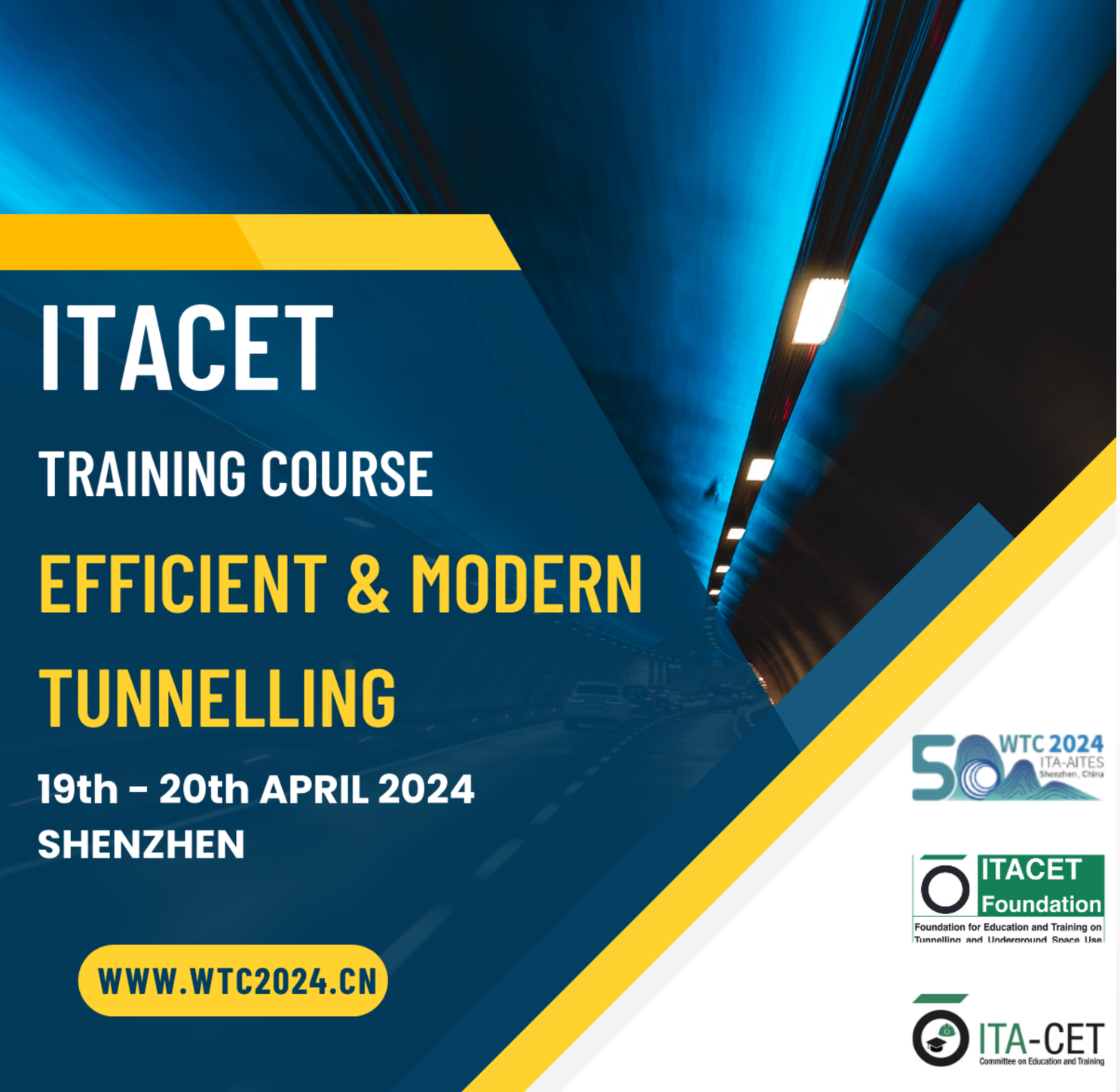

Don’t miss the ITACET training course at the WTC in Shenzhen!

