



## ITA-CET

### Committee on Education and Training

# Newsletter

## Issue 8

## June 2018

### IN THIS ISSUE



Dear ITA friends,

It is always a pleasure to catch up with tunnelling colleagues from around the globe at the occasion of the World Tunnel Congress and this year's event at the World Trade Centre in Dubai in April was no exception. In addition to the formal meetings of the congress, the social events provided an enjoyable and relaxed setting for more informal discussions with ITA Member Nation representatives, Working Group animateurs, Committee chairs and ITA Executive Council members.

The ITA-CET Committee was involved in the congress right from its kick-off, having chosen the lecturers for the traditional WTC training course, which took place on 21<sup>st</sup> and 22<sup>nd</sup> April, prior to the official opening. This event was organized by the ITACET Foundation and the Society of Engineers UAE in relation with the ITA. The theme of this year's course was "The Main Opportunities and Technical Issues in Tunnelling" and it was inspiring to see so many dedicated and renowned lecturers eager to share their knowledge with the 35 participants who were just as eager to draw on their expertise (see page 2).

The Committee's meeting on 23<sup>rd</sup> April (see page 4) confirmed the strong will of ITA Member Nations to continue to develop and promote training actions, with a turnout of 22 attendees, from 14 different countries, comprising both official Committee

members and members of the Committee's regional correspondent network. This network has continued to grow with a new correspondent from Nigeria, Abidemi Agwor, (Tunnelling Association of Nigeria) who recently initiated training actions in relation with ITA-CET (see our article on page 6).

During the Committee meeting, the regional correspondents from Mexico issued a formal request for official ITA endorsement of the Master's in Tunnelling and Underground Works which runs at UNAM. Having closely examined the information regarding the course, the Committee approved this request, which means that there are currently five Master courses in tunnelling which have such endorsement (see page 5).

The Committee meeting was also the chance to present reflections on how to strengthen the ITA-CET university network, which currently comprises 27 official members. A LinkedIn group was recently set up to provide an exchange platform for these members, who can post information on teaching methods, invite other members to act as a guest lecturer, promote specific initiatives conducted by their university, advertise professor vacancies or organize student exchanges, etc. It is hoped that this initiative will strengthen collaboration between universities, notably through the exchange of guest lecturers.

The Committee's presentation at the WTC General Assembly was the chance to promote the work conducted over the last year and in particular the 8 training sessions organized around the globe, which have enabled over 800 trainees to benefit from the expertise of ITA lecturers. We have no doubt that the next year will be just as busy, with several other training sessions already in the pipeline for the coming months. Many thanks to all those involved.

**Rober Galler: Committee Chairman**  
**Michel Deffayet: Vice Chairman**

### A wealth of expertise at the World Tunnel Congress short course

Lecturers from around the globe shared their knowledge and experience with an attentive audience (page 2)

### An encouraging turnout at the Committee meeting in Dubai

The Committee members and regional correspondents met on 23<sup>rd</sup> April during the WTC (page 3)

### Mexico receives ITA endorsement of the Master's course at UNAM

We take a closer look at what this course has to offer (page 5)

### Educating the tunnelling and underground space industry in Nigeria

The chairman of the Nigerian Tunnelling Association explains how collaboration with ITA-CET can help develop underground space use in Nigeria (page 6)

### A busy schedule ahead!

We take a look at the training sessions planned around the world over the next few months (page 8)

### FOR MORE INFORMATION

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

[ita-cet.secretariat@developpement-durable.gouv.fr](mailto:ita-cet.secretariat@developpement-durable.gouv.fr)

# A wealth of expertise at the WTC short course

by Robert Galler, Michel Deffayet and Claude Berenguier  
ITA-CET Committee Chairman, Vice Chairman and Secretary General

The ITACET short course organized within the scope of the World Tunnel Congress has become a tradition over the years and 2018 saw the ninth edition take place in Dubai on 21st and 22nd April 2018.

The aim of these WTC courses, organized by the ITACET Foundation in relation with the host Member Nation, is to provide students and young professionals (but also more experienced engineers) with the chance to benefit from the experience and knowledge of renowned international experts.

