



ITA-CET

Committee on
Education and
Training

Newsletter

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IN THIS ISSUE



The Committee Steering Board in Lyon, October 2018

Dear ITA friends,

As another year draws to an end, this issue of our newsletter takes a look at ITA-CET activities over the last twelve months and perspectives for the coming year.

2018 has confirmed the global reach of the Committee's actions, with a total of 7 training events held in Asia, South America, Europe, the Middle East and, for the first time, Africa. India has also shown interest in the Committee's activities, with the MIT World Peace University Pune having joined as a member.

In line with its action plan, the Committee has been collaborating with other ITA entities, either through the inclusion of new members on its Steering Board (see page 2) or through joint efforts to develop training session content (see article on page 3).

As well as developing the content of training events at the request of ITA member nation bodies, ITA-CET can also develop training material at the specific request of industry representatives. In April a training session on the Use of Fibre-reinforced Concrete in Precast Segments was organized at the request of Bekaert Maccaferri (see previous issue) and in June, a session on Long Tunnels at Great Depth was held at the request of the Lyon-Turin Tunnel promoter (see page 5).

Whilst typical ITA-CET training sessions tend to be aimed at students and white collar workers, the Committee obviously also backs initiatives to improve the training of blue collar workers. Our article on page 4 takes a look at the ITA endorsed EFNARC nozzleman scheme, which is due to be revised.

New training requirements are emerging in the industry and ITA-CET is aware of the need to develop corresponding training material in collaboration with the other Committees and WGs (page 6). Developing new forms of educational material, such as on-line lessons, is also a strategic goal. The Committee's WG4 has produced a first video lesson and others are planned over the next year (see page 7).

Let's not forget that the WTC 2019 is fast approaching and the Committee has been busy working with the organizers to develop the content of the two training sessions for which registration is now open! (see page 8)

Finally, it remains for us to thank all those involved in the Committee's activities in 2018. Let's hope that next year will be just as productive. A very happy new year to you all!

Rober Galler: Committee Chairman
Michel Deffayet: Vice Chairman

The Committee's Steering Board welcomes two young talents

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Lights, camera, action!

The first ITA-CET video lesson will shortly be available (page 7)

WTC 2019: registration for the ITA-CET courses is open!

Two ITA-CET courses will be on offer at next year's World Tunnel Congress (page 8)

FOR MORE INFORMATION

<http://www.ita-aites.org/en/wg-committees/committees/ita-cet>

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The Committee's Steering Board welcomes two young talents



The ITA-CET Steering Board met in Lyon on 23rd October (see cover photo) and was delighted to welcome two newcomers representing the ITA Young Members Group: Chrysothemis Paraskevopoulou and Nicolas Ziv. Here they share their thoughts on possible forms of collaboration between the two entities.

"ITA-CET's mission is to coordinate and promote education and training throughout the tunnelling and underground space association. Getting the younger generation involved is one way of bringing in fresh, innovative ideas, both for the development of educational tools and for communication on emerging topics within the tunnelling industry.

There is an increasingly strong demand for the use of new technologies and modelling tools in the industry, such as BIM, Machine Learning, Artificial Intelligence, Remote Sensing and Early Warning Systems. Widespread knowledge and good practices are required to develop these activities. The ITA Young



Dr. Chrysothemis Paraskevopoulou

Assistant professor (lecturer) at the University of Leeds (UK)

- Teaches BSc and MSc level courses in rock mechanics and tunnelling engineering.
- Runs a research laboratory, collaborates internationally with other universities and organisations and acts as a consultant at a national and international level.

Members (ITAYm) are considerably involved in these fields and keep on top of on-going changes and demands. They can be a great source of information for the ITA-CET, helping to provide insights into emerging issues and newly developed knowledge and could cooperate with ITA-CET for the development of training programmes on such topics.

The ITAYm are in contact with a large group of Young Members all over the world, enabling them to inform young professionals and students of the various training and education opportunities in the tunnelling industry, including ITA-CET training sessions and university courses. One of the primary goals of ITA-CET is to strengthen and expand the university network. Through its contacts around the globe, the Young Members can help the Committee to engage other universities and young researchers.

The ITAYm recently launched a newsletter which reaches out to young professionals. This newsletter could promote ITA-CET activities and help raise awareness of the educational and training programmes on offer. If you wish to subscribe, [click here](#).