Over the years, the ITACET training session has become a traditional and highly appreciated prelude to the official opening of the World Tunnel Congress. This year’s course will be held over two days on 19th – 20th April and will focus on ‘Efficient and modern tunnelling’.

The first day will be client-oriented and will be dedicated to project management and contractual practices and the second day will be technician-oriented and will focus on modern tunnelling methods and equipment.

This face-to-face course will be held at the World Exhibition & Convention Center in Shenzhen, next to Shenzhen Bao'an International Airport, Fuyong Port and directly linked to the metro lines and city rails.

This event is a great opportunity to benefit from the knowledge of some of the top names within the ITA community and to network with likeminded professionals.

To see the detailed programme and register for this event, please visit the WTC 2024 web site:

https://www.wtc2024.cn/technicalVisit.html

19th April 2024: Client-oriented day – Project management and contractual practices

09:00 – 09:45 Tunnel project management – actors and main principles

/Eric Leca, France/

This presentation will take a look at the design progressive steps, the responsabilities of the stakeholders, the choices to be made, the investigation programmes.

09:45 – 10:30: Managing risks and uncertainties

/Uni. Prof. Robert Galler, Montanuniversität Leoben, Austria/

Due to the variability of geotechnical conditions, the planning of underground structures differs significantly from that of other engineering structures, in which the static system, the loads and the characteristics of the materials used can be defined comparatively well. Due to the inherent uncertainties in the geotechnical model, the risks associated with underground construction can only be estimated. It is therefore necessary to continually adapt the structural and mechanical measures of the rock and/or soil conditions encountered and to implement a safety management system. Planning needs to be continually updated – even during construction – with greater precision as the level of information improves.

10:45 – 11:30 Health and safety requirements

/Michael Halwachs, PORR Bau GmbH, Austria/

This lecture will provide a comprehensive understanding of the health and safety requirements and how they can be properly handled during the design phase, the tendering phase and the construction.

11:30 – 12:15 Recent developments for carbon footprint reduction in the design and construction of tunnels

/Benoit de Rivaz, Bekaert Underground Solutions, France/

The aim of all those involved in the planning, design, construction, operation and renewal of tunnelling infrastructure should be to decarbonize it. This implies reducing the embodied and operational carbon produced. Carbon emissions throughout the entire life cycle of underground infrastructure should be considered. On tunnelling projects, 60-80% of the embodied CO2e emissions are in the concrete tunnel lining. Therefore, the easiest way to make the biggest positive impact is to reduce the CO2e emissions associated with these linings. This presentation will focus on this main challenge, showing some recent case studies based on design optimization, Portland cement and steel reduction.

14:00 – 14:45 Risk management adapted to underground works

/Elena Chiriotti, INCAS Partners, France/

The lecture will give an overview of the main principles, description of the global process and implementation in the contractual documents.

14:45 – 15:30 Risk allocation in underground works contracts

/Matthias Neuenschwander, Neuernschwander Consult Eng., Switzerland/

Since the very first tunnelling contracts we know of (e.g., the “Hole of Uri” 1707 A.D.), the allocation of ground risks has been a factor of success and failure of projects. Over the past decades, employers and financing institutes have been pushing for a fixed price with the shifting of all risks to the contractor. This clashed with the impossibility of calculating the unknown and often led to project disruption and bankruptcy of flourshing industries. This presentation will take a look at developments since the early 21st century towards more successful risk allocation in subsurface works contracts.

15:45 – 16:30 Contract conditions and management

/Yang Jinjun, China Railway Tunnel Group Co., Ltd (CRTG), China/

Contracts serve as the foundation of business relationships, outlining terms, responsibilities, and expectations between parties. This session, led by Mr. Yang Jinjun, offers a deep dive into: Mainstream contracts: including widely used frameworks like NEC and FIDIC and other relevant contracts, through real-world examples and case studies.
Contract drafting and negotiation: key points of drafting the contract and the strategies to negotiate based on the various contract and project conditions. Contract management: effective contract management, and practical recommendations for each phase of the contract management process. Additionally, it also highlights the real cases and practices for effectively managing claims.