The ITA's Committee on Education and Training is heavily involved in the preparation of these courses, as it is responsible for establishing the programme with the host Member Nation and choosing suitable lecturers, according to the topic in question. The choice of subject matter is adapted to the context and specific issues of the country. Last year's course in Bergen for example, focused on "Excavation and Support in Soft Ground Conditions", as hard rock tunnelling projects in Norway regularly experience soft ground in weak zones between the surrounding areas of hard rock.

This year's course focused on "The Main Opportunities and Technical Issues in Tunnelling", with the development of sustainable dense urban areas in mind. Sustainability has become a key issue in urban development throughout the world and the use of the underground can not only limit environmental impacts on the surface, but also foster economic growth and meet increasing societal needs. Dubai, which hosted this year's course, is a perfect example of a rapidly expanding and densely populated city, faced with daily road congestion and frequent air pollution.

The city is striving to develop its underground network, not only to develop more efficient and environmentally friendly transportation means, but also to provide resilience to the sudden and extreme rainfall that it can experience, the consequences of which can be disastrous due to the high levels of groundwater. The future Dubai Deep Tunnel Storm Water System and the 15km extension of the metro system, (with 4km underground) are designed to protect the population from extreme climatic events and help to ease urban traffic congestion.

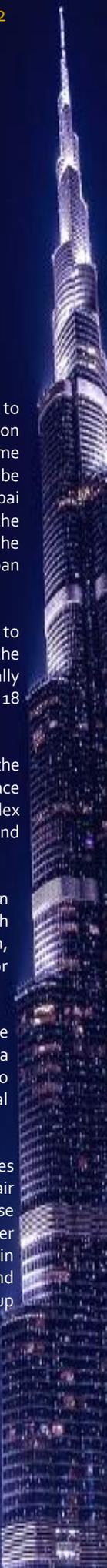
The 2018 WTC short course was designed to be accessible to participants from the gulf region who are relatively new to the tunnelling world, although the majority of the attendees actually came from neighbouring regions or further afield. In total 18 different nationalities attended the course.

The first day was dedicated to a general introduction to the advantages and main features of tunnelling and underground space use, whilst the second day provided information on more complex technical issues of particular interest in an urban environment and within a sustainable approach.

Fourteen renowned experts from around the globe were chosen by ITA-CET to lecture during the event, all of whom have high profile roles within the International Tunnelling Association, either as Executive Council members, Committee chairpersons or Working Group animateurs.

Topics addressed on the first day began with a look at the advantages and disadvantages of underground space use, with a convincing presentation given by ITA president, Prof. Tarcisio Celestino, looking at the financial, environmental and societal impacts of going underground.

Numerous examples of successful solutions and opportunities missed from around the world were presented by the ITACUS chair and vice chair, Prof. Han Admiraal and Antonia Cornaro. Case studies ranged from underground educational facilities to water collection basins, with a look at the reasons for success or failure in each case. This lecture was followed by a focus on underground sustainable solutions presented by the chair of ITA Working Group 20, Wout Broere.





Participants from 18 different countries attended the course

A variety of stakeholders were present amongst the 35 participants of the course, who were able to benefit from a presentation on the responsibilities of each type, given by Matthias Neuenschwander, Animateur of ITA Working Group 3. Questions such as "Who are the key stakeholders in underground works?", "What organization is required for a smooth-running project and successful delivery?" and "How should responsibilities be defined and assigned?" were addressed.

Key planning and design issues were presented by the ITA Executive Council Member, Felix Amberg, whilst Prof. Arnold Dix, also an Executive Council member, gave a thought-provoking and entertaining presentation of the legal and compensation issues surrounding underground projects, encouraging interaction with the attendees.

The environmental impacts of tunnel construction in urban areas were presented by Jan Rohde, the Animateur of ITA Working Group 15, whilst Dr. Donald Lamont, Animateur of ITA Working Group 5, stressed the importance of taking into consideration health and safety aspects in underground works.