In summary, we believe that our involvement in ITA-CET activities will help inform the younger generation, both professionals and students, about on-going ITA-CET activities (educational workshops and training courses), identify the gaps in scientific knowledge and raise more awareness of the importance of always being up-to-date with the latest technological advances and industry needs. If you want to stay on-top of the game, you have to commit to life-long training. This is what our main goal is."

Dr. Nicolas ZIV

Data Engineer at Bouygues Travaux Publics

- In charge of the development of machine learning algorithms to improve productivity of TBMs.
- Teaches MSc courses on the "application of systems engineering in the construction industry" at ESTP Paris (Ecole Spéciale des Travaux Publics)

Working together to strengthen education actions

by Kristen DROUARD - ITA-CET Administrative Secretary



More recently, ITA-CET also teamed up with ITACUS to develop the contents of the first ITA training session to be held in Kenya, which took place on 7th December 2018. This one-day event provided an introduction to the use of underground space to increase liveability and sustainability in urban areas and in other key public resource regions.

Topics examined included the advantages and disadvantages of underground solutions, how underground space can help cities meet current and future challenges, the main stages in the planning, design and construction of an underground project, human aspects and risks in underground space and regulatory and financial issues. Han Admiraal, the ITACUS chairman (pictured below), was one of the lecturers.

Similar collaborations between ITA-CET and ITACUS are planned in the forthcoming months, within the scope of a training session in Mexico on "Underground Solutions for Greener Cities" (date to be confirmed at the time of writing).



As part of its strategy to strengthen collaboration with other Committees of the International Tunnelling Association, earlier this year ITA-CET teamed up with ITA COSUF (Committee on Operational Safety of Underground Facilities) within the scope of a training session which took place in Argentina.

This one-day session focused on the "Management of User Safety in Underground Railway Facilities" and was held on 5th September 2018, within the scope of the 8th "Tunnelling and Underground Space Days" organised by the Argentinian Tunnelling Association (AATES).

The two Committees worked together to determine the contents of this training session, which examined topics such as basic safety principles for railway and metro tunnels, lessons learnt from past tunnel incidents, the role and main features of safety equipment, the main actors, roles and responsibilities in terms of safety, safety documentation, crisis preparation and maintenance requirements.

Roland Leucker, (pictured centre above), past chairman of ITA COSUF, lectured alongside Hugo Rocha (São Paulo Metro, Brazil) and Peter Reinke (HBI Haerter).

With numerous road and rail tunnel projects nearing completion around the world, there is an increasing need to train tunnel owners and operators on safety and maintenance issues and it is likely that the two Committees will collaborate on similar events in the future.



Industry training and the “EFNARC nozzleman scheme”

by Michael Kompatscher – Leader of ITA-CET WG2

Construction of tunnels and other underground structures requires highly skilled persons. There have been significant developments in equipment and materials over the last few years, which need trained and qualified persons for skilled handling and operation.

ITA-CET Activity Group 2 aims to collaborate with industry in order to:

- Providing training courses at the request of contractors or tunnel owners;
- Provide ITA endorsement of certification schemes for specific skills in the tunnelling industry;
- Coordinate and improve training courses offered by industry members.

Activity Group 2 collaborates with industry representatives, notably through the ITAtech Committee, which has a representative within the ITA-CET Committee Steering Board. This collaboration has led to the development of Deminars (training sessions which are a mixture of a live demonstration and a seminar), which provide participants with a more hands-on approach than traditional academic courses.

In the recent ITA-CET steering board meeting, the participation and engagement of industry in ITA-CET was discussed. ITA-CET invites all parties worldwide interested in the field of education and training for tunnelling and underground space use to become a member and participate in ITA-CET's activities. ITA-CET membership has to be confirmed by the Committee Steering Board, but does not bind applicants to membership in ITA. Of course, a membership in both is possible and welcome. The application form can be found on the [Committee's web pages](#).

Wide-ranging membership will undoubtedly help to improve the use of underground space.

The work of this Activity Group has also led to the ITA endorsement of the EFNARC nozzleman scheme. This scheme offers certification to experienced nozzlemen who can demonstrate their technical knowledge and practical skills. The scheme operates through national examiners and is progressing well with certified examiners and nozzlemen from across North America, South America, Europe, South Asia and Australasia.