16:30 – 17:15 Case studies and examples of the implementation of different contracts –Experience from the Grand Paris Express

/Alexis de Pommerol, Société du Grand Paris, France/

Société du Grand Paris is in charge of financing, designing, building, testing and commissioning the Grand Paris Express. It’s a new fully automated transit network of 200 kilometers. This network is 90% underground, includes four new lines and 68 new stations. The first phase of the project was designed by engineering companies and then built by contractors. For the second phase, Société du Grand Paris adapted its contractual scheme and chose design-build contracts. Efficient dialogue and updated risk allocation lead to a new generation of contracts, awarded 2023-2024, meeting performances, costs and planning expectations of all stakeholders.

17:15 - 18:00 Risk management on Singapore’s land transport projects

/Alvin Sim, Land Transport Authority, Singapore/

Singapore is a highly urbanised city with well-documented land constraints. One of the key strategies to sustain the nation’s land resource is in exploring use of its underground space – the decision for Singapore’s railway infrastructure to go underground was hence a national imperative. Implementing underground infrastructure in Singapore presents significant technical challenges, as developers strive to optimise land use while navigating the complexities of the island’s geology and the inherent safety risks associated with construction in densely built-up environments. Singapore’s Land Transport Authority (LTA) has a forty-year track record in designing and managing complex underground railway projects. Over the years, these projects have evolved in complexity, requiring multi-disciplinary, multi-agency considerations to deliver them safely, on schedule and within budget. This presentation delves into the risk management approaches adopted by LTA in the delivery of its megaprojects and provides insights into the strategies employed to navigate these complexities, mitigate risks and deliver world-class infrastructure for the nation.

20th April 2024 Technician-oriented day – Modern tunnelling methods and equipment

09:00 – 09:45 Conventional tunnelling process in soil and rock

/Nasri Munhaf, Gall Zeidler Consultants, LLC, United States/

Introduction to conventional tunnelling in rock and soils and recent advances. The lecture will cover conventional tunnelling principles and theory, typical configuration of the tunnel, the ground and ground support system classifications, structural analyses and design, available toolbox tolls and their use, available ground improvement methods related to conventional tunnelling, and the importance of instrumentation and monitoring during excavation. Case studies will be used to illustrate the principles and recent innovative solutions.

09:45 – 10:30 Innovations in drilling technology and equipment

/Pekka Nieminen & Toni Xia, Sandvik Group/

This presentation will take a look at improvements and upgrades to the new data jumbo, new rock drills, boom, control system, and the GeoSURE system based on AWD (Analyzed While Drilling) technology. It will also include new features of iSURE, corresponding applications for data analysis, pull out, over & under break control. Some specific case studies in China will be presented, such as the use of hidden coverage area for full section extraction in the Huangshan project, the parallel cutting application for rapid extraction in the Kangding adit project and the effective pull-out comparison in the Pingchang project.

10:45 – 11:30 Innovations in blasting technology and equipment

/Mark Ganster, Austin Powder GmbH, Austria/

The lecture will take a look at the adaptation of the blasting maps to the rock characteristics, new explosive products, new detonators, control of the ignition, optimizations and data collection and treatment.

11:30 – 12:15 Innovations in support technology and equipment

/Güenther Volkmann, DSI Underground Group, Austria/

Over the last 25 years, a variety of shallow, urban infrastructure tunnels have been built. These were often characterized by soft, subsidence-sensitive ground and were therefore supported by special measures. The result was the increased use of pipe umbrella systems, which over time became established as the most commonly used pre-support measure under these conditions. At the same time, a series of steps were implemented that have a decisive influence on the efficiency of this support system. These milestones will be presented and their influence on the construction process determined. The main focus will be on the subject area's safety, installation time, construction time, material reduction and CO2 footprint reduction. Areas of application of this system are not limited to pre-support in tunnels, however, because under difficult conditions the pipe umbrella system, which has already been installed successfully many times over the last decades, can be used both as an injection system for waterproofing or ground improvement measures, and as vertical micro pile.