The second day of the course looked at more complex issues and at the request of the host nation, dealt with several specific topics. Michel Deffayet, ITA-CET Vice Chairman kicked off with a look at the preliminary ground investigations and main parameters to be taken into consideration in an underground project. Prof Robert Galler, ITA-CET chairman then gave the attendees a rundown of the different construction methods and their different fields of application.

Launching a TBM in shallow tunnels can be a particularly tricky procedure and is highly dependent upon the project conditions and the contractor's experience and skills. Interesting case studies from Japan and new Zealand were presented by Kazuhiko Imakura, who explained the URUP (Ultra Rapid Under Pass) method, which is a unique method that eliminates shafts by launching and retrieving TBMs at ground level.

Waterproofing issues were addressed by Prof. Daniele Peila, with a look at risk analysis procedures, current practices, key innovations and relevant case studies, followed by a look at the effectiveness of rockbolting, by Günther Volkmann, which is determined



Tarcisio Celestino, ITA President, (left) Eng. Mohammed Mashroom, President of the Society of Engineers UAE, (right)

not only by ground conditions, but also by influencing factors such as the expected failure mechanism or the duration of use.

The general principles of utility tunnels for water, energy and communications were addressed by Han Admiraal and Antonia Cornaro. Felix Amberg and Prof. Robert Galler then added highly specific and innovative examples which are being developed for adiabatic compressed air energy storage.

The course rounded off with two case studies. The first was focused on underground planning and project management in Singapore and was presented by Dr Jeyatharan Kumarasamy from the Singapore Land Transport Authority. The second focused on operation and asset management of underground space and was presented by former ITA COSUF Chairman Roland Leucker.

Despite the small number of attendees (35), the feedback from the course has been highly positive. ITA-CET would like to sincerely thank the lecturers all those involved in the course organization. The Committee is already working with the WTC 2019 organizers to prepare next year's courses in Italy and is looking at how to increase the number of course participants, so that many more young professionals may benefit from such a wealth of expertise.

# An encouraging turnout at the Committee meeting in Dubai

By Kristen Drouard (ITA-CET Administrative Secretary)



The 23<sup>rd</sup> April saw the Committee host its annual meeting during the WTC in Dubai. As was the case last year, in addition to inviting official members, the invitation was also extended to the Committee's numerous regional correspondents around the globe. These correspondents, whilst not official Committee members, have established strong relations with ITA-CET through collaboration on the organization of training events.

The meeting provided a chance to look at the past year's achievements, discuss future goals and raise issues of concern/interest to specific members. In total the meeting gathered 22 participants, comprising Committee members and regional correspondents from 14 different countries. This encouraging turnout is an indicator of the willingness of ITA Member Nations to continue to work on training and education actions.

The meeting kicked off with a look at the current Committee membership, which has remained stable over the last year, with 47 official members, from both academic and industry backgrounds.

The Committee action plan was then briefly presented to the attendees by Chairman Robert Galler, with specific actions discussed in detail during a presentation of the ongoing work of the four Activity Groups.

The Committee's Vice Chairman, Michel Deffayet, provided a reminder of the 8 training sessions held since the previous Committee meeting, in 7 different countries (Argentina, Chile, UAE, China, France, Nigeria and Bhutan). These events have enabled over 800 young professionals to benefit from the expertise of carefully selected international lecturers. With the valuable help of these lecturers, ITA-CET intends to

establish a bibliography of reference documents, providing young professionals with suggested useful reading material.

The Vice Chairman went on to explain that the Committee hopes to develop training actions with ITA members from Africa and India. A training session on Underground Space Use held in Nigeria in March within the scope of the TAN Conference 2018 has paved the way for further collaboration with the country's tunnelling association, as Abidemi Agwor explains in the article on page 6 of this newsletter. During the WTC training session in Dubai, participants from Kenya also expressed interest in developing training actions.

Committee actions regarding training and education in industry were presented by Michael Kompatscher (Activity Group 2), who spoke of the difficulties encountered in mobilizing interest from major companies, who for the most part already have their own training centres for blue collar workers. With regard to training for white collar workers, a recent course on the use of fibre-reinforced concrete organized by ITA-CET at the request of Bekaert Maccaferri, shows that there is a demand for training on highly technical and specific topics, as long as such courses provide a good mix of non-biased presentations from both industry and ITA representatives.

