Organized by the Greek Tunnelling Society (GTS)

Professional Congress Organizer

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www.convin.gr
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Dear Colleagues and Friends of the Tunnelling and Underground Space family,

It is with great pleasure, on behalf of the Greek Tunneling Society (GTS), to welcome you to the World Tunnel Congress 2023 that is held in Athens – Greece, from the 12th to the 18th May 2023. GTS is honoured and proud to host, for the first time ever, this outstanding event of the tunnelling community that is embraced with the participation of hundreds of consultants, contractors, software producers, machine / equipment manufacturers, investors, as well as operators and owners gathered in Athens to meet, exchange knowledge, promote their expertise / knowhow and define future needs.

The theme of ITA-AITES WTC 2023 Conference “EXPANDING UNDERGROUND” focuses on the Knowledge and Passion that our industry offers to Make a Positive Impact on the World, by means of the multiple advantages and solutions that underground space can provide. Indeed, cities, infrastructure and logistics expansion towards underground provide environmentally friendly, safe and resilient solutions that may facilitate the transformation of millions of people’s lives into a more sustainable lifestyle. This is becoming imperative as the globe is facing first-priority demanding challenges, such as (i) rapid urbanization, (ii) climate change and extreme weather phenomena, (iii) other natural hazards, (iv) need for sustainable energy geo-resources and (v) high demands for efficient people’s mobility and transportation of goods.

The congress covers all “hot” topics of the tunnelling and underground space industry. More than 420 papers from 45 different countries have been accepted
for publication, whereas the organizers’ aim to ensure the highest possible scientific level was achieved thanks to the contribution of more than one hundred fifty (150) highly skilled professionals and academics coming from 29 countries. Their great effort in the reviewing process is highly acknowledged.

Timeless Athens, the birthplace of “symposia”, provides the ideal conference host city and the meeting hub of the tunnelling and underground space professionals, thanks to its unique blend of history, culture, art, lifestyle and entertainment.

We strongly believe that WTC2023 in Athens (Greece) provides a valuable opportunity and a fertile soil for the international tunnelling and underground space engineering community to -literally- make a positive impact on the world. GTS is committed to organize a successful and memorable ITA-AITES World Tunnel Congress 2023 and offer what has been known as a traditional Greek hospitality.

We welcome you to Athens!

Ioannis Fikiris
Chair of the Organizing Committee
ITA – AITES World Tunnel Congress 2023 / Athens
TUNNEL & TRANSIT SYSTEMS BEYOND THE EXPECTED

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World Tunnel Congress 2023
EXPANDING UNDERGROUND
15 - 17 May 2023
Athens, Greece.
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12-18 May
Megaron Athens International Congress Centre (MAICC)

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<th>SATURDAY 13 MAY 2023</th>
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Check ITA-AITES and ITACET Training Courses program online
Scan the QR code
## Session 1: Risk management principles

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<tr>
<th>Time</th>
<th>Session Title</th>
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<tbody>
<tr>
<td>08:30</td>
<td>Registration</td>
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<tr>
<td>09:00</td>
<td>Opening - Short - Introduction</td>
<td>Uni. Prof. Chrysothemis Paraskevopoulou</td>
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<tr>
<td>09:10</td>
<td>How to handle risk in Subsurface Engineering</td>
<td>Uni. Prof. Robert Galler</td>
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<tr>
<td>09:50</td>
<td>Geological Uncertainty, geotechnical investigations, and observational design within the context of risk management</td>
<td>Uni. Prof. Mark Diederichs</td>
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<tr>
<td>10:30</td>
<td>Coffee Break</td>
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<tr>
<td>10:45</td>
<td>Main risks associated to deep tunnelling</td>
<td>Gerard Seingre</td>
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<tr>
<td>11:25</td>
<td>Risks in planning, design, construction of large diameter tunnels</td>
<td>Dr. Sotirios Vardakos</td>
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<td>12:05</td>
<td>Q&amp;A</td>
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<td>12:15</td>
<td>Lunch</td>
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## Session 2: Tendering & Implementation during construction

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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>13:30</td>
<td>Monitoring for avoiding hazard situation during construction</td>
<td>Klaus Rabensteiner</td>
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<tr>
<td>14:10</td>
<td>Contractual Practices and Geotechnical Baseline Reports</td>
<td>Matthias Neuenschwander</td>
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<td>14:50</td>
<td>Coffee Break</td>
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<tr>
<td>15:05</td>
<td>Conventional tunnelling cost assessment and benchmarking</td>
<td>Uni. Prof. Chrysothemis Paraskevopoulou</td>
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<td>15:45</td>
<td>Examples of Risk management in mechanized tunnelling</td>
<td>Dr. Karin Bäppler</td>
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<td>16:25</td>
<td>Q&amp;A</td>
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**ITACET Training Course**

**Risk management and sustainable underground solutions**

**Friday, 12 May, 2023**

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**ITA-AITES PROGRAM & ITACET TRAINING COURSES**

**09:30 – 16:25**

**Athens Chamber of Commerce and Industry**

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**WTC 2023 • Athens, Greece**
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Session 3: Sustainability issues

09:10 - 09:50
Introduction to Sustainability Issues in Tunnelling – A look underground in delivering a sustainable future for our people and planet
Prof. Arnold Dix & Antonia Cornaro

09:50 - 10:30
Sustainability issues in tunnelling
Dr. Giovanny Alvarado

10:30 - 10:45
Coffee Break

10:45 - 11:25
Sustainability issues – Digital engineering approach in tunnelling construction
Max Labecki

11:25 - 12:05
Life Cycle assessment and sustainability
Uni. Prof. Panagiotis (Panos) Spyridis

12:05 - 12:15
Q&A

12:15 - 13:30
Lunch

Session 4: Implementation during design, construction, and operation

13:30 - 14:10
Digitalization and numerical methods contributions towards sustainability
Uni. Prof. Mike Mooney

14:10 - 14:50
Holistic Management of emergencies handling on Road Tunnels: The experience from safety drills
Uni. Prof. Konstantinos Kirytopoulos

14:50 - 15:05
Coffee Break
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>15:05 - 15:45</td>
<td>Example in CO2 reduction in tunnel construction from a material technology point of view</td>
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<td>Dr. Wolfgang Aldrian</td>
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<td>15:45 - 16:25</td>
<td>Examples of resilient tunnel evacuation</td>
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<td>Uni. Prof. Andreas Benardos</td>
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<td>16:25 - 16:35</td>
<td>Q&amp;A</td>
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<td>16:35 - 17:25</td>
<td>Round Table Discussion: Future of Tunnelling - underground experts from Greece</td>
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<td>Uni. Prof. Sergios Lampropoulos, Ioannis Lefas, Nick Koronakis, Ilias Michalis</td>
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<td>17:25 - 17:30</td>
<td>Closing Remarks</td>
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</tbody>
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14:00 - 17:30

Meeting WGs + Committees + EXCO

Allegro Hall
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<tr>
<td>08:30 – 10:30</td>
<td>ITA General Assembly</td>
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<td>10:30 – 11:00</td>
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<td>11:00 – 12:30</td>
<td>ITA General Assembly</td>
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<td>12:30 – 13:30</td>
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<td>14:00 – 17:30</td>
<td>Working Group Meetings</td>
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### ITA-AITES PROGRAM & ITACET TRAINING COURSES

#### Monday, May 15, 2023

**14:00 – 15:20**

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<th>Working Group Meetings</th>
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**15:20 – 15:50**

**Coffee Break**

**15:50 – 17:30**

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**ITA-AITES PROGRAM & ITACET TRAINING COURSES**

**Tuesday, May 16, 2023**

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<td>13:15 – 14:00</td>
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<td>14:00 – 15:20</td>
<td>YM Session</td>
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<td>Workshop on Overcoming Challenges and Fostering a Resilient Industry</td>
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**ITA-AITES PROGRAM & ITACET TRAINING COURSES**

**Tuesday, May 16, 2023**

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MONDAY, MAY 15, 2023

13:00 - 14:00
Lunch Break

14:00 - 15:20
Technical Session 1.1.
Knowledge & Passion to Expand Underground for Sustainability & Resilience
Chairs: Maria Kapsali, Konstantinos Kyrpyoulopou

14:00 - 14:20
Managing tunnel infrastructure: a new guideline
M. Knight
14:20 - 14:40
Sustainable and Resilient city: the case study of a hypogeum stadium in a desert area
S. Lundquist, G. C. Cassinis
14:40 - 15:00
What might be our vision of the ecological transition in tunnels and underground spaces for the years to come? An open discussion

15:00 - 15:20
BIM-enabled Carbon Accounting and Integrated Design of underground infrastructures
Y. L. Chen, M. G. Huang, Q. B. Zhang, R. Wang

15:20 - 15:40
Coffee Break

15:40 - 16:00
Technical Session 1.2.
Knowledge & Passion to Expand Underground for Sustainability & Resilience
Chairs: Martin Knight, Konstantinos Kyrpyoulopou

15:40 - 16:00
Underground solution for urban resilience: Stormwater management infrastructure
A. Kapsali, T. Kazerani, G. Quest, J. Serr
15:00 - 16:30
Carbon footprint emissions of different tunneling construction methods
P. Jarast, M. Bakhshi, A. Brauchart
16:30 - 17:00
Search for potential Compressed Air Energy Storage sites in Switzerland
M. S. Lopez, R. E. Eberhardt
17:00 - 17:30
Urban underground space use in a climate neutral city
B. Boudolos, G. Gus, A. Benardos

16:10 - 17:10
Technical Session 2.
Geological, Geotechnical Site Investigation and Ground Characterization Chaires: Philippa Seppänen, Thomas Haricher

16:10 - 16:30
Reliability analysis of discrete fracture network projections from borehole to shaft scale discontinuity data
J. A. Börjeson, E. Eberhardt, S. Rogers
16:30 - 16:50
Observations on the condition of a hydraulic pressure tunnel through an RRV survey
J. Goepfert, E. Paulatto, M. Kjær Jensen
16:50 - 17:10
The management of excavation data in accordance with the WBS philosophy in the expansion of the Stockholm metro to Nacka
E. G. Sørensen, O. H. C. Sørensen, E. Paulatto
17:10 - 17:30
Mapping by pictures: a case study of simplified rock mass classification to improve consistency
J. Hu, A. Rajevich, M. Cussino
17:30 - 18:30
Television defect aperture logging for detailed model development – A case study from the RMT, Sydney, Australia
D. M. Booth, M. A. Doig, K. A. A. Lippin