14:00 – 14:45 Innovations in hard rock mechanized tunnelling

/Brad Grothen, Robbins TBM, United States/

There are many innovations in hard rock tunnelling, with non-circular mechanized boring being a topic of interest in the mining industry in particular. The actual performance of these machines compared to circular profiles has been limited to date, but with recent innovations the differences have been reduced and in the near future, performance may be considered the same. In this presentation, we will analyze performance aspects of non-circular boring machines and take a ook at the design of a specific rectangular boring machine developed for an underground mine in hard rock.

14:45 – 15:30 Innovations in mechanized tunnelling - non circular TBMs

/Zhang Zhiguo, China Railway Engineer Equipment Group Co., Ltd (CREG), China/

Given its advantages in space utilization efficiency, functional compatibility, etc., non-circular TBMs are widely adopted during the construction of tunnels with unconventional sections such as subway entrances and exits, urban underpasses, utility tunnels, underground parking lots, highways and railways. This presentation will first introduce the development background and classification of non-circular TBMs, and then elaborate on key technologies of rectangular TBMs, horseshoe-shaped TBMs, U-shaped TBMs and others based on typical projects and their performance. Finally, the development prospects of this type of TBMs will be looked into.

15:45 – 16:30 Innovations in mechanized tunnelling- large TBMs & variable ground conditions

/Karin Bäppler, Herrenknecht AG, Germany/

There is a growing trend towards ever larger diameters in mechanized tunnelling following the vision of multi-purpose underground infrastructures such as three-lane road corridors, combined transport solutions, road-metro routes with utilities such as sewage schemes. This requires dedicated TBM technology adapted to high groundwater pressures, mixed-face conditions, shallow overburden and large excavation volumes. The presentation highlights selected infrastructure projects that, in addition to large TBM diameters, deal with a complexity of variable geology, technical and logistical limitations in mechanized tunnelling to deliver efficient, effective and sustainable underground solutions in time.

16:30 – 16:55 Innovations in mechanized tunnelling - geology prediction technology during TBM driving

/Wang Xu, China Railway Academy Co., Ltd （CRA), China/

In order to ensure the efficient tunnelling of TBMs, the passive seismic signals generated during rock breaking during TBM tunnelling are used to detect unfavorable geological bodies such as fault fracture zones, weak interlayers, and karsts in front of the tunnel. This method does not require any additional excitation sources and is much more convenient than conventional prediction methods. Moreover, detection is carried out in real time, through automatic data processing and without TBM shutdown, preventing disruption of construction. At the same time, based on deep learning algorithms, automatic identification and interpretation of geophysical anomalies are achieved, with automatically generated prediction reports after detection. This method provides the basis for reinforcement measures and adjusting TBM tunnelling parameters, which can effectively ensure the safe excavation of tunnels.

16:55 - 17:20 Digitalisation for sustainability of underground infrastructures - carbon assessment and optimisation for TBM tunnelling

/Uni. Prof. Qianbing Zhang, Monash University, Australia/

Life Cycle Assessment (LCA) methodologies significantly impact the AEC industry, shifting focus towards cost and carbon management through the use of BIM and sustainability rating systems. This presentation will introduce a systematic framework by integrating BIM, carbon assessment standards, numerical modelling, and optimisation techniques to assess carbon emissions and establish benchmarks for construction products and processes. A prototype program is utilised to set baselines for segmental lining designs and identify carbon reduction strategies at both material- and asset-levels. Advanced numerical modelling helps to develop correlations between geotechnical conditions, tunnel dimensions, and TBM operations to quantify construction emissions.