Georg Anagnostou (Activity Group 3) presented the private LinkedIn Group recently set up for members of the Committee's University Network. University members present at the Committee meeting who had not already joined this group were invited to do so and to post information that may be of interest to others (teaching methods, requests for guest lecturers, specific initiatives conducted by a university, advertisement of professor vacancies, student exchanges etc).

Other Committee activities related to the University network include the examination of requests for the ITA endorsement of Master courses in tunnelling and underground space use. During this Committee meeting in Dubai, representatives from AMITOS (the tunnelling association of Mexico) issued a formal request for official ITA endorsement of the Master's which runs at UNAM (Autonomous National University of Mexico). Having closely examined the information regarding this course, the Committee approved this request. Details on this course can be found in our article overleaf.

After discussions on various other topics (next year's training course at the WTC, how to become an ITA-CET lecturer, use of social media by the Committee, the meeting rounded off with a group photo (see above). Sincere thanks to all our ITA colleagues who attended.

# ITA endorsement of the Master's course at UNAM

By Kristen Drouard (ITA-CET Administrative Secretary)

The spread of urbanization is a global phenomenon and Mexico is no exception. Over the past decades, the rise in population and the decrease in available surface space in the country, have naturally led to a boom in the field of tunnelling and underground works, with major metro and sewerage tunnel projects calling for specialized expertise.

Sensing the need to make up for the lack of qualified engineers for such works, in 2014 the National Autonomous University of Mexico, (UNAM), the Alliance for Training and Research in Infrastructure for Development in Mexico (FiiDEM Alliance) and the Mexican Association for Tunnel Engineering and Underground Works (AMITOS) set up a Master's degree in civil engineering, with a specific focus on tunnelling and underground works.

Eager to promote the Master's and to increase the number of tunnelling engineers, for which there is a strong demand, in 2017 AMITOS put forward a request for ITA endorsement of the course. ITA-CET is responsible for examining such requests and so began the lengthy process of analyzing the course content, the teaching and evaluation methodology and the lecturer profiles.

The course, which has a duration of two years, is designed around 13 modules, covering essential topics such as geology, rock and soil mechanics, numerical methods in underground works, excavation procedures, support systems, laboratory and field testing and

shotcrete use. These subjects are studied in the first two semesters. The third semester focuses on research activities and provides students with the chance to work on real projects through an internship, whilst a thesis is defended at the end of the fourth semester.

To be accepted on this high-level course, students must have already completed a civil engineering degree (9 semesters). So far, 13 students have graduated and the majority are now working on major underground projects in the country, with starting salaries that are double that of non-graduate Master engineers. The next edition of the course will start in August 2018.

Whilst the course is taught primarily in Spanish by local lecturers with both academic and industry backgrounds, the Master students are enrolled on ITA-CET courses organized in Mexico, which enables them to benefit from wider international expertise.