16:10 - 17:30
Technical Session 3.
Planning and Designing of Tunnels and Underground Structures Chaires: Tardos Celestino, Niklas Safadi

16:10 - 17:00
Reducing uncertainty in tunnel design
A. Tsakas, P. Tsakas, P. Tsakas
17:00 - 18:00
A design approach of large diameter surge shaft and passageway connection between headrace tunnels
E. Ermilan
18:00 - 19:00
3D numerical modelling of a large-shaft cavern in deeply built-up area for Sydney Metro
S. Alawi, D. Tsing, B. A. Cooke, B. Hu
19:00 - 21:00
A numerical investigation of the lining performance of composite SCL tunnels with debonded sprayed waterproofing membrane
M. A.
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<tr>
<th>Time</th>
<th>Technical Session 9.2</th>
<th>Technical Session 6.4</th>
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<td>The effect of explosions in road tunnels on critical structural elements</td>
<td>Design considerations for deep caverns in Opalinus Clay</td>
<td>An analysis of metal wear in rock excavation by TBM</td>
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<td>A holistic tunnel safety concept for a 20-year-old tunnel upgrade to an ADR “Category A” tunnel</td>
<td>Yielding elements made of high-strength expanded polystyrene (HS-EPS)</td>
<td>Innovative and Sustainable ProcAct Solution for High Speed 2 Green Tunnels</td>
<td>Record-Setting Large Diameter Mixed Ground Tunneling in Turkey, the Ege-Sahil Railway Tunnel</td>
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<td>Road tunnel fire risk analysis: A D 1 analysis inferior to A D 0?</td>
<td>Brenner Base Tunnel, Lots Modul 2-3 (Italy) the Construction Experience of the Emergency Stop in Trents</td>
<td>Mechanical Behavior of Invert Structure with New Geometries for Simplified Construction</td>
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<td>The Impact of Battery Electric Bus Fire on Road Tunnels</td>
<td>Tunnel Volume Loss Study on Various Geological Conditions in Singapore</td>
<td>Ground Movement Impacts on Heritage Buildings from Trinocular Cavern Excavation at Town Hall Station on the Melbourne Metro Tunnel Project</td>
<td>A study on the wear and replacement characteristics of the large diameter EPS Shield TBM disc cutter through field data analysis</td>
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<td>Self-Rescue in Traffic Tunnels - Applications</td>
<td>Aligiers Metro - Extension E, Beaubourg, a case study</td>
<td>Longitudinal joints in segmental linings: To spear or not to spear?</td>
<td>TBM hard rock tunnels projects: cutter disc wear comparison between estimations and real performance</td>
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</table>
**Triantí Hall**

**Technical Session 7.1.** Innovation, Robotics and Automation

Chairs: Florent Robert, Jamal Rachani

8:30 - 8:50 LIDAR Navigation in Underground Openings
  Z. Kosmatopoulos, A. Vlachos, J. Spurk, M. Schröer

8:50 - 9:10 Storytelling as Collaboration Support for 3D Tunnel Monitoring
  Krzysztof Z. Chmelka

9:10 - 9:30 Automated Tunnel Design with Dynamic and SAP2000
  E. P. Malo, J. W. Melotec

9:30 - 9:50 Automation in Segmentation and Visualization, use of robots, hydraulically systems and artificial intelligence
  M. Meurlin

10:00 - 10:30 3D Printing of tunnels
  P. Philip, T. A. Delport

Detection system of inner lining cracks for the Athens Metro
  Y. Miyazaki, L. Yazur, A. M. Mourouzis

**MC1 Hall**

**Technical Session 5.1.** Conventional tunneling, Drill-and-blast applications

Chairs: Peikka Mennemi, Tatiana Kotzoda

8:30 - 8:50 Design and Planning of Excavation Sequence and Blasting Techniques for large UC caverns
  A. Pekka, N. Bächtiger

8:50 - 9:10 Development of Projection Mapping Technique for the Tunnel Face
  T. Xu, Y. Kong, T. Mayamoto

9:10 - 9:30 French Hill Road Tunnel: A Pragmatic Rock Support Approach
  S. Salim, D. Kic, A. Pami

9:30 - 9:50 Design and Construction of the Deepest Underground Station in Canada
  W. Nazzi, T. Vouyi

10:00 - 10:20 High temperature ground improvement
  M. Koles, A. Paradeskaipooulos, K. Dousakas

10:20 - 10:30 3D numerical investigation of the air flow axis operating on tunnel junctions constructed in fractured/weathered to very blocky rocks
  A. F. M., K. Kavadias

**Poster Area**

**Triantí Hall**

**Technical Session 8.1.**

**Poster Area**

**Technical Session 5.2.**

**Poster Area**

**Technical Session 6.2.**

**Poster Area**

**Technical Session 6.3.**

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**Technical Session 7.2.**

**Poster Area**

**Technical Session 8.2.**

**Poster Area**

**Technical Session 9.1.**

**Poster Area**

**Poster Area 5 detailed program on page 46**

**Coffee Break**

**Coffee Break**

**WOMEN IN TUNNELLING**

Picture an underground expert: paving the road to diversity

Moderators: Paraskevi Yiouta-Mitra, Chrysothemis Parideskaipooulos

Elavtrya Vargi
Theodoros Vavoulou
Helin Reeves
Mark Diedrichs
Alexandra Zizic
Arnold Dix
Sarja Zlataric

ROUND TABLE

“Picture an underground expert: paving the road to diversity”

Irene Momika
Evangelia Pelled
Enael Araubai
Selma Latifi
Eleïne Zygouri
Eleni Kompatscher
Manila Balak

**Technical Session 3.5.** Planning and Designing of Tunnels and Underground Structures

Chairs: Magalis Schuhr, Dimitris Litas

8:30 - 8:50 Using a vernacular-based fire protection mortar to increase the fire resistance of reinforced concrete tunnels

8:50 - 9:10 Preliminary comparison of the life cycle cost and safety of a single bore bi-direcional tunnel including semi-ventrancence ventilation, with a twin bore unidirectional tunnel of the same length longitudinally ventilated
  A. Goulas, A. Antoniadis, A. Papafragani

9:10 - 9:30 Planning of the Tel Aviv Metro Network
  T. Stamos, M. S. V. A. D. V. N. K. S. M. M. D. A. N. L. I.

9:30 - 9:50 Optimizing the impact of tunnel structures by advanced numerical simulations
  P. Spyrakis, K. Bergmeister

10:00 - 10:20 Pillar stress estimation - 20 numerical analyses
  D. M. F. C.

10:20 - 10:30 Numerical simulation of the rock cutting process using the Discrete Element Method
  K. Kalogeros, T. Mikelakopoulos