The nozzleman project was undertaken by the EFNARC Sprayed Concrete Technical Committee, (which had already prepared the various ISO EN standards for sprayed concrete), and culminated in the launch of the EFNARC Nozzleman Certification Scheme in September 2009. Since then, over 100 examiners and more 350 nozzlemen have been certified and interest in the scheme continues to grow.

The EFNARC Nozzleman Certification Scheme is not a training course as such; it only offers certification to nozzlemen who have already gained the necessary experience and can demonstrate their technical knowledge and practical ability. The scheme has been developed in recognition that the construction industry requires a means of identifying expert nozzlemen.

EFNARC is currently revising the nozzleman scheme with the aim of further strengthening training and fostering the skilled operation of sprayed concrete technology. New tools like the Virtual Reality Simulator are being evaluated and integrated into the future education and assessment package. Specific training for non-experienced nozzlemen is also being addressed and is under preparation.



Mastering the complexities of long tunnels at great depth

By Emmanuel HUMBERT - TELT

The Lyon-Turin railway line, currently under construction, is a high-capacity railway line for freight and passengers which stretches over 270 km (70% in France and 30% in Italy). When finished, it will form the missing link in the corridor connecting southwestern Europe with Central and Eastern Europe.

The main element of the cross-border section is the 57.5km twin-tube Mont Cenis base tunnel which is the longest rail tunnel in the world. The complexity of the project lies in the fact that the tunnel crosses the Alps at a depth of between 1,000 and 2,200 m, going through very different geological zones, each requiring its own specific excavation methods.

The public promoter responsible for the completion of the 65-km long cross-border section of the Lyon-Turin line is TELT (Tunnel Euralpin Lyon-Turin), established in 2015 for the purpose of the project.

The complex nature of the project calls for specific competences in tunnelling at great depth and over long distances. Technical issues typically encountered in projects of this type are numerous. Preliminary geological and geotechnical investigations are complicated and tend to be limited by the great depth. Squeezing ground conditions are frequent, with problems due to rock burst and high ground water pressure.

In order to bring together international experts in this field and to exchange on the specific challenges of such a monumental project, TELT decided to hold a two-day training session entitled "Sharing Experience on the Construction of Long Tunnels at Great Depth". This event was organised in association with the ITA-CET Foundation (which took care of financial and organisational aspects) and the ITA-CET Committee, which collaborated with ITA Working Group 17 to develop the course content.

The hundred strong audience included engineers from TELT in addition to students studying the ITA-endorsed Master's in Tunnelling and Tunnel Boring Machines at the Politecnico di Torino in Italy. TELT started collaboration with this university at the end of 2017, the goal being to train a new generation of professionals with the know-how to tackle complex underground projects.

Technical, financial and contractual issues surrounding the construction of long and deep tunnels were discussed, highlighting specific concerns of tunnel owners during projects of this nature, such as communication, mediation, and relations with public authorities. Safety aspects on works sites were also examined.

Case studies included three of the seven base tunnels that are located along the Alpine arc, with a look at difficulties encountered, both in technical terms (swelling rock, stress release) and in terms of logistics (coordination of works sites, mucking, supply chains etc.). Lessons learnt in terms of risk management and cost contingencies were addressed.

In addition to examples from Europe, case studies from around the world were presented, such as high-speed railway tunnels in South Korea, whilst the chairman of ITA Working Group 17 reminded the audience that this group has established an international database on long and deep tunnels in order to share experience.

Two round tables on "How to manage disputes" and "Management of very large projects", were respectively chaired by the President of SIG (the Italian Tunnelling Society), and the President of AFTES (the French Tunnelling Association), providing an excellent opportunity for exchanges between the speakers and with the attendees.



The emergence of new training requirements

by Michel Deffayet – Vice chairman of ITA-CET



Although many requests for training from member nations concern awareness of the use of underground space or technical aspects of tunnel construction, as we reported in a previous newsletter, our portfolio has been extended to include new topics. Programmes concerning tunnel calculation methods and numerical modelling are thus available. This is also the case for a "sustainable tunnelling" programme devoted to advances in environmental preservation during underground works. This latter topic was dealt with in a training session in Buenos Aires in September 2017.