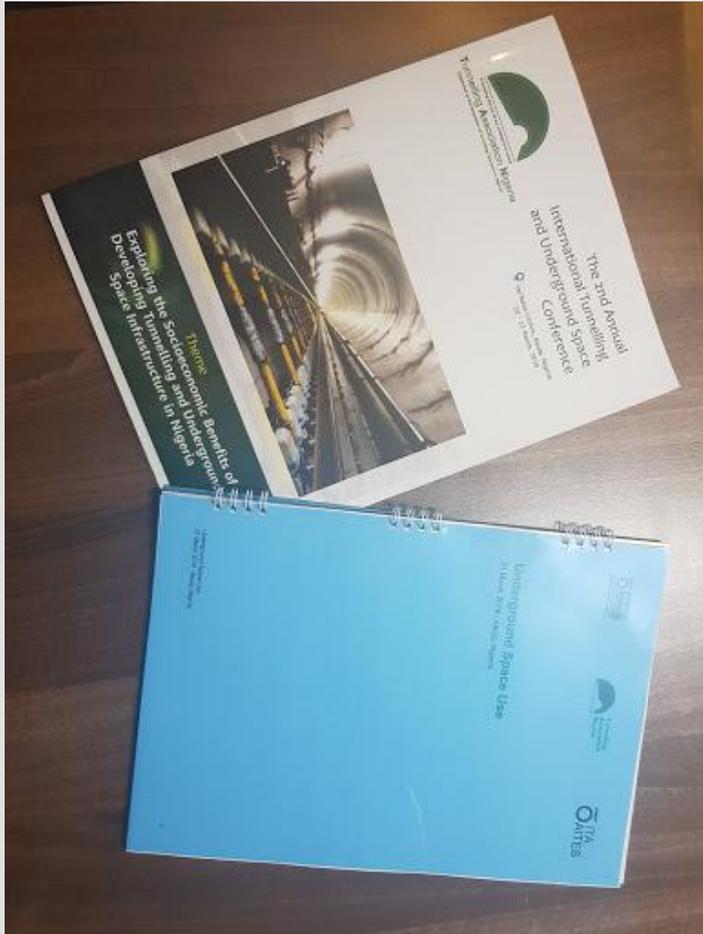
During the ITA-CET meeting in Dubai in April 2018, and after having closely examined all the relevant information, the decision was taken to grant ITA endorsement of the Master's. It is hoped that this endorsement will help encourage numerous young engineers to pursue a career in the underground works industry.



Students of the Master's at UNAM with Roberto Gonzales Izquierdo (President of AMITOS ) pictured top centre

# Educating the tunnelling and underground space industry in Nigeria

By Abidemi Agwor, President of the Tunnelling Association of Nigeria



When the Tunnelling Association Nigeria (TAN) was established in June 2016, it was obvious that a lot of work would be required to develop the know-how for tunnelling and underground space use in the country. This influenced the Association's 10-year strategic plan which is guided by 3 pillars: Awareness Creation, Education and Capacity Development.

There is a global shortage in tunnelling and underground expertise and the situation is even more critical in emerging countries like Nigeria. Most of the handful of Nigerian professionals who have relevant experience in tunnelling and underground infrastructure development reside outside of the country. Hence, the Tunnelling Association Nigeria set up a TAN Diaspora support network to work with these professionals and draw on their expertise. TAN's strategy for education is propagated in partnership with existing professional institutions, with the aim of engaging the public sector (Federal, State and Local Government), academia and the private sector.

In order to raise major stakeholders' awareness of the need to go underground, the Tunnelling Association Nigeria hosted its first ever Tunnelling and Underground Space Seminar in Abuja on the 21st of March 2018. The seminar was organized in collaboration with the ITACET Foundation as part of TAN's 2nd International Tunnelling and Underground Space Conference. The programme was developed by the ITA-CET Committee, which also chose distinguished ITA lecturers (Prof. Tarcisio Celestino, Dr Nikolai Bobylev and Mr Olivier Vion). Mr Chukwudi Ononogbo acted as moderator. The aim of the seminar was to explain the key issues that need to be considered when using underground space and how these issues are dealt with on a worldwide basis. The event was attended by 97 professionals from the Federal Ministry of Transport, the Ministry of Power, Works & Housing and the Ministry of Water Resources. The private sector was also present, as were Nigerian professionals from the diaspora. It was an engaging event, raising questions on the current challenges that are faced and how they affect underground space use.



Abidemi Agwor, President of TAN, during the seminar in Abuja



Representatives of ITA, TAN and the Nigerian Ministries pose in front of the Nigerian National Assembly

This full-day seminar on the theme of “Underground Space Use” included topics such as the benefits of going underground, missed opportunities, the roles and responsibilities of key stakeholders, the main stages in a tunnel project and sustainability and resiliency issues.

The highlight of the event was the remark from the Director of Rail Mass Transit - Federal Ministry of Transport - Dr Anthonia Ekpa, who emphasised the missed opportunities in Nigeria and the need to urgently promote the use and benefits of tunnelling and underground space use within the Nigerian Institute of Transport Technology curriculum. Whilst thanking the organizers of the seminar, she acknowledged their overall vision for the industry.

