they will all be at your disposal for questions and discussions, an opportunity not to be missed!

The training course is also an ideal chance to network and meet other young tunnellers in a friendly, professional and collegial setting.

The price of this two-day course is 4500 NOK

[Please register at www.WTC2017.com](http://www.WTC2017.com)

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## Other events in preparation

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**Risk Management in Tunnelling** - Chile - date not yet fixed

**Sustainable Underground Solutions for Transport** - 29th-31st October 2017, Dubai, UAE (within the scope of the 5th IRF Middle East Regional Congress and Exhibition)

**Rock bolting and shotcreting** - 2nd -3rd November 2017, Melbourne, Australia (within the scope of the ATS Congress 2017)

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## News from Foundation scholarship students

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### Senthilnath Govindaraju Thangavelu receives prestigious award



Former ITACET Foundation scholarship beneficiary, Senthilnath Govindaraju Thangavelu, was recently named "Young Tunneller of the Year" at the NCE Tunnelling Awards 2016, which took place on the 8th December 2016 in London, UK.

Senthilnath received a scholarship from the ITACET Foundation in 2013 in order to follow the post-graduate specialized Master's in Tunnels and Tunnel Boring Machines at the Politecnico di Torino in Italy where he completed his thesis on the topic "Face stability of Closed TBMs in Urban Tunnels". Read his testimonial [here](#).

He is currently working as a senior tunnel engineer with Geoconsult in Singapore. He was also a finalist for the ITA Awards 2016, once again under the category "Young Tunneller of the Year".

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### Rodrigo Winderholler graduates from the Politecnico di Torino



*Rodrigo Winderholler with the course director, Daniele Peila*

Foundation scholarship student Rodrigo Winderholler successfully graduated from the Politecnico di Torino, Italy in December 2016. Rodrigo received his Master's degree after successfully completing the 10th edition of the ITA-endorsed "Specialized Master in Tunnelling and Tunnel Boring Machines". Claude Berenguer, Executive Director of the ITACET Foundation sat on the panel of examiners who listened to Rodrigo defend his thesis on "Building information modelling applied to underground structure". The Foundation wishes him all the best for his future career.

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## The Foundation welcomes a new secretary and communications assistant

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The ITACET Foundation is pleased to welcome two new members to its team. Kate Havard began her post as Executive Secretary at the end of January. She will deal with organizational aspects of the training sessions organized by the Foundation and in this context will work in close relationship with the Foundation's Executive Director, ITA Member Nation representatives and the ITA-CET Committee Vice Chairman and secretariat. She will also be

responsible for organizing the meetings of the Foundation's Council.

Kristen Drouard is the Foundation's new communications assistant and is in charge of the freshly designed web site and newsletter.

She is also the administrative secretary of the ITA-CET Committee.

As mentioned in the President's address, both the ITACET Foundation secretariat and ITA-CET Committee secretariats are now housed at the CETU (Centre for Tunnel Studies) in Lyon, France. This new proximity will facilitate collaboration between the two entities on a daily basis, and increase overall efficiency.

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## The Foundation's Council meets in Paris

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### The Foundation's Council Met In Paris On 31st March



The members of the Foundation's Council met in Paris on 31st March in order to discuss organizational, financial and strategic issues related to the Foundations' activities.

The meeting kicked off with a presentation by the Executive Director on the new organization of the Foundation's secretariat and communication activities, which are now fully operational and both based in Lyon, France. Other organizational matters discussed included the relationship with ITA and the renewal of the Foundation's Executive Board members.

Amongst the financial issues examined were the latest promises of donations, without which the Foundation could not continue its actions. In addition, the draft budget for 2017 -2018 was presented by the Foundation's Executive Director and Treasurer and accepted by the Council.

Training sessions under preparation were discussed, with sessions in Malaysia, China, Norway (WTC2017), Dubai, Chile, Saudi Arabia and Australia planned before the end of the year.

The updating of the Foundation's action plan was a major item on the agenda and the proposed draft was examined in detail by the Council Members, along with a "direction of action".

The Foundation's activities in terms of communication were also examined and notably the new web site, which has had 443 visitors since the 1st January.

The Council will next meet at the end of October 2017 in Dubai, at the occasion of the 5th IRF Middle East Regional Congress & Exhibition.

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