ITA-CET

Committee on Education and Training

Newsletter

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Editorial

Dear ITA friends,

The WTC is always a much awaited event, as it provides the opportunity for both old and new members of the ITA-CET Committee to meet, discuss training requirements and opportunities in their area of the globe, draw on the experience and ideas of other members and establish possible future collaborations.

With this in mind, the Committee decided to extend the invitation to its annual meeting to the members of its key correspondent network. This network comprises representatives of institutions around the globe that have already been actively involved in the actions of the ITA-CET Committee and the ITACET Foundation. This initiative proved a success, as the Committee meeting in San Francisco gathered participants from 11 different countries.

The Committee is pleased to welcome two new organizations on-board: the University of Queensland, Australia and SELEM, a consultancy firm based in the UAE which provides training courses in construction engineering.

Requests for ITA training sessions have continued to flood in. Two courses were organized at this year's WTC in collaboration with ITACUS, the WTC organizing Committee and the ITACET Foundation. The topics were "Underground Space Use" and "Monitoring and Control in Tunnelling" (see article page 3).

Another 8 short courses are planned before the end of the year in Chile, Switzerland, Bhutan, Mexico, Nepal, Myanmar, Saudi Arabia and Poland. As ever, the topics covered vary enormously from "Health and Safety" to "Immersed Tunnels", "Soft Ground Tunnelling", "Risk Management", "Contractual practices" and Life-cycle Management". In all, 2016 will see the ITA-CET Committee and ITACET Foundation involved in the preparation of at least 14 short courses around the globe.

The WTC is also the chance for the ITA-CET Committee to fully exert the central role that its plays in terms of education and training within the ITA community. Meetings held with working groups enabled the Committee to stress that new innovative methods or tools in tunnelling can be promoted not only through ITA publications, but also through training courses. These courses can take either the form of traditional face-to-face academic courses, "Deminars" (which mix a seminar with real-life demonstrations), or video-conference courses. A first successful course broadcast by video-conference was organized by the Committee in February and enabled students in two universities (in France and Italy) to simultaneously benefit from a lecture within the scope of their post-graduate Master degree (see article page 4).

On the subject of Master degrees, the ITA-CET Committee has further broadened its outreach to universities and a number of possible collaborations between Masters were discussed, which is fully in-line with the Committee's strategy for international university networking.

As you can see, the Committee has remained very active over the last months, thanks to the commitment of its members and its key correspondent network. Many thanks to all!

Rober Galler ITA-CET Chairman

Michel Deffayet - ITA-CET Vice Chairman

FOR MORE INFORMATION

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

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The annual Committee meeting: a hub of ideas for education and training actions!

by Michel Deffayet

Photo courtesy Moscone Centre

The impressive Moscone Centre in the heart of the city of San Francisco was the venue of the annual ITA-CET Committee meeting which took place on 25th April during the 2016 WTC. This event is a chance for both new and old Committee members to meet face-to-face and exchange news and ideas on education and training actions.

In addition to official Committee members, this year the invitation to the meeting was extended to members of the Committee's "key correspondent" network, who act as regional contacts for training activities in their area of the globe. This invitation was warmly received, as correspondents from Thailand, Mexico, and Brazil attended the meeting, bringing the number of participant countries to 11.

For new members, the meeting was the chance to learn about the Committee's goals and activities which include implementing training for professionals and industry. In this aim, the ITA-CET Committee continues to collaborate with ITAtech by developing programmes for Deminars organized in collaboration with the ITACET Foundation. Further potential collaborations with industry need to be explored. One idea expressed during the meeting was the development of further ITA-endorsed certificates of professional competence, similar to the existing certificate for nozzlemen. This idea may be explored in the forthcoming months.

The Committee wishes to further strengthen its relationship with the ITA Working Groups. This could be achieved by promoting information on new methods, technologies, best practices, and recommendations produced within the scope of Working Group publications, by means of course or seminar programmes which could be developed by the Committee. This idea was raised during the meeting of the Working Groups and Committee animateurs on the 23rd April.

Lively, open discussions were held on the different forms of training and knowledge sharing that exist within the organizations of the Committee and key correspondent network. The Thailand Underground and Tunnelling Group (TUTG) for example, regularly invites foreign speakers to participate in short afternoon talks, referred to as "Tea Talks", on a wide-variety of topics. Other organizations said that they hold similar events or would be interested in doing so.