**Poster Area**

**MC2 Hall**

**Technical Session 5.2.**

**Poster Area**

**Technical Session 6.2.**

**Poster Area**

**Technical Session 6.3.**

**Poster Area**

**Technical Session 7.2.**

**Poster Area**

**Technical Session 8.2.**

**Poster Area**

**Technical Session 9.1.**

**Poster Area 5 detailed program on page 46**

**Coffee Break**

**Coffee Break**

**WOMEN IN TUNNELLING**

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**Coffee Break**

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<td>14:00 - 15:20</td>
<td>Technical Session 8.2</td>
<td>Big Data and Machine Learning Applications in Tunnelling</td>
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<td>Chairs: Dimitris Rizos, Jurij Karlovsek</td>
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<td>14:00 - 14:20</td>
<td>Tunnel Euralpin Lyon-Turin C009: 8.2 - BIG implementation in conventional tunneling</td>
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<td></td>
<td>F. Risch, A. Giurda, B. Berti, G. Ragazzis, J. Pepiot, S. Lione</td>
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<td>14:20 - 15:00</td>
<td>Development of Penetration Rate Prediction Models for Hard Rock Tunnel Construction Phase by Deep Learning and Block Model Techniques: A Case Study in Mac Tange-Mae Ngad Tunnel, Northern Thailand</td>
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<td>N. Monthanopparat, T. Tanchaisawat, C. Tanoamthi</td>
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<td>15:00 - 15:20</td>
<td>Multi-Camera-Based Tunnel Segment Detection and Inspection Using Artificial Intelligence</td>
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<td>A. Boerzel, C. Whor, J. Steinmann, J. Fehrenbach, D. Fehrenbach</td>
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<tr>
<td>15:20 - 16:50</td>
<td>Coffee Break</td>
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<tr>
<td>15:30 - 17:00</td>
<td>Technical Session 8.3</td>
<td>Big Data and Machine Learning Applications in Tunnelling</td>
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<td>Chairs: Jurij Karlovsek, Cornel Balsi</td>
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<td>15:30 - 16:30</td>
<td>Analyzing and predicting surface settlements from metro construction using Machine Learning methods</td>
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<td>E. Nosrat, A. Machgogiones, A. Benardos</td>
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<td>16:30 - 16:30</td>
<td>Generating a digital twin for tunneling projects during the construction phase</td>
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<td>16:30 - 16:30</td>
<td>Are we ready for TBM tunneling automation? Two strategies to improve model performance</td>
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<td>S. Mousta, R. Sousa, J. Klink, H. Einstein</td>
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<td>16:30 - 16:30</td>
<td>Tunnel Digitalization Center - Beyond BIG in underground construction</td>
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<td>V. Pletsch, R. Brandt, G. Leibl, R. Wysl, N. Elligh</td>
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<td>17:10 - 17:30</td>
<td>Methods for local big data integration to reduce geotechnical uncertainty and risk on subsurface infrastructure projects</td>
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<td>M. A. Mooney, J. G. Graef, R. Gangrade</td>
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<tr>
<td>16:00 - 17:30</td>
<td>Technical Session 9.1</td>
<td>Safety, Risk and Operation of Underground Infrastructure</td>
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<td>Chair: Konstantinos Sakars, Carmine Todaro</td>
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<td>16:00 - 16:00</td>
<td>Monitoring of compressed air workers during hyperbaric interventions in TBM</td>
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<td>N. Subbu, J. Castro, P. Pillai, I. Kalliviti, A. Benardos</td>
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<td>16:00 - 16:00</td>
<td>Seismic performance of a major twin tunnel with unlined segments: Expert witness study for the needs of arbitration</td>
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<td>A. Anastopoulos, G. Gaziou, A. Benardos</td>
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<td>16:00 - 16:00</td>
<td>Modelling underground mine ventilation characteristics using artificial neural networks</td>
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<td>M. Karapapages, A. Benardos</td>
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<td>17:30 - 19:00</td>
<td>Coffee Break</td>
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<tr>
<td>18:00 - 19:30</td>
<td>Technical Session 10.2</td>
<td>Safety, Risk and Operation of Underground Infrastructure</td>
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<td>Chair: Spyridon Konstantis</td>
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<td>18:00 - 18:30</td>
<td>Monitoring and daily and seasonal monitoring of an immersed tunnel</td>
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<td>W. Bax, X. Zhang</td>
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<td>18:30 - 19:30</td>
<td>Earth, Fire, Water, Wind: Addressing insurance expectations by pro-actively taming the four elements</td>
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<td>S. Mostafa</td>
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<td>19:30 - 21:00</td>
<td>Poster Area</td>
<td>Presented posters and oral presentations with time slots for poster discussions</td>
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### ITA PLENARY SESSION • TUESDAY, MAY 16, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Trianti Hall</th>
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<tbody>
<tr>
<td>08:30 - 10:00</td>
<td>ITA Plenary Session, Part I</td>
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<td>Presentation of WGs and Committees report</td>
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<td>OPENING</td>
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<td>Arnold Dix, ITA President</td>
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<td>Rock Support for mechanically bored tunnels</td>
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<td>Sindre Log, ITAtech</td>
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<td>Guideline for radially installed bolts in Tunnelling</td>
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<td>Günther Volkmann, ITAtec</td>
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<td>Logistics aspects of long and deep tunnels</td>
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<td>Magali Schivre, WG17</td>
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<td>An owner’s guide to submerged floating tunnels</td>
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<td>Marcel’t Hart, WG11</td>
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<td>Walter Grantz memorial</td>
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<td>Code of practice for risk management of tunnels works - 3RD edition</td>
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<td>Patrick Bravery, ITA- IMIA</td>
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<td>Presentation of the work of the task force on possible restructuring of the Working Groups</td>
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<td>Jamal Rostami, ITA Vice President</td>
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<tr>
<td>10:00-10:15</td>
<td>SPECIAL PRESENTATION</td>
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<td>CERN Existing and Future Tunnels</td>
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<td>John Osborne</td>
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<td>10:15-10:45</td>
<td>Coffee Break</td>
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<tr>
<td>10:45 - 13:00</td>
<td>ITA Plenary Session, Part II</td>
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<tr>
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<td>Underground infrastructures to strengthen resilience and reduce vulnerability to climate change</td>
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<td>Arnold Dix</td>
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<td>Introduction</td>
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<td>Presentation of the WG 20 report: Urban Underground Space for resilient cities</td>
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<td>Wout Broere (WG20)</td>
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<td>Round Table 1</td>
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<td>Building Resilient infrastructures – New materials, examples from China, US and Italy</td>
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<td>Benoit de Rivaz, Hongwei Huang, Nasri Munfah, Daniele Peila</td>
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<td>Round Table 2</td>
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<td>Tunnels part of city resilience – examples from India, Portugal, Canada, New Zealand, Norway</td>
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<td>A.K. Dinkar, Goncalo Diniz, Giuseppe Gaspari, Matt Mules</td>
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<td>Round Table 3</td>
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<td>Planning the future – How underground space is used in selfsustaining communities, Mission Earth first, use of subsurface in Cities Climate plans, resilience towards natural disasters (earthquake)</td>
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<td>Antonia Cornaro, Nikolai Bobylev, Suresh Sharma</td>
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<td></td>
<td>Conclusion</td>
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<td>ITA Committee on Sustainability</td>
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<td>Tommy Olsen, Arnold Dix</td>
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</table>
Successful tunneling projects require deep knowledge and experience in underground construction. Sandvik Mining and Rock Solutions has a wide range of underground drilling equipment and digital products to offer effective and flexible solutions for your operation’s most challenging targets.

Visit us at Booth 81 to speak with our team of tunneling experts or find out more at ROCKTECHNOLOGY.SANDVIK
Successful tunneling projects require deep knowledge and experience in underground construction. Sandvik Mining and Rock Solutions has a wide range of underground drilling equipment and digital products to offer effective and flexible solutions for your operation’s most challenging targets.

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POSTER SESSION 1
Monday, May 15, 2023 14:00 – 15:00 Poster Area

Poster Station A

14:00 - 14:20
PP_Theme01_01: Low-carbon ground support design for an underground tunnel crossover with a narrow roof pillar in a road tunnel project in Sydney, Australia
S. Thirukumaran, D. Oliveira, M. Sheffield

14:20 - 14:40
PP_Theme01_02: Shafts and spiral tunnels for heat storage – an economic study on ideal geometries
S. Messerklinger, M. Smaadahl, E. Saurer

14:40 - 15:00
PP_Theme01_03: Low Carbon Lining for Tunnelling Precast Segment – How Dramix® Fibre Reinforced Concrete Could Facilitate this Achievement
B. De Rivaz

Poster Station B

14:00 - 14:20
PP_Theme01_04: The New Line 16 Sao Paulo Metro and Best use of zero-carbon technology
H. C. Rocha, F. M. Pontes, D. L. C. Lima

14:20 - 14:40
PP_Theme01_05: Final Design Considerations for the Major Rehabilitation of the Montreal Lafontaine Tunnel
J. Habimana, B. Amara, R. Showbary, L. Rus

14:40 - 15:00
PP_Theme01_06: Advancement of Conventional Cost Benefit for Selection of Truly Sustainable Infrastructure Alternatives
T. Kondrachova, G. Grasselli, E. Miller

Poster Station C

14:00 - 14:20
PP_Theme01_07: A look at embodied carbon in segmental tunnel lining
J. P. Banyai, A. Caspersen

14:20 - 14:40
PP_Theme01_08: Traceability and environmental follow-up of excavated materials – learnings from implementation experiences with bigger projects
C. Villette, T. Dumas

14:40 - 15:00
PP_Theme01_09: Environmental profile of bentonite drilling fluids for civil engineering applications

Poster Station D

14:00 - 14:20
PP_Theme02_01: Acceleration of soft ground with tunnels near soft-hard strata interface: longitudinal shaking
Y. Yong, L. Siming, X. Mingqing

14:20 - 14:40
PP_Theme02_02: Geotechnical analysis of adapted permeation and compaction grouting techniques for detailed design and construction of underground structures
T. M. A. Delport, J. A. S McCosh, K. M. Nowak

14:40 - 15:00
PP_Theme02_03: Geostatistical modelling of geotechnical properties in the context of a tunneling project: application to the Grand Paris Express project (France)
L. Lacherade, A. Marache, A. Denis, I. Halfon, L. Closset, J. Rohmer, F. Quesnel

Poster Station E

14:00 - 14:20
PP_Theme02_04: Acoustic emission of calcitic and dolomitic rock specimens during uniaxial compression tests
M. A. Lotidis, P. P. Nomikos

14:20 - 14:40
PP_Theme02_05: Innovative and conventional geophysical investigations at the Hamza Bey (Alcazar) monument in Thessaloniki, Greece
G. N. Tsokas, P. I. Tsourlos, G. Vargemezis, A. Stampolidis, E. Athanasiou, C. Raptis
POSTER SESSION 1

Monday, May 15, 2023  14:00 – 15:00  Poster Area

14:40 - 15:00  PP_Theme02_06: Hydrogeology of the Brenner Base Tunnel in the Italian section: observed inflows and forward monitoring procedures  P. Perello, S. Skuik, A. Spaziani, A. Voza

Poster Station F

14:00 - 14:20  PP_Theme03_01: Comparing the issues, risks and levels of geotechnical investigation for remote hydropower tunnels with urban transportation tunnels  A. G. Noble

14:20 - 14:40  PP_Theme03_03: Parametric analysis of shotcrete lining capacity using an improved Compressive Membrane Action model  E. S. Bernard, R. Winterberg

14:40 - 15:00  PP_Theme03_02: Pre-Cast Tunnel Linings for Hydropower Tunnels: Advantages and Successes  D. Brox, R. Grandori

Poster Station G

14:00 - 14:20  PP_Theme04_01: The assessment of intact rock strength for penetration  H. Wannenmacher, P. Hamdi, F. Amann, T. Marcher, T. Frühwirt

14:20 - 14:40  PP_Theme04_02: Innovation and application of triple-mode shield machine/TBM  C. P. Zhong, W. B. Zhu

14:40 - 15:00  PP_Theme04_03: Study on the cutter wear based on the cutterhead working status monitoring system in TBM tunnelling  Q. Gong, X. Xie, F. Wu, J. Liu, H. Xing, H. Ren, H. Zhang, Y. Xiao

Poster Station H

14:00 - 14:20  PP_Theme09_02: Risk Management in Outfall Tunnelling, the MPSO Tunnel, Doha, Qatar  J. B. Stypulkowski, A. M. Najder Olliver, K. S. F. S. Al-Khayareen

14:20 - 14:40  PP_Theme09_03: Development near Underground Rail Corridors – Engineering Assessment with Case Studies  J. Pan, A. Kuras, N. Loganathan

14:40 - 15:00  PP_Theme09_04: Experimental study on macro synthetic fibre reinforced concretes subjected to tunnel fires  T. Clarke, S. Fragomeni, M. Guerrieri

Poster Station I

14:00 - 14:20  PP_Theme09_05: A 3D numerical study of sprayed concrete lined junctions  A. Keneti, A. Thomas, B. Sainsbury

14:20 - 14:40  PP_Theme09_01: Correlation of ROV Observations with Actual Damage in the Tala Headrace Tunnel  D. Brox, S. Wangdi, L. Namgyal

14:40 - 15:00  PP_Theme09_06: Influence of grouting on recovery of longitudinal differential settlement of shield tunnel lining  Y. S. Hua, H. W. Huang, D. M. Zhang, P. D. Li

Poster Station J

14:00 - 14:20  PP_Theme03_04: Study of a large opening in a retaining wall by a TBM: consequences on the ground and the structures, structural reinforcement solutions and impacts on neighboring constructions  E. Charanton, L. Marchese, N. Noroozipoor