Today, training requests also concern more global approaches such as communication around major projects, how to facilitate the acceptability of these projects by the population, how to communicate well and when to do so. They also concern BIM, new technologies and the innovations they allow in our businesses and such requests are likely to increase. It is no coincidence that these two topics have been included in the training sessions that will precede the WTC in Naples in May 2019 (see page 8).

Further down the line is the issue of data processing and big data, which has been successfully implemented in several projects for the choice of technical solutions and risk management. The ITA Young members are notably pushing for development of training programmes on this topic (see page 2), which is likely to lead to major evolutions in the profession.

The committee wishes to cover the whole range of identified training requirements, from traditional practices to new developments, which implies the effective mobilisation of all relevant experts. We are pleased to see that this is still the case despite the many other commitments of the experts in our field. The "portfolio" of training programmes developed by the Committee, in relation with ITA Working Groups, currently covers 22 topics. These programmes can of course be adapted to meet the specific requirements of the member nation in question. More information on the content of these training programmes can be found on the [ITACET Foundation web site](#).

- Underground Space Use
- Principles of Tunnel Design
- Calculation Methods for Tunnel Design
- Numerical Simulation for Tunnel Design
- Software Applications in Tunnelling
- Site Investigations
- Conventional Tunnelling
- Mechanized Tunnelling
- Health and Safety During Construction
- Risk Management
- Management of (User) Safety in Underground Facilities
- Innovations in Tunnelling
- Monitoring and Control in Tunnelling
- Waterproofing
- Sprayed Concrete Use
- Planning, Construction and Operation of Utility Tunnels
- Principles of Tunnel Maintenance and Repair
- Maintenance and Operation of Road Tunnels
- Immersed Tunnels
- Sustainable Tunnelling
- Communication and Stakeholder Engagement
- Tunnelling 4.0



Lights, camera, action!

By Daniele PEILA – Leader of ITA-CET WG4

Since 2009, the ITA's Committee on Education and Training has acquired an impressive track record, having established the programmes for 73 training sessions for over 8,000 participants in 28 countries. Although these traditional face-to-face events undeniably favour interaction between participants and the speakers, they do have several disadvantages. Firstly, the number of participants is limited and depends on the size of the venue. Secondly, those wishing to attend often have to pay for travel costs as well as registration fees and may not necessarily be available on the chosen dates. Lastly, the lecturers themselves often have to travel considerable distances, which is costly and time-consuming.

Whilst webinars would solve the majority of the above-mentioned problems, they nevertheless require both the lecturers and the participants to be familiar with certain software and unless they are recorded and then put on-line, they do not solve the time zone issue.

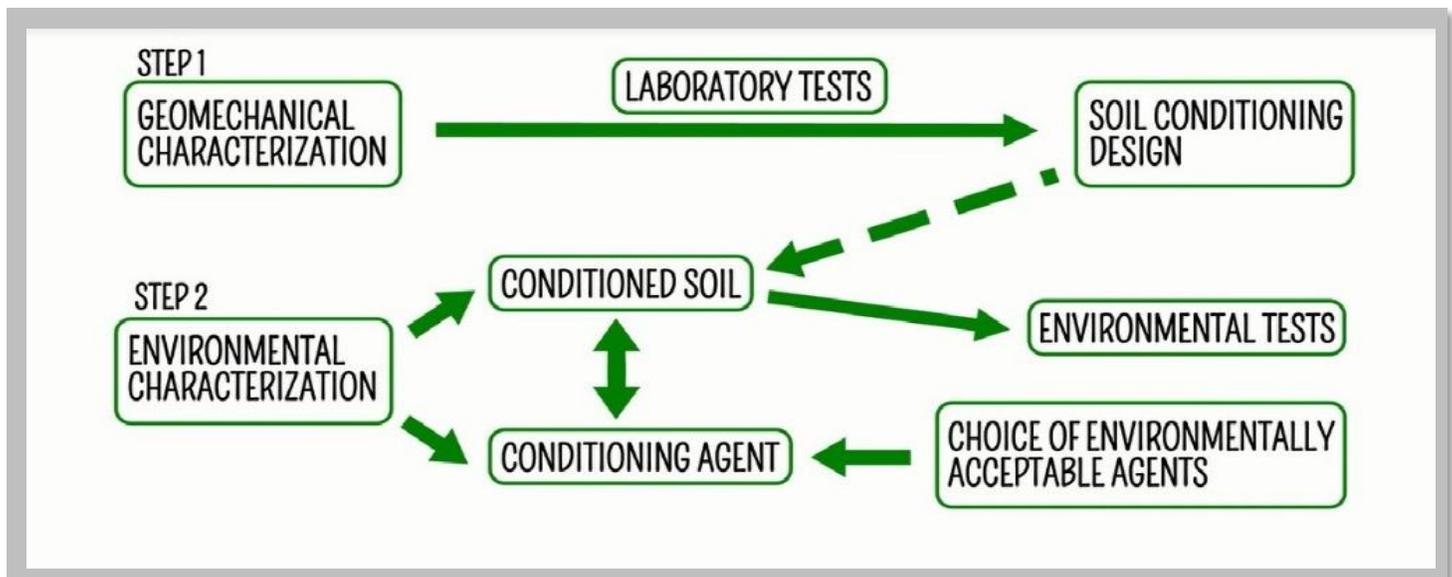
With this in mind, Working Group 4 of ITA-CET has begun working on a series of short video lessons. The aim is to enable the widest possible public to have access to short, simple presentations on a range of tunnelling topics, given by experts from the ITA.