As stated earlier, the need for education is core to the achievement of our objectives as an organisation as well as our continuous work and partnership with the ITA-CET. The Tunnelling Association Nigeria hopes to hold such seminars at least twice every year in the next 2 years, with the plan of developing module-like packages that can be integrated into existing higher institutional curricula, whilst still holding executive seminars on request from institutions and organisations.

Through its university campaigns, the Tunnelling Association Nigeria is also encouraging and supporting students interested in studying tunnelling and underground space related programmes at Master’s and Doctoral levels. The need for e-learning is also increasing and could enable training sessions/seminars to occur even more frequently. The demand ahead is huge and to quote one of the TAN Diaspora (Mr Sodiq Adegbite) there is *“enormous work ahead for TAN with regards to educating the populace”*. However, we are confident that with Nigeria’s involvement with the ITA and notably the ITA-CET Committee and ITACET Foundation, the much-required support is at hand.



Speech from Dr Anthonia Ekpa, Federal Ministry of Transport

# A busy schedule ahead!

by Kristen Drouard (ITA-CET Administrative Secretary)

The Committee faces a busy schedule over the next few months, preparing the programmes and choosing the lecturers for several training sessions which are in the pipeline and will be organized by the ITACET Foundation.

“Long Tunnels at Great Depth” will be the topic of a training session to take place on June 20<sup>th</sup>-21<sup>st</sup> at the University of Savoie, Le Bourget du Lac, France. This event has been organized at the request TELT (the Lyon–Turin Euralpine Tunnel promoter), which is in charge of the completion of the 65 km long international section of the tunnel, from Saint-Jean-de-Maurienne in France to Susa/Bussoleno in Italy. The aim is to share experiences on the excavation of long tunnels at great depth, with examples from around the world. The session will take a look at the Mont Cenis Base Tunnel project, technical issues surrounding the construction of long and deep tunnels (with an example from Asia), financial and contractual issues and specific concerns of tunnel owners such as environmental impacts, health and safety and communication.

South America continues to remain highly active in education actions, with training sessions planned in Argentina, Chile and Colombia. The session in Argentina will take place on 5<sup>th</sup> September 2018 within the scope of the 8th “Tunneling and Underground Space Days”, organized by the Argentinian Association of Tunnels and Underground Space (AATES) and will focus on “The Management of (User) Safety in Underground Railway Facilities”. The programme for this session will be established in collaboration with ITA COSUF and will look at 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 for tunnels in operation, safety documentation, crisis preparation and maintenance requirements. The Sao Paulo metro network will serve as a case study. Last year’s session on



“Sustainability and Eco-friendly Tunnelling” organized within the same event, gathered 111 participants and it is hoped that this year’s session will be just as successful.

Two other training sessions are also planned in September in Chile (date not yet fixed) and Colombia on 17<sup>th</sup>-18<sup>th</sup> September (to be confirmed at the time of writing). Both will deal with “Mechanized Tunnelling” and topics covered will include the advantages and disadvantages this type of excavation, selection criteria for TBMs, microtunnelling and trenchless techniques, segmental lining, FRC tunnel segments, deep shafts, cutting tools, compressed air works, new variable density machines, risk and safety management and on-site logistics.

Preparations for the WTC 2019 in Naples, Italy, are already underway and two separate short courses will be offered. A two-day course on “Information Technology for the Design, Construction and Maintenance of Underground Works” will be held on 3<sup>rd</sup>-4<sup>th</sup> 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 use of BIM in tunnelling will notably be discussed, in addition to the use of automation and virtual and augmented reality as tools to improve the tunnel construction process and advanced technologies for geotechnical mapping, exploration and monitoring.

The second course will take place on 4<sup>th</sup> May 2019 and will focus on “Tunnel Design, Construction and Operation: Communication and Stakeholders Engagement”. 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. 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.

Various other sessions are still at the initial discussion stage and will hopefully take place in Mexico, Brazil, China, Nepal, Nigeria and Malaysia.