14:40 - 15:00  PP_Theme03_06: Advanced semi-probabilistic methods for the design and assessment of concrete tunnel linings  P. Spyridis, L. Novák, D. Novák, K. Bergmeister
POSTER SESSION 2

Monday, May 15, 2023 15:50 – 17:10 Poster Area

Poster Station A

15:50 - 16:10
PP_Theme03_07: Tunnelling in the Desert, Wakrah and Wukair Tunnel, Doha, Qatar
J. B. Stypulkowski, A. M. Najder Oliver, K. S. F. S. Al-Khayareen

16:10 - 16:30
PP_Theme03_08: Numerical analysis of the effects of grouting on mitigating the risk of hydraulically induced failure during deep shaft excavation
J. Šaponjić, S. Radovanović, N. Divac, D. Divac

16:30 - 16:50
PP_Theme03_09: Design and Construction of Underground Infrastructure at Airports
L. J. Pakianathan

Poster Station B

15:50 - 16:10
PP_Theme03_11: Interaction between underground works and deep foundations. A risk assessment approach
J. V. Cruanyes Gavilà, M. Becerril Muñoz, P. Ramirez Rodriguez, P. Ingram

16:10 - 16:30
PP_Theme03_12: The Traditional Method of Madrid – a 2D SSI approach calibrated via 3D modelling
C. Cabral Dias, A. Gonzalez Villavicencio, J. Masagué Martín

16:30 - 16:50
PP_Theme03_13: Effective use of fibres of various types and material for shotcrete in rock support for tunnels
A. Sjölander, A. Ansell, E. Nordström

Poster Station C

15:50 - 16:10
PP_Theme01_10: Resins filling injections of an extensive system of voids behind the final lining of Monte Baldo highway tunnel
M. Mazzola, M. Giordano, C. Alessio, B. Spigarelli, C. Ghilardi

16:10 - 16:30
PP_Theme01_11: Autostrade per l’Italia (ASPI) TRS Tunnel Renewal Strategy: the cases of Castello 1 left, San Fermo right and Colle Marino left tunnels
M. Mazzola, M. Giordano, C. Alessio, B. Spigarelli

16:30 - 16:50
PP_Theme01_12: ADVANTEX: Research of innovative tools to support the logistics of use of excavation materials produced by the Lyon-Turin railway line for the best sustainability and circular economy of the process

Poster Station D

15:50 - 16:10
PP_Theme02_07: Optimization of electrical resistivity survey utilizing harmony search algorithm to predict anomalous zone ahead of tunnel face
Y. Yoon, M. Kang, J. Lee, Y. Choe, H. Choi

16:10 - 16:30
PP_Theme02_08: Rheological Properties of Artificial Sandy Soil Conditioned with Foam and Polymer
B. Hwang, J. Kwak, D. Lee, A. Bae, H. Choi

16:30 - 16:50
PP_Theme02_09: Laboratory experiments for hazardous ground prediction ahead of a TBM tunnel face based on resistivity and induced polarization
M. Kang, J. Lee, S. Park, K. Kwon, H. Choi
POSTER SESSION 2
Monday, May 15, 2023 🕒 15:50 – 17:10 📍 Poster Area

16:50 - 17:10
PP_Theme02_10: Which tests for a rapid geotechnical characterization of excavated materials for use as concrete aggregates? Application to the Lyon Turin base Tunnel
A. Cherrey, D. Chamoley, J. Vennat, P. Schriqui, J. Blache

Posters Station G
15:50 - 16:10
PP_Theme05_01: A framework to assess the expected utility of the observational method
T. P. Roper, J. Karlovšek

16:10 - 16:30
PP_Theme05_02: Origin of the vibrations induced by tunnels' excavation
M. Cardu, C. Todaro

16:30 - 16:50
PP_Theme05_03: Correlation between the Round Panel test and the Barcelona test for the control of shotcrete reinforced with fibers in tunnels
S. Carmona, C. Molins, C. Parada

16:50 - 17:10
PP_Theme05_04: Face stability of tunnels under the groundwater level: comparison of existing theories and introduction of a new analytical method calibrated on 3D FEM calculations
D. L’Amante, G. Fantauzzi

15:50 - 16:10
PP_Theme07_01: Automating fault identification along the HS2 Chilterns tunnel alignment from aerial LiDAR scanning
G. Sercombe, C. Paraskevopoulou, A. Bedi, I. Vazaios

16:10 - 16:30
PP_Theme07_02: Utilising remote sensing to digitally map discontinuities in tunnelling
A. Allen, C. Paraskevopoulou, J. Smith, A. Bedi, M. Invernici

16:30 - 16:50
PP_Theme07_03: Statistical interpretation of tunnel project characteristics and their influence on technical risks – current and future challenges
C. Paraskevopoulou, P. Spyridis, D. Prosek, G. Doukkas

15:50 - 16:10
PP_Theme04_04: Analysis of annular grouting in tunnels tail void with gap by an interface model
A.H. Ahn, A. Pouya, G. C. Cho

16:10 - 16:30
PP_Theme04_05: New Technology of readily biodegradable soil conditioning foaming agents
M. A. Sposetti

16:30 - 16:50
PP_Theme04_06: Dispersion of fine-grained soils in slurry shield tunnel excavation
J. Fillibeck, U. Schindler, R. Cudmani

16:50 - 17:10
PP_Theme04_07: Computational modelling of artificial ground freezing in mechanized tunnelling
R. J. Williams, A. Alsahty, G. Meschke

17:10 - 17:30
PP_Theme04_08: Semi-Analytical Approach to Estimate Slurry Penetration in Highly Permeable Soils
A. Wiendl, J. Fillibeck, R. Cudmani

15:50 - 17:30
PP_Theme09_07: Statistical interpretation of tunnel project characteristics and their influence on technical risks – current and future challenges
C. Paraskevopoulou, P. Spyridis, D. Prosek, G. Doukkas

15:50 - 17:10
PP_Theme09_08: Numerical analysis of rehabilitating an existed tunnel by grouting with different grouting volumes considering soil spatial variability
Z. W. Ye, J. Z. Zhang, D. M. Zhang, H. Shao

16:10 - 16:30
PP_Theme09_09: Shaking table test of fault site effect on seismic response of fault-crossing tunnels
R. H. Li, Y. Yuan, X. Zhao

16:30 - 16:50
PP_Theme09_10: Experimental study on ultimate bearing capacity of shield tunnel segments under unloading conditions
K. P. Zhang, X. H. Zhang, Q. Zhang, Z. C. Pei, L. Z. Qi
POSTER SESSION 2
Monday, May 15, 2023  

16:50 - 17:10
PP_Theme09_11: Experimental study on ultimate bearing capacity of the stagger-jointed shield tunnel reinforced by steel plate  
X. Zhang, Z. Pei, K. Zhang

16:50 - 17:10
PP_Theme09_15: Role of variable speed drives in safe, reliable and sustainable tunnel ventilation  
M. Fedorovicheva

Poster Station I

15:50 - 16:10
PP_Theme09_12: A probabilistic approach to evaluate the seismic loss of metro tunnels in Shanghai City  
Z. K. Huang, D. M. Zhang, W. D. Zhou, K. Pitilakis, G. Tsinidis, S. Argyroudis

16:10 - 16:30
PP_Theme09_13: Time-dependent reliability assessment of shield tunnel considering corrosion of segment reinforcement and joint bolts  
D. M. Zhang, Z. K. Huang, W. D. Zhou, C. C. Chen, Y. Tong

16:30 - 16:50
PP_Theme09_14: Seismic Experiment of Tunnel-group Metro Station in Rock Site  
R. Li, Y. Yuan

Poster Station J

15:50 - 16:10
PP_Theme10_01: Project Alliances: Do they work for tunneling projects?  
M. Xanthouli, C. Kerber, N. Khokhar

16:10 - 16:30
PP_Theme10_02: Contractual Practices & Project Management: TELT Time Adjustment Mechanism  
M. Bertrand, A. Fontana, C. Salot, C. Dumoulin, M. Macary

16:30 - 16:50
PP_Theme10_03: Development of a Project Objective and Requirement System (PORS) for major infrastructure projects to align the interests of all the stakeholders  
S. C. Becker, P. Sander
POSTER SESSION 3
Tuesday, May 16, 2023  ☑ 14:00 – 15:00  📍 Poster Area

Poster Station A

14:00 - 14:20
PP_Theme01_14: Waterproof sprayed concrete with improved sustainability performance
E. S. Moe, K. G. Holter, H. Strømsvik

14:20 - 14:40
PP_Theme01_15: Mixed use potential of existing road tunnels for conveying water for hydropower generation: A case study of motorway tunnels in Swat, Pakistan
A. Riaz, A. Hussain, M. Ajdar, Z. Ud Din

14:40 - 15:00
PP_Theme01_16: Experimental study on cyclic shear behavior of biopolymer-treated soil as a tunnel backfill material

Poster Station B

14:00 - 14:20
PP_Theme06_01: Anti-soil ingress for immersion joints
H. Mortier, P. Menge, P.-J. Verdonck

14:20 - 14:40
PP_Theme06_02: Tunneling with low rock cover within tight geometric constraints
M. Abrahamsen, R. Alves, C. Cátedra

14:40 - 15:00
PP_Theme06_03: Extending Immersion Technology for the First Immersed Tunnel in the Alps
M. Ø. Sørensen, S. Sterkenburgh, J. Bubel

Poster Station C

14:00 - 14:20
PP_Theme06_04: Experiences and challenges during the implementation of the Blominmäki sewage tunnels, Espoo, Finland
I. Konstantas, C. af Hallström, J. Salmelainen, J. Paajanen, J. Yli-Kuivila

14:20 - 14:40
PP_Theme06_05: Grand Paris Express Line 16-1: difficulties of mining under a rail junction into a steel bell
L. Carlos, F. Grisel, G. Pini

14:40 - 15:00
PP_Theme06_06: Geotechnical assessment of ground surface settlements induced by microtunneling construction. Case study: Pikrodafeina stream. P. Matsouladis, C. Stratakos, A. Ntountoulakis

Poster Station D

14:00 - 14:20
PP_Theme06_07: Ground settlements induced by tunneling in soft and variable rock formations. Observed performance of SEM tunnelling for a section of Athens Metro - Line 3.
A. Alexandris

14:20 - 14:40
PP_Theme06_08: Numerical simulation of circular tunnel intersections in anisotropic rock mass
A. Zafeiropoulos, P. Nomikos

14:40 - 15:00
PP_Theme06_09: The Icelandic Glacier Tunneling System
H. Ö. Arngrímsson, R. Sævarsson

Poster Station E

14:00 - 14:20
PP_Theme06_10: Construction of Platform Tunnel by Conventional Tunnelling below Heritage Buildings
P. Singh, R. Mittal, S. K. Gupta, A. H. Khan

14:20 - 14:40
PP_Theme06_11: Tunnel construction under dense urban agglomeration - The Dwarka Najafgarh Metro Corridor
A. Sahu, A. Kumar

14:40 - 15:00
PP_Theme06_12: Conventional Excavation for widening of TBM bored tunnel by mechanical means for Shittadevi Station, Mahim
S. Vishwakarma, A. K. Rai, R. R. Kumar, D. Binwar, A. D. Shinde
E-POSTERS

POSTER SESSION 3
Tuesday, May 16, 2023  🔄 14:00 – 15:00  📍 Poster Area

Poster Station F

14:00 - 14:20
PP_Theme07_03: The use of an Innovative Fiber Optic Methodology to Capture the Axial Response of Rib Spacing and Grout Annulus Effects on Grouted Rock Bolts
K. S. Moore, N. Vlachopoulos

14:20 - 14:40
PP_Theme07_04: Underground Replacement of a 100 Year Old Tunnel using the Sequential Demolition Method
G. J. E. Kramer, J. Habimana

Poster Station G

14:00 - 14:20
PP_Theme07_06: Innovative Steering of Tunnel Boring Machines
E. Nathanson, S. Mauerberger, G. Wehrmeyer

14:20 - 14:40
PP_Theme07_07: Long-term structural behavior of inner-city segmental tunnel linings investigated by an innovative structural monitoring
F. Rauch, O. Fischer

Poster Station H

14:00 - 14:20
PP_Theme08_01: Deep learning methods for underground deformation time-series prediction
E. Maj, M. Janiszewski, M. Torkan

14:20 - 14:40
PP_Theme08_02: 3D Numerical Simulation of TBM Excavation for Predicting Surface Settlements - State of the Art
B. Kratz, P. Jehel, M. Tatin

Poster Station I

14:00 - 14:20
PP_Theme08_03: Compressible linings solutions: a multi-scale mechanical and technical demonstration up to a full 6m diameter surface loading “accelerator” device
J. Zghondi, G. Armand, L. Kerner, B. Terrade, N. Dias, J. M. Bosgiraud

14:20 - 14:40
PP_Theme08_04: TunAID - Interactive simulation-based tunnel track design tool for mechanized tunneling in urban areas
Y. Zendaki, B. T. Cao, A. Alsahly, S. Freitag, G. Meschke

Poster Station J

14:00 - 14:20
PP_Theme09_16: Decision support tool for resilience assessment of road tunnels

14:20 - 14:40
PP_Theme09_17: Seepage mitigation in karst with customised grouting techniques; the rehabilitation case of Enguri pressure tunnel, Georgia
E. Christakis

14:40 - 15:00
PP_Theme09_18: Engineering Correlations for Critical Velocity Estimation in Road Tunnel Fires: A Comparative Assessment using CFD Tools
G. Papadima, D. I. Kolaitis
POSTER SESSION 4
Tuesday, May 16, 2023  15:50 – 17:10  Poster Area

Poster Station A

15:50 - 16:10
PP_Theme01_17: ATG Ceneri Base Tunnel: Driving Method and Production of Concrete Aggregates
E. Catelli, P. Lanfranchi
16:10 - 16:30
PP_Theme01_18: On the mechanical behavior of underground pipeline with separated joints rehabilitated by cured in place pipe
K. J. Shou, J. M. Hsu
16:30 - 16:50
PP_Theme02_11: Equivalent Material Modelling of Fractured Rock Mass Resistance Effects
H. T. Holmes, C. Paraskevopoulou, M. Hildyard, K. Neaupane, D. P. Connolly
16:50 - 17:10
PP_Theme02_12: Tunnel portal design optimisation in tectonically disturbed and weathered gneissic rock masses
F. Kritikou, C. Paraskevopoulou, V. Marinos

Poster Station B

15:50 - 16:10
PP_Theme03_15: Structural safety of tunnels in case of fire based on CFD simulations
M. Filus, T. Pappou, B. Protopsaltis, K. Diakakis, A. Gisakis, K. Stokos
16:10 - 16:30
PP_Theme03_16: Effect of the rock mass disturbance due to the tunnel excavation on the tunnel loading, based on numerical simulation
D. Georgiou, A Benardos, P. Nomikos
16:30 - 16:50
PP_Theme03_17: Tunnel design guideline in cases of tunnel face pre-support by fiberglass nails and / or forepoling umbrella
D. Georgiou, G. Georgakopoulos, E. Diakoumi, A. Malandraki
16:50 - 17:10
PP_Theme03_18: Effect of rock heterogeneity on the Convergence-Confinement curve during numerical analysis of underground excavation in discontinuous rock mass
N. Lathourakis, P. Yiouta - Mitra

Poster Station C

15:50 - 16:10
PP_Theme03_19: TBm excavation under existing operation railway: a practical example applied to the Brenner railway
C. Iasiello, M. Aganetti, D. Maturi, D. Buttafoco, V. Perrotta Orgnani
16:10 - 16:30
PP_Theme03_20: Circular economy and reuse of excavated materials from TBm excavations
D. Sebastiani, I. Bavasso, M. Amici, N. Valiante, M. Di Nauta, M. Santamicone, G. De Carli
16:30 - 16:50
PP_Theme03_21: Influence of Construction Joints on the Mechanical Behavior of Linings in Mountain Tunnels Acted on by External Forces
K. Kawata, R. Okawa, R. Nakazato, T. Natsume, N. Isago, A. Fujii
16:50 - 17:10
PP_Theme03_22: Effect of spatial heterogeneity of geomechanical properties on stability of tunnel face
Y. Okazaki, T. Fukuura, M. Ohya, S. Morimoto, H. Hayashi, M. Shinji

Poster Station D

15:50 - 16:10
PP_Theme04_09: A non-conventional system for TBM recovery: abandonment of the shield and underground disassembly of the mechanical equipment and inner structures
P. F. Coto, F. Dominguez Mayans, P. Garcia de Haro, G. Zonghua, Y. Zhuangzhi
16:10 - 16:30
PP_Theme04_10: Development of a tension-resistant single pass segmental lining in high pressure tunnels. The experience of Snowy 2.0 (Australia)
N. Valiante, H. Elgarhi, F. Lazzarin, R. Crapp, R. Stucchi
16:30 - 16:50
PP_Theme04_11: Tunnel linings made of precast concrete segmental rings - from design choice to installation and performance
D. Marini, G. Venditti
**Poster Station E**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 15:50 - 16:10 | PP_Theme05_05: 3D numerical investigation of the bending moments acting on tunnel junctions constructed in fractured/weathered to very blocky rockmass  
F. Chortis, M. Kavvadas |
| 16:10 - 16:30 | PP_Theme05_06: Challenges faced during conventional tunneling in urban environment—Mumbai Metro Line 3  
A. Dorugade, G. Raju, S. Gupta |
| 16:30 - 16:50 | PP_Theme05_07: Investigation of microfine cement both rheological properties and permeation in soils  
K. Boschi, R. P. Castellanza, C. G. di Prisco, D. Grassi |
| 16:50 - 17:10 | PP_Theme05_08: Blasting and vibration control for hard rock shafts in urban centers  
I. J. F. Teixeira, C. V. Chanquini, F. Abreu, P. Messa, L. B. Partelli |

**Poster Station G**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 15:50 - 16:10 | PP_Theme06_17: The successful crossing of an extended fault zone in carboniferous squeezing rocks: a practical case from TELT’s SMP4 construction site  
M. Calorio, F. Franchetti, L. Rew, A. Counilh, A. Saitta, B. Serrano, C. Salot |
| 15:50 - 16:10 | PP_Theme06_18: An integrated design approach for the renovation of masonry railway tunnels of Central Italy with ARCHITA and MIRET  
F. Foria, S. Gazzola, M. Calicchio |
| 16:10 - 16:30 | PP_Theme06_19: North-West road bypass of Merano—South Tyrol—Italy  
G. Barovero, M. Moja, E. M. Pizzarotti, F. Prati, J. Strimmer |
| 16:30 - 16:50 | PP_Theme06_20: Design criteria for caverns under high stress rock conditions for Snowy 2.0 Power Station Complex  
S. Khodr, P. L. Tonioni, P. Lignier, A. Lambrughi, M. Diederichs, I. Ching, F. Lazzarin |

**Poster Station F**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 15:50 - 16:10 | PP_Theme06_13: Tunneling Construction Challenges on Mumbai Coastal Road Project  
V. Surana, J. D. Celentano, G. V. R. Raju, M. M. Swami |
| 16:10 - 16:30 | PP_Theme06_14: Semi-Analytical Prediction of Ground Surface Settlements due to EPB Tunneling in Kolkata  
H. Jain, T. G. Sitharam |
| 16:30 - 16:50 | PP_Theme06_15: Construction of Headrace Tunnel of Vishnugad-Pipalkoti HE Project (444MW) in Extreme Geological Conditions: Issues and Challenges—A Case Study  
R. K. Khali, S. Potnis |

**Poster Station H**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 15:50 - 16:10 | PP_Theme07_09: New products for rapid refurbishment of existing tunnels  
D. Michelis, E. Dal Negro |
| 16:10 - 16:30 | PP_Theme07_10: A new approach to measure the stress level in tunnel linings of the Italian highway networks  
G. Ascani, A. Dalle Fratte, A. Terraneo, C. Alessio, L. Baccolini |
| 16:30 - 16:50 | PP_Theme07_11: Mobile mapping systems and Algorithms for Italian Tunnel Assessments  
F. Iacobini, A. Pranno |
POSTER SESSION 4
Tuesday, May 16, 2023 ✨ 15:50 – 17:10 ⬅️ Poster Area