The first "pilot" video has been produced in collaboration with the Politecnico di Torino. The topic of this short ten-minute film is "Soil conditioning for EPB tunnelling in cohesionless soil".



It gives an overview of the working mechanisms of an earth pressure balance tunnel boring machine, the main objectives of soil conditioning in EPB tunnelling, the parts of the TBM in which soil conditioning agents can be added, the most frequently used conditioning products, the required properties of foam, the use of soil conditioning agents according to the grain size distribution of the soil and laboratory tests for soil conditioning assessment. The film will shortly be made available on the [ITA's YouTube channel](#).

ITA-CET hopes to collaborate with ITA Working Groups over the next few months to produce other videos. Watch this space!



WTC 2019: registration for the ITA-CET short courses is open!

by Daniele PEILA – WTC Scientific Committee representative

As you are no doubt aware, the beautiful city of Naples will be the backdrop for the next World Tunnelling Congress, which will take place from 3rd-9th May 2019. Since 2010, the ITA's Committee for Education and Training has organised short courses within the scope of the WTC's, in collaboration with the host nation and the ITACET Foundation.

Although the courses are open to a wide public, they particularly target students and young tunnelling professionals eager to benefit from an opportunity to learn from some of the world's top tunnelling experts. The WTC 2019 will see two ITA-CET short courses on offer, which will address two very different issues. ITA-CET has been working in close collaboration with the conference organizers to establish the programme for these courses and choose the lecturers.

A two-day course entitled "Tunelling 4.0: Information Technology for the Design, Construction and Maintenance of Underground Works" will take place on 3rd-4th May 2019. The aim of this course is to highlight some of the most advanced aspects of digital and information technology applications in the design, construction, maintenance and refurbishment of underground works.

The second course on offer will take place on 4th May 2019 and will address the issue of "Communication and Stakeholder Engagement during Tunnel, Design, Construction and Operation."

There is growing awareness of the need for efficient communication with the populations and the stakeholders involved in the increasing number of underground projects all over the world. Engaging in dialogue is necessary at all stages of ideation, financing, design, construction and operation. In addition, the considerable rise in sustainability policies and procedures over recent years mean that communication strategies need to be adapted accordingly, whilst making the most of new media.

This course will provide advanced information on communication techniques and approaches that can be applied to foster interaction amongst stakeholders, through the use of new media. It will explain sustainability assessment procedures with a special focus on underground works. Finally, relevant cases histories and examples of best practices will be presented from all over the world.

The use of BIM in tunnelling will be presented and discussed, providing attendees with relevant examples from the design to the "as built" model implemented during construction, in addition to the use of BIM during maintenance and refurbishment of underground infrastructure.

The second key topic of the course is the use of automation and virtual and augmented reality as tools to improve the tunnel construction process. Advanced technologies available for geotechnical mapping and exploration, surveying and monitoring will be discussed, together with automation applied to equipment used in underground construction and to quality control and assessment processes.

The course is designed to inform designers, site managers, young engineers and university students how the most recent innovations in information technology can be applied to tunnelling and be used to improve design, construction and maintenance processes.

Registration for both ITA-CET courses is now open. Please visit <http://www.wtc2019.com/conference/itacet-training-course>