The Committee's university network continues to expand, with the University of Queensland having recently become a member. The annual meeting provides an excellent opportunity to nurture existing collaborations between Masters and develop new ones. Mexico (AMITOS) has expressed its interest in receiving future ITA endorsement for its Master course, which has been running at UNAM (Mexico Autonomous National University) for several years. Chile and Thailand are looking into setting up similar Master courses on tunnelling and could draw on the experience of existing Masters to do so.

The Politecnico di Torino in Italy informed meeting participants that it regularly holds an "ITA-CET week" during which ITA-CET lecturers are invited to give talks on various topics to Master students, within the scope of their specialized course on Tunnelling and Tunnel Boring Machines. This university also recently collaborated with the French Master in Lyon, enabling its students to attend a lecture broadcast by video-conference (see page 4 for more details).

On the subject of distance learning, discussions during the meeting concluded that live, "face-to-face" distance training methods (such as video-conferences) are preferable when possible, as they allow direct exchange with the lecturers and other participants. However, other forms of distance learning such as pre-recorded webcasts are not to be excluded and could be developed in the future.

The Committee's privileged relationship with the ITACET Foundation was discussed. For new Committee members, the meeting was a chance to understand how the two different bodies work together, with the ITA-CET Committee producing course programmes and carefully selecting lecturers and the ITACET Foundation taking care of financial and organizational aspects with clients. Collaboration between these two bodies has continued to strengthen over the years and has enabled 6 training sessions to be organized so far this year, two of which were held during the WTC in San Francisco. Another 8 courses are set to follow before the end of 2016.

During the meeting, the members also discussed how the Committee promotes its activities. At present, the main means of communication are through the Committee's web pages and through the Committee newsletter published twice a year, although articles may also appear in other publications, within and outside ITA. The Committee also presents its annual activity report during each ITA General Assembly. This is a good means of raising awareness of the Committee's activities to a larger ITA community and making new contacts with organizations interested in developing training and education actions.

We would like to take this chance to remind our readers that the Committee's newsletter is open to all those who would like to communicate on training issues in the field of tunnelling and underground space.

The ITA-CET Committee chairman presents the Committee's activity report during the ITA General Assembly at the WTC 2016. Photo courtesy ITACET Foundation

The WTC hosts its traditional two-day training courses

by Claude Berenguier

Training courses have long become a traditional part of ITA's yearly World Tunnel Congress. This year, participants had the choice between two courses held simultaneously over two days: "Underground Space Use" and "Monitoring and Control in Tunnelling".

The programme for the course on Underground Space Use was prepared by the ITA-CET Committee in collaboration with ITACUS (ITA Committee on Underground Space).

The aim of this course was to provide engineers, architects, urban planners and public authorities with an introduction to the use of underground space as a means of improving liveability and sustainability in urban areas and other key regions.

The course kicked off with a look at how the use of underground space has helped to enhance spatial quality in urban areas, and provided examples of missed opportunities.
A history of underground space use was provided, looking at the wide ranges of underground facilities worldwide. The potential advantages of underground space use were examined and assessed in comparison to other planning and construction alternatives.

A brief overview of construction methods was provided, giving non-specialists an insight into the various layouts and techniques and the implications of these choices in terms of usage, cost and environmental impact.

Controlling costs in underground space development is a major issue, and can often be achieved through carefully considered construction and layout choices. However, the course explained how in some cases a more costly option may prove to be more sustainable and beneficial in the long run.

The second day of this course looked at architectural, planning and sustainability issues for broad-scale underground use, with a focus on legal issues, resiliency and the notion of a connected underground urbanism, which is a relatively new concept.

Case studies of master planning for underground space use were also provided, followed by information on current underground space research and development activities. Open discussions closed this two-day course.

The second course offered at this year's WTC took a look at issues related to monitoring and control in tunnelling. This two-day course was aimed at tunnel owners, designers, construction engineers, supervisors and managers.

Due to the great variability in ground conditions, monitoring has an essential role to play in tunnelling and is the only effective means of enabling design and construction procedures to be adjusted and validated as excavation takes place.

The course began with a general presentation on the objectives behind tunnel monitoring (why, what and who) and looked at the different types of instruments used for data collection.

Monitoring methods for different tunnelling techniques were presented, followed by a look at data interpretation.

The course then moved on to examine contractual aspects and roles, explaining the responsibilities of the various stakeholders and how monitoring data can be used by contract management. The role of monitoring in risk management was also highlighted and examples of monitoring in different excavation conditions were presented by TBM manufacturers.

Discussions then ensued, enabling participants to put their questions to the numerous lecturers who came from varied backgrounds in both the public and private sector, many of them prominent members of ITA.

The ITACET Foundation and the WTC organizing committee were responsible for the organizational aspects of these successful courses which gathered more than 70 participants.

Photos courtesy of ITACET Foundation

24 lecturers

70 participants

Video conferences: the way forward for training events

Photos courtesy CETU

by Kristen Drouard

One of the ITA-CET Committee's goals is to develop distance learning. This will enable wider audiences to be targeted and will reduce financial costs for organizers, lecturers and course participants.

Modern distance learning methods encompass a range of technical tools such as video-conferencing, webinars or webcasts. After taking a look into the advantages and drawbacks of each of these tools, the ITA-CET Committee decided to opt for video conferencing as an initial means of providing distance learning to students in tunnelling.

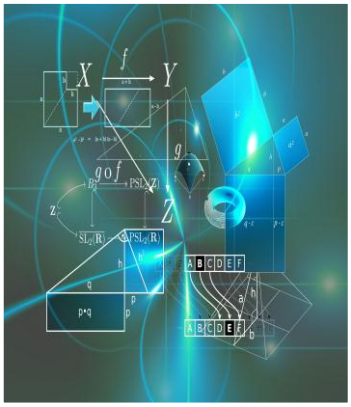
As a first step, on the 8th February 2016 a one-hour training session on the topic of resource-efficient tunnelling and the re-use of excavated materials was given to a group of students at the ENTPE in Lyon, within the scope of their post-graduate Master on Tunnels and Underground Works. .

Professor Robert Galler (Montanuniversität Leoben, Austria) gave a face-to-face lecture to the students in Lyon which was simultaneously broadcast by video-conference to a group of Master students at the Politecnico di Torino in Italy and to a small group of engineers at the CETU (Centre for Tunnel Studies) in Lyon. This enabled the technical capacity of the system to be fully tested and showed that a multi-site conference is possible.

The lecture was followed by a question and answer session in which all three sites were able to interact with the lecturer and with each other.

This event enabled contact to be established between the two European Masters (both of which are endorsed by ITA) and has paved the way for future scientific and educational collaborations between the two universities.

The feedback from this initial training session has been positive and has shown that video-conferencing can offer a practical means of providing short distance learning courses. The Committee therefore envisages organizing similar courses of this type in the future.



Three new ITA short course programmes

by Emmanuel Humbert

The ITA-CET Committee is pleased to announce that three new topics have been added to the portfolio of short training courses that can be organized on request by the ITACET Foundation:

- Calculation Methods for Tunnel Design
- Numerical Simulation for Tunnel Design
- Sustainable Tunnelling

The ITA-CET Committee developed the programmes for these three courses in collaboration with experts from ITA working groups.

The first two topics were previously only dealt with briefly in the course programme "Principles for Tunnel Design". There was therefore a need to provide tunnelling professionals with a deeper insight into current available methods, their respective advantages and drawbacks and the limits of their use in tunnel design.

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The objective of the course programme entitled "Calculation Methods for Tunnel Design" is to present the design methods commonly used to assess tunnel stability. Each method is illustrated by an example and the advantages and disadvantages when applied to a tunnel project are highlighted.

The programme covers not only design methods employed in the preliminary stages but also those employed in the detailed stages of studies. This two-day course requires no prior knowledge or specific skills in numerical simulation or calculation methods, but provides a sound introduction to these issues.

The specific issue of numerical simulation is dealt with on a more-in-depth level in the course programme entitled "Numerical Simulation for Tunnel Design". This two or three-day course provides a general overview of the different calculation methods, explaining the use, advantages and difficulties of numerical simulation followed by a more in-depth look at numerical models and associated parameters. Finally, examples of application are provided. The first two days of this short course are aimed at professionals in tunnelling with prior knowledge of geomechanics. An optional third day is available which provides technical details and practical advice when performing numerical simulation. This third day is aimed at engineers who conduct numerical simulation.

The issue of sustainability is becoming increasingly important within the tunnelling industry. The short course on "Sustainable Tunnelling" developed by the ITA-CET Committee aims to provide an introduction to the environmental impacts of tunnel construction and to ways of adopting a more environmentally friendly and sustainable approach to resource consumption.

The course outlines resource-efficiency issues and notably the handling of excavated materials. This two-day course also provides information on methodologies and tools that can be used to assess environmental impacts, especially Life Cycle Assessment.

With these three new programmes, the ITA short course portfolio now comprises 20 different topics.

Online information on academic courses in tunnelling

by Kristen Drouard

Activity Group 3 of the ITA-CET Committee has built up an academic network which currently comprises 28 members from universities and other higher education establishments in Europe, Asia, North America and South America.

The activity group sent a questionnaire to these members asking them for information on tunnelling-related courses provided by their organizations. The replies received have been published on the ITA-CET Committee's web pages.

Courses are classed by country and provide information such as the type of course (Bachelor, Master etc.), the number of teaching hours per week, the language that the course is taught in, the number of ECTS credit points and the course syllabus.

This list of courses will be progressively enriched as the university network is extended and new information is received.

If you are a university or higher education establishment providing courses in tunnelling and you would like information on your course to be published on the ITA-CET Committee web pages, please contact the Secretariat at the address provided on the cover page of this newsletter.

Focus on the French post graduate Master in Tunnelling and Underground Works

by K. Drouard, D. Branque and R. Kastner

Whilst the underground construction industry has seen numerous technical innovations over recent years, new challenges and methods have arisen in the areas of safety, sustainable development, project management and financing that call for high-level specialized training.

In this issue we take a closer look at the post-graduate Master in Tunnelling and Underground Works offered in Lyon, France.

Set up in 2011 at the initiative of AFTES (the French Association for Tunnels and Underground Space), the Master was designed in response to these new challenges and to the boom in underground works at a national and international level.

This one-year post graduate Master is run by INSA (National Institute of Applied Sciences) and the ENTPE (an engineering school under the supervision of the Ministry in charge of transport). These two renowned French higher education establishments designed the course in close collaboration with AFTES and CETU (Centre for Tunnel Studies).

The course aims to provide graduate civil engineers with solid skills in all technical aspects of underground construction, whilst providing sound knowledge of the entire design process, from project feasibility phases through to the construction phase.

In addition to delivering essential knowledge on ground behavior, the Master looks at risks in all project stages, as well as regulatory and contractual aspects and constraints from an environmental, sustainable development, operational and maintenance point of view.

The Master is open to graduates with 5 years in higher education and to company executives with four years' higher education and three years' professional experience.

Most classes are given in French. However, given the international nature of the underground construction industry, some lectures are given in English. Students therefore need a good level in both languages. Over 90% of teaching and tutoring is conducted by French and foreign experts from the tunnelling profession.

The course runs from October to September and consists of six modules, a project module and 5 months work placement.

Course modules	Classes	Lectures	ECTS
Basics	72 hrs.		6
General project approach	52 hrs.	8 hrs	6
Construction techniques	66 hrs.	20 hrs	7
Design	66 hrs.		6.5
Equipment and safety during tunnel operation	30 hrs.	4 hrs	3
Tunnel asset management	23 hrs	4 hrs	2.5
Project	150 tutored hours		14
Visits (work sites, factories)	About 60		
Work placement	5 months		30

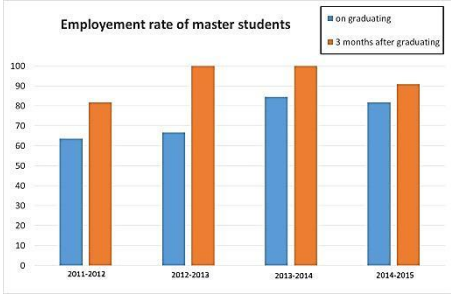
Since 2011, over 96% of students have benefited from financial support covering part or all of their tuition fees. Scholarships may be granted to both French and foreign students and job seekers, subject to a commission review of their application. The ITACET Foundation may notably award scholarships to students from emerging countries.

From 2011-2015, 47 students successfully graduated out of the 50 who enrolled on the course. Over 40% of these students came from outside the European Union, highlighting the international reach of the course. The 2015-2016 class comprises 9 students from France, Spain, the Lebanon and Algeria.

The Master opens up numerous career opportunities:

- Project management engineer
- Quantity surveyor
- Project and construction methods engineer
- Management engineer for underground structures under construction
- Management engineer for underground structures in operation.

The rate of employment of graduates is excellent as the table below shows:



Students graduate with a comprehensive outlook on developing underground space from a sustainable development perspective and with the resources that they need to qualify for project management positions. Graduates are therefore of interest to tunnel owners, major construction companies specialized in underground works, consultancy firms, technical organizations within the public sector and inspection authorities.

This post-graduate Master course has received ITA endorsement, along with five other post graduate courses in Italy, the United Kingdom, Spain, Switzerland and the USA. If you would like to receive information on this French Master, please visit http://www.insa-lyon.fr/fr/mastere-ouvrages-souterrains)

In the next issue of our newsletter, we will take a closer look at the Master in Tunnels and Tunnel Boring Machines offered by the Politecnico di Torino in Italy.

All photos courtesy of ENTPE