16:50 - 17:10
PP_Theme07_12: Automation of tunnel lining construction with Self-Compacting Concrete: full-scale experiment and numerical simulation
K. Kato, H. Koyama, T. Hiromitsu, S. Fujiiwara, C. Kuroda, N. Utagawa, T. Ono, Y. Uno

16:50 - 17:10
PP_Theme08_10: Automated semantic segmentation of 3D point clouds of railway tunnel using deep learning
J. Park, B.-K. Kim, J. S. Lee, M. Yoo, I.-W. Lee, Y.-M. Ryu

Poster Station I
15:50 - 16:10
PP_Theme08_07: Soft Ground Tunnel Lithology Classification using Resampling and Supervised Learning
K. Kilic, H. Ikeda, T. Adachi, Y. Kawamura

16:10 - 16:30
PP_Theme08_08: Development of simple floating dust sensor during tunnel construction using video image sequences – algorithm of automatic particle recognition
K. Tanaka, S. Nakashima, H. Hayashi, M. Shinji, K. Ide, N. Kishida

16:30 - 16:50
PP_Theme08_09: Development of a Ground Forecasting System Based on the Geological and Groundwater Conditions in Mountain Tunneling
T. Fukuda, S. Yoshikawa, K. Hosono, S. Iwanaga

16:50 - 17:10
PP_Theme08_10: Automated semantic segmentation of 3D point clouds of railway tunnel using deep learning
J. Park, B.-K. Kim, J. S. Lee, M. Yoo, I.-W. Lee, Y.-M. Ryu

Poster Station J
15:50 - 16:10
PP_Theme09_19: Time-dependent impact of expansive soil location on tunnels
A. Saqib, L. Changjian, C. Ying

16:10 - 16:30
PP_Theme09_20: Analytical study of anomalies in tunnel lining thickness: critical temperature variations
S. Aiello, V. De Biaqi, B. Chiaia, C. Alessio, L. Baccolini, R. Fantuz

16:30 - 16:50
PP_Theme09_21: The strength of concrete in existing Italian tunnels
A. P. Fantilli, B. Chiaia, M. Giordano

16:50 - 17:10
PP_Theme09_22: A probabilistic approach to evaluate the risk due to a fire in unidirectional road tunnels ventilated by jet fans
D. Martinelli, P. Oreste
POSTER SESSION 5
Wednesday, May 17, 2023 09:30 – 10:10 Poster Area

**Poster Station A**
9:30 - 9:50  
**PP_Theme03_23**: A 3-D finite element design of a tunnel temporary lining, under Archaeological area  
E. Zygouri, D. Bairaktaris

9:50 - 10:10  
**PP_Theme03_24**: Reinforcement and Bonded Block Modelling  
G. A. Skarvelas

**Poster Station B**
9:30 - 9:50  
**PP_Theme03_25**: Analysis and numerical simulation of mechanical interaction between ground and elastic supporting elements for circular tunnel  
T. Nishimura, M. Kohno

9:50 - 10:10  
**PP_Theme03_26**: Function of Reinforcement in Concrete Tunnel Linings  
R. Winterberg

**Poster Station C**
9:30 - 9:50  
**PP_Theme04_13**: Finite element analysis of surface settlement above TBM tunnels for Jakarta MRT project  
N. Yingyongrattanakul, S. Nagano, W. Maulina, T. Boonyatee

9:50 - 10:10  
**PP_Theme04_14**: Development of environment-friendly tail grease for shield tunnelling method  

**Poster Station D**
9:30 - 9:50  
**PP_Theme05_09**: Development and Application of Remote Monitoring Systems for Tunneling Works in Conventional Tunnel Construction  
K. Sakai, K. Mitani, T. Tani, S. Miyamoto

9:50 - 10:10  
**PP_Theme05_10**: Application of Radar Measurement for Energy Efficient Blast Calculation by the tunnelling  
J. Ortuta, M. Bakoš, V. Greif

**Poster Station E**
9:30 - 9:50  
**PP_Theme05_11**: Montreal Metro Blue Line Extension Tunnels and Caverns  
V. Nasri, M. Bakhshi, G. Maurel, R. Saghaee

9:50 - 10:10  
**PP_Theme05_12**: Modernization of a Century Old Mont-Royal Tunnel  
M. Motallebi, B. Esmaeilkhanian, V. Nasri

**Poster Station F**
9:30 - 9:50  
**PP_Theme06_21**: Stilling basin built in the form of ultra-large cross-sectional tunnel  
S. Igarashi, A. Fujimi, S. Murakami, K. Akiyoshi

9:50 - 10:10  
**PP_Theme06_22**: Watertight Rail Tunnel Excavation and environmental Conservation of Wetlands Registered under the Ramsar Convention  
A. Kameyama, R. Kashiwagi, T. Ishida

**Poster Station G**
9:30 - 9:50  
**PP_Theme06_23**: Triple layered tunnel supports system against extremely high squeezing ground condition  

9:50 - 10:10  
**PP_Theme06_24**: Case Study in the Construction of Tunnels on the Durango - Mazatlan Highway (Mexico)  
A. Ramírez-Piedrabuena, L. Cañete-Enríquez, W. Araujo-Quimbaya

**Poster Station H**
9:30 - 9:50  
**PP_Theme07_13**: Characteristics of laser ablation-excited vibrations in concrete  
N. Yasuda, T. Asakura
E-POSTERS

POSTER SESSION 5
Wednesday, May 17, 2023 09:30 – 10:10 Poster Area

9:50 - 10:10
PP_Theme07_14: Vision-based Measurement method with Segmentation for Concrete Tunnel Crack Inspection
J. Kim, J. Park, G. C. Cho, S. Shim

Poster Station I
9:30 - 9:50
PP_Theme08_11: Stage-updated TBM operational parameter prediction model using random forest algorithm
D. Kim, K.-H. Lee, N. Y. Kim, K. Kwon, H. Choi

9:50 - 10:10
PP_Theme08_12: Estimation of uniaxial compressive strength at tunnel face using TBM operation data
T. Y. Ko, T. H. Kim

POSTER SESSION 6
Wednesday, May 17, 2023 11:00 – 12:20 Poster Area

Poster Station A
11:00 - 11:20
PP_Theme03_27: The importance of axisymmetric simulations for the estimation of tunnel support pressure for sequentially supported deep tunnels
V. Gkikas, P. Nomikos

11:20 - 11:40
PP_Theme03_28: Design Challenges of Underground Highway Structures in Qatar
Y. Matsuo, G. Sergakis, T. Tzaveas

11:40 - 12:00
PP_Theme03_29: Ensuring face support and control of surface deformations in soft ground urban tunnels: Verification through international case studies
S. Konstantis, G. Prountzopoulos, P. Spyridis

12:00 - 12:20
PP_Theme03_30: Numerical simulation of the mechanical behaviour and support of laminated discontinuous roof of underground excavations
P. Yiouta-Mitra, E. Vougioukas

Poster Station B
11:00 - 11:20
PP_Theme03_31: Highway Tunnel Design Under River With Shallow Overburden-Terzili Tunnel Example
B. Kocak, I. Sáenz de Santa María Gatón, C. H. Sentürk

11:20 - 11:40
PP_Theme03_32: Evaluation of subway stations from an architectural point of view
Ö. Öztürk

11:40 - 12:00
PP_Theme03_33: Stress status of sprayed waterproofing membrane under groundwater pressure within composite SCL tunnels
J. Su

12:00 - 12:20
PP_Theme03_34: Single and Double Tube Configurations for Transit Systems
M. Sepehrmanesh, V. Nasri

Poster Station C
11:00 - 11:20
PP_Theme04_15: Successful usage of steel fibres in the Parisian Metro network expansion
B. Rossi, P. Decobécq, A. Cornille, F. Delort, A. Bertrand
Wednesday, May 17, 2023
11:00 – 12:20
Poster Area

11:20 - 11:40
PP_Theme04_16: Development of waterjet drilling system with dual nozzles for granite
J.-S. Park, H.-J. Cha, E.-S. Hong, T.-M. Oh

11:40 - 12:00
PP_Theme04_17: Analysis of the disc cutters spacing in the face area of a small diameter TBM

12:00 - 12:20
PP_Theme04_18: Numerical investigation of segmental lining with compressible layers in deep soft rock
J. Park, J. B. An, J. Kim, G.C. Cho

Poster Station D

11:00 - 11:20
PP_Theme04_19: Refurbishment of a 15,2 M TBM (S19 Rzeszow Poludnie – Babica project) 17 years after its first use (M-30 Madrid project)
F. Vara, M. Calero

11:20 - 11:40
PP_Theme04_20: Effect of cutting speed on conical pick cutter performance obtained from portable linear rock cutting machine (PLCM)
C. Balci, F. Shoaee, D. Tumac, H. Copur

11:40 - 12:00
PP_Theme04_21: Comparison of two identical EPB TBMs under different and complex geological conditions
I. S. Binen, F. Kara, M. Temur, M. Cinar, U. Ates

12:00 - 12:20
PP_Theme04_22: Validity of Stickiness and Consistency Index in Assessment of Cutterhead Clogging Potential of Cohesive Soils
R. Shetty, A. Eisenman, S. Lopez, M. A. Mooney

Poster Station F

11:00 - 11:20
PP_Theme06_29: Challenges in the Construction of a Tunnel Under Crossing a Channel in Singapore
Z. Chen, T. Y. S. Chew, C. W. Wan, D. Loh

11:20 - 11:40
PP_Theme06_30: Evaluation of Over-Excavation for Earth Pressure Balance (EPB) Shields through Data Analytics
C. Teo, Y. L. Paterson, J. Kumarasamy, Y. H. Zhang

11:40 - 12:00
PP_Theme06_31: A case study on design and construction of mined tunnel in challenging ground conditions in Singapore
Y. Jinrong, M. Claudia, K. Sharique, G. Venkatesh

12:00 - 12:20
PP_Theme06_32: Design challenges and construction experience of the main tunnels of Brescia-Verona high-speed railway
POSTER SESSION 6

Wednesday, May 17, 2023  11:00 – 12:20  Poster Area

**Poster Station G**

11:00 - 11:20  
**PP_Theme06_33:** Repurposing of reception shaft, Mumbai Coastal Road Project – Case study  
A. Di Fabio, A. Panciera, M. Varma, S. Kumar, P. Kachhy, S. Singh, S. Pajni

11:20 - 11:40  
**PP_Theme06_34:** Zhinvali HPP tailrace tunnel maintenance: investigations, design and works implementation under challenging constraints  
B. M. Quigley, A. Arigoni, S. Liccardo, G. Matcharadze

11:40 - 12:00  
**PP_Theme06_35:** Experiences on the Use of GBR in Tunnel and Cavern Projects  
C. S. Lau, A. Dematteis, R. Orena, A. Di Fabio

12:00 - 12:20  
**PP_Theme08_13:** Reduction of risks and operation improvement in TBM tunneling through advanced techniques of data management, processing and analysis  
E. Paris, S. Arrate

11:20 - 11:40  
**PP_Theme08_14:** Optimization of shield tunneling parameters under controlled surface settlements  
P. Jongpradist, S. Wainiphithapong, C. Phutthahanon

11:40 - 12:00  
**PP_Theme08_15:** Underwater Car Keeps Current Flowing  
M. Short, S. Drobny

**Poster Station H**

11:00 - 11:20  
**PP_Theme07_15:** The benefits of InSAR monitoring during the construction of the Ceneri Base Tunnel  
D. Stocker, D. Merlini, M. Falanesca, A. Del Col, C. Gervasi, L. Iannicella

11:20 - 11:40  
**PP_Theme04_23:** Increasing safety in small-diameter tunnelling: the role of automation and microtunnelling  
P. Schuerm. M. Lübbers, F. Seng

11:40 - 12:00  
**PP_Theme04_24:** Penetration behaviour of slurry in saturated soil – analysis of particle deposition on the basis of electrical resistance  
S. Kube, B. Schoessler, M. Theves

12:00 - 12:20  
**PP_Theme07_16:** Underwater Car Keeps Current Flowing  
M. Short, S. Drobny

**Poster Station J**

11:00 - 11:20  
**PP_Theme07_17:** Estimation of permanent lining stress of road tunnel by ultrasonic velocity  
T. Ishimura, A. Kusaka, N. Isago

11:20 - 11:40  
**PP_Theme08_26:** Evaluation of Mechanical Behavior of Hanging and Anchorage System supporting Jet Fan for Safety of Road Tunnels  
Y. Koizumi, A. Kusaka, Y. Tatsumi

11:40 - 12:00  
**PP_Theme09_25:** Performance and monitoring results of repair work to prevent chloride attack in operating subway tunnels  
Y. Mutou, S. Nakamura, N. Ogura

12:00 - 12:20  
**PP_Theme09_28:** Design of stress level for accelerated life test of HLW repository sensor  
C. Park, H.-J. Hwang, G.-C. Cho, C.-H. Hong
### Poster Station A

**14:00 - 14:20**  
**PP_Theme03_35:** Design aspects of deep water distribution shafts  
N. Allahverdi, V. Nasri

**14:20 - 14:40**  
**PP_Theme04_25:** Design of Orange Line Project in Austin, Texas  
T. Malouf, A. Bhargava, V. Nasri

**14:40 - 15:00**  
**PP_Theme03_36:** Design and construction of internal structures of Montreal REM Airport Tunnel using precast steel fiber reinforced concrete units  
M. Rabiei, M. Bakhshi, V. Nasri

### Poster Station B

**14:00 - 14:20**  
**PP_Theme06_37:** Study into the TBM jamming hazard in Opalinus clay  
A. N. Nordas, M. Natale, G. Anagnostou, L. Cantieni

**14:20 - 14:40**  
**PP_Theme06_38:** Problems derived from designing tunnels in loose soils with rock mass methodologies  
N. Della Valle, P. García de Haro, B. Koçak

**14:40 - 15:00**  
**PP_Theme06_39:** The performance of an EPB-TBM in a complex geology with frequently encountered dykes and in transition zones  
M. Aymir, I. Yaşçioğlu, B. Türker, N. Bilgin

### Poster Station C

**14:00 - 14:20**  
**PP_Theme06_41:** Hybrid SCL and Handmined Shaft - A Case Study from the Bank Station Upgrade Project  
A. Nasekghan, Z. Ng, G. Savage, S. Macknight

**14:20 - 14:40**  
**PP_Theme06_42:** Design Aspects of Swelling of Shales for Tunnelling Projects in Southern Ontario, Canada  
M. Rahjoo, V. Nasri, M. Sepehrmanesh, M. Soudkhah

**14:40 - 15:00**  
**PP_Theme06_43:** Construction of the First Street Connector Tunnel as part of the Northeast Boundary Tunnel Project in Washington D.C.  
B. Giurgola, F. Azzarà, F. Bonaiuti, N. Fuegenschuh

### Poster Station D

**14:00 - 14:20**  
**PP_Theme04_26:** Design of FRC Precast Segments for Fire in Light-Rail Tunnels  
M. Bakhshi, M. Partovi, A. Haghighat, V. Nasri

**14:20 - 14:40**  
**PP_Theme03_38:** REM de l’Est Project in Montreal  
V. Nasri, M. Sepehrmanesh

**14:40 - 15:00**  
**PP_Theme09_29:** Self-Rescue in Traffic Tunnels - Simulation Method  
M. Bettelini

**15:00 - 15:20**  
**PP_Theme09_30:** Tunnels and Underground Stations Ventilation System  
A. Haghighat, N. Shahcheraghi, V. Nasri
POSTER SESSION 7

Wednesday, May 17, 2023 14:00 – 15:20 Poster Area

Poster Station E

14:00 - 14:20
PP_Theme09_31: Shaking table test of segmental linings with ground-penetrating shield tunnel (GPST) under transverse excitations
Q. Wang, Y. Yuan

14:20 - 14:40
PP_Theme04_27: Fundamental TBM selection criteria in urban environment based on engineering geological and geotechnical conditions
D. Papouli, V. Marinos

14:40 - 15:00
PP_Theme09_33: Risk management process for underground works
G. Armetti, A. Panciera

Poster Station F

14:00 - 14:20
PP_Theme08_17: Near Surface Full Waveform Inversion via deep learning for subsurface imaging
A. Parasyris, L. Stankovic, S. Pytharouli, V. Stankovic

14:20 - 14:40
PP_Theme08_18: A novel holistic approach to rehabilitation of underground structures
V. Gall, T. Martin, L. Boyd

14:40 - 15:00
PP_Theme08_19: BIM Implementation in a Major Tunnel Rehabilitation
T. Vovou, H. Bosques-Mendez, V. Nasri

Poster Station G

14:00 - 14:20
PP_Theme10_05: Lessons learned procuring a high availability tunnel asset for the A303 Stonehenge
D. R. Hull

14:20 - 14:40
PP_Theme10_06: Introducing the ATOM risk management methodology for managing risks in heavy subway projects - The middle section of the Tehran Metro L6 & Tehran-Eslamshahr subway phase 1
B. Mardani Givi, A. Akbarpour, Z. S. Hashemi, H. R. Abbassian, Jahromi, S. Mousazadeh

14:40 - 15:00
PP_Theme10_07: Tunnel Assessment: the Italian case

15:00 - 15:20
PP_Theme10_04: Tunnel and Underground Works: Managing insurance particulars in a well-structured and risk-averse environment
T. Konstantis, A. Towers

Poster Station H

14:00 - 14:20
PP_Theme08_20: Comparison between Machine Learning Algorithms for TBM Advance Rate Prediction
S. Huang, P. Dastpak, M. Esmaeilpour, K. Liu, R. L. Sousa

14:20 - 14:40
PP_Theme08_21: Study on the Digitalization of Tunnel Inspection Using Deep Learning
Y. Ohara, T. Nakayama, A. Miwa, T. Shimizu

14:40 - 15:00
PP_Theme06_45: Non-open-cut tunnel construction technology and monitoring system for railway underpass
A. Miwa, Y. Ohara, T. Ushida, T. Shimizu, T. Nakayama
Advancing tunnel design and management through digital innovation

Bentley and Seequent unite geotechnical engineering, tunnel design, and asset management with a digital twin approach to the underground.

VISIT US AT BOOTH 85 & 87 for expert presentations and product demonstrations.
Different Technical Visits will take place during WTC2023. **Cost per person € 20.** Please contact the registration desk to purchase a ticket, limited seats will be available onsite.

Additional information will be available through the conference APP. All technical visits will depart from the Congress Venue.

*Check Technical Visits program online*  
Scan the QR code
1. Athens Metro Line 4

The first phase of Line 4 (from Alsos Veikou to Goudi areas) is being constructed fully underground by the joint venture “AVAX AE - GHELIA SpA - ALSTOM TRANSPORT SA” following a tender award on 2021 from the Project Owner ATTIKO METRO S.A.

Main features of the Project:

✔ 12.8km line: double track TBM tunnel
✔ 15 underground stations with platform screen doors
✔ 9 intermediate or terminal shafts
✔ 2km underground forestations, underground trumpet structures and connecting tunnels
✔ A new Operation Control Center
✔ A new repair workshop in the existing Depot area
✔ Underground Train stabling and maintenance yards at both ends of the Line
✔ Transfer connections at two existing Stations (Line 2 & Line 3)
✔ 20 new 4-car automated driverless trains.

*The Project’s estimated cost is 1,510,000,000.00 € and the estimated delivery time is 96 months.*

Among the technical challenges of this Project is TBM tunneling under existing Metro tunnels and excavation of new stations close to operating Metro stations whose safety and activities should remain unaffected. Furthermore, boring or digging under or next to high buildings, sometimes old or historical ones in the city center, has to be performed securing their structural and serviceability standards. The risk of coming across archaeological findings during excavation works is always high in the Athens area and the issue of how to protect them while not impeding the works is of great importance.

The tour will start with a presentation of the Project at a construction site office. Delegates will then visit a number of worksites to view tunnelling works and construction of stations, shafts etc.

It is expected that by the time the Technical Visits take place, TBM tunneling works will have started and construction of cut & cover structures (stations, vent. shafts) as well as conventional tunneling will be in progress.
TECHNICAL VISITS

Thursday, May 18, 2023

TBM cutter-head inspection

Akademia Station preparatory works

Katehaki Shaft – boring of piles for retaining walls

Cost per person : 20.00 €
*limited participation on a first come first served basis
2. Underground Construction of National Railway Line in Athens

The Greek Public Railway Construction Company (ERGOSE) assigned in 2018 the construction of a four-track rail corridor, 2.36 km long of which approx. 1.9 km is fully underground, starting from the Athens Central Railway Station and ending at Sepolia area, in Athens Municipality. There the line connects to the new four-track rail corridor which was recently completed and opened to traffic. The rail corridor mostly runs within the occupation zone of the existing open air train tracks. The east half of the four-track corridor will serve suburban trains, whereas the west half will be used mainly for intercity services.

The project schedule has to provide for a number of constrains such as maintaining the existing surface train operation, safe construction close to adjacent buildings, close overpassing a Metro running tunnel and a Water Authority (EYDAP) culvert. The integrity and serviceability of all those structures is to be secured during the works, therefore modern instrumented monitoring is implemented.

When finished, the surface area above the underground corridor will serve 9 vertical streets which are currently interrupted due to the on-ground corridor. Moreover, landscaping will provide citizens with recreation areas of green (trees, shrubs).

Works are in full progress by the Contractor “J/V INTRAKAT SA – SIDIRODROMIKA ERGA ATE” and Phase A is to be completed by 2024, while the whole project will be delivered by the end of 2025.

Following a brief presentation of the Project, we will visit a worksite to see construction work of the underground part of the Line. It will be a half-day visit.
3. The Hellinikon Project – Underground Coastal Road

The revitalization of the former Hellinikon Airport area is the biggest project of its kind in Europe and the most ambitious development project ever undertaken in Greece that will positively impact the local and national economy. It combines urban development, recreation facilities, a huge metropolitan park and seafront full accessible to the public. Access through metro and tram lines will be assured while the existing road along the shoreline will be reconstructed to become fully underground.

The Project of the Underground Coastal Road was assigned by the Owner LAMDA DEVELOPMENT to the Contractor AVAX SA and excavation works have already started. The underground road will begin at the area of Alimos and rise to surface at Ag. Kosmas marina. The purpose of this Project is to allow connection of the seashore front to the rest of the Hellinikon area.

The tour includes presentation of the Hellinikon Project at the Company’s office and then walk the delegates around the various worksites in the area especially in the underground coastal road.
Cost per person : 20.00 €
*limited participation on a first come first served basis
The famous marble that was used for the construction of the Parthenon in the 5th century BC is a deposit in the Mt. Pentelikon in Attica, about 20 km from Athens. In the ancient times, the huge pieces of stone had to be hauled to the building site by oxcart. The roadway used was a continual downhill, and followed the natural inclination of the land.

Pentelikon marble is currently exploited by DionyssoMarble who holds a leading position in the production, processing and trade of marble and other ornamental stone, marble dust and calcium carbonate filler. The increased demand for dimension stone in combination to quarrying in an environmentally sensitive area, has led the company to exploit part of its deposit using underground methods to minimize their environmental footprint.

To achieve this goal, the company participated in a three-year research program of the European Union, in the period 1999 – 2001. In cooperation with academic institutions and mining industries from EU countries, an integrated methodology of planning and programming for underground marble mining was developed.

The exploitation method is room and pillar with openings up to 15 meters wide, while the maximum height of the excavations is 30 meters. Following studies and simulations in collaboration with the School of Mining Engineering of the NTUA, preventive support measures (anchors) are implemented.

During the visit at DionyssoMarble, there will be an initial briefing by the company on site, its history and achievements and description of both the surface and underground mining methods. A visit to the quarry with emphasis on the underground excavations area will follow. A visit of the processing plant and the exhibition will conclude the excursion.

Cost per person: 20.00 €
*limited participation on a first come first served basis
Thursday, May 18, 2023

TECHNICAL VISITS

Final Program 61
5. Athens Metro Lines 2 & 3: Operations Control Centre

The Operations Control Centre (OCC) for Metro Lines 2 & 3 is located at the Syntagma Station, in the heart of Athens. It is the complex centre of train controls, communication, information & reports collection by the staff. It is the point where instructions are passed on to staff on site and where the overall co-ordination for a safe and effective operation on a 24/7/365 basis is performed.

Access to the visit location will be by actually riding Metro Lines 2 or 3 depending where the attendee is – from the Congress venue, go to the nearby Megaro Moussikis Station and take trains going toward Dimotiko Theatro Station, then get off at Syntagma Station and ascent to Concourse Level.

During the visit, the tasks of the OCC will be analyzed and the visitors will have an exclusive view of systems such as supervision and control of the signalling system, train movements, power and environmental system. An authority official of the Athens Metro will provide in-depth details of communication and co-ordination of all local staff as well as emergency services in case of an incident and restoration of traffic after the incident is over. Delegates will have the opportunity to ask questions about the various topics of operation and controlling of the Metro Lines. At the end of the visit, coffee and refreshments will be offered.

Estimated visit time at the OCC room:
1 – 1:30 hours (excluding delegate travel time)

Cost per person: 20.00 €
*limited participation on a first come first served basis
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About Athens

The city of Athens is much more than what it seems.

The cradle of democracy and civilization: yet, beyond its rich history, Athens is a vibrant modern European city with an old-town feel; ancient monuments fuse with a trendy, cosmopolitan scene. Masterpieces of significant architectural values stand tall today in a harmonious coexistence with impressive modern buildings.

German architect Ernst Ziller designed some of Athens’ most iconic buildings, giving the city the architectural identity and aesthetics needed as the capital of the new Greek state. The Presidential Mansion, Iliou Melathron (which houses the Numismatic Museum of Athens today), the National Theater, and the National Archaeological Museum give only a small example of Ziller’s heritage. On the other hand, modern buildings of high architectural value such as the House of Letters and Arts, the New Acropolis Museum, the Cultural Center-Stavros Niarchos Foundation, and the National Art Gallery remind us that Athens is a part of the 21st century.

In 1981, Athens hosted the ceremonial signing of Greece’s accession to the European Union, while four years later, in 1985, the city was inaugurated as the first European City of Culture. At the dawn of the 21st century, Athens hosted the 2004 Olympic Games, a landmark in modern history, as the Games returned to their birthplace.

This event gave rise to the construction of large modern infrastructure such as the International Airport “Eleftherios Venizelos”, the Metro, and the Attiki Odos highway. These and many more infrastructures represent the modern aspect of Athens.

This is why the capital of Greece is a unique travelling destination, especially for conferences: the city of Athens ties its past, present, and future into one exciting experience.

This is what makes Athens timeless.
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FROM A to Z
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Search for “The Event App” by EventsAIR on PlayStore. When you are prompted for a code upon launching the App, insert wtc2023.

iOS devices
Search for “The Event App” by EventsAIR on AppStore. When you are prompted for a code upon launching the App, insert wtc2023.
The Mobile App will be live two weeks before the congress.

CERTIFICATES OF ATTENDANCE
A Certificate of Attendance will be sent to all registered participants after the Conference via email.

CONGRESS DATES
Friday, 12 May to Thursday, 18 May 2023

CONGRESS VENUE
Megaron Athens International Conference Centre (MAICC)
Vas. Sofias avenue & Kokkali street, Athens 115 21, Greece
T. +30 210 7282000

The MAICC is distinguished as one of the leading and most technologically advanced conference venues in Europe. A building of modern architecture, dominates imposingly with its Doric austerity on the main avenue of Vassilisis Sofias. Right in the heart of the city, only a few minutes away by foot from Syntagma square -the main square of the city- and easily accessible by all means of
transportation. The Metro station is located a few meters away from the main entrance of the MAICC. It is also very close to major hotels, museums, shops, and fine restaurants, many of which are within walking distance.

CSR

ELEPAP (Rehabilitation for The Disabled) is the largest charitable non-profit organization in Greece that provides comprehensive support for children with motor disabilities and neurodevelopmental disorders. It provides innovative, constantly-evolving methods of education and rehabilitation, aiming for every child to reach their maximum potential and to integrate smoothly and equally into the social fabric.

In the context of the Conference’s Social Responsibility, delegates can support ELEPAP while participating in the Symbolic Marathon that will be held on Thursday May 18th, at the unique cultural monument of Panathenaic Stadium.

CURRENCY / EXCHANGE
The Greek currency is euro (EUR). Exchange offices and Banks are located all around the city centre.

ELECTRICITY
The electrical power supply voltage in Greece is 220-240 Volts (US/Canada: 110-120 Volts).

EMERGENCY CONTACTS
Police: 100
Fire department: 199
Medical emergency (ambulance): 166
European emergency contact number (all above): 112

ENVIRONMENTAL POLICY
The WTC2023 Conference is observing an environmentally friendly policy. In this context, every effort has been made from preparation to realization of the Congress, to minimize impact on the environment. The Organizing Secretariat observes an in-house recycling policy, and offices are hosted in energy saving premises.

Venue selection has taken into account easy access through a variety of public transportation environmentally friendly choices, thus minimizing carbon footprint.
EXHIBITION OPERATING HOURS
All exhibitors are listed in the Program Book (see Industry Section and Venue Floorplans). The exhibition will run during the following hours:

**On Site Exhibition**
- **Day 1** Monday, 15/05/2023 12:30-18:00
- **Day 2** Tuesday, 16/05/2023 08:00-18:00
- **Day 3** Wednesday, 17/05/2023 08:00-17:30

**Virtual Exhibition**
- **Day 1** Monday, 15/05/2023 08:30-18:00 EEST
- **Day 2** Tuesday, 16/05/2023 08:30-18:00 EEST
- **Day 3** Wednesday, 17/05/2023 08:30-18:00 EEST

**FOOD & BEVERAGES**
Coffee or Lunch during official breaks is included in the delegate registration fee and will be served in designated catering stations in all Congress areas.

**HYBRID FORMAT**
Overcoming the pandemic crisis, we are excited to be able to organize a physical event with interaction and full of networking opportunities in the beautiful and historic capital of Greece, Athens. Thanks to flexible technology provided to us, the Organizers have adapted the new trend in congresses structure: the WTC2023 will be held in a hybrid format. It will be mainly a Congress with physical attendance; nevertheless, it will also have a strong digital presence with participation of high-level attendees. Physical participation is encouraged so that this Congress makes a strong statement marking the reopening of face-to-face interaction and networking. All Congress sessions can be watched live via the WTC2023 virtual platform, by clicking on the session’s name, where you can find more information and the livestream itself.

**Live Support:** A Live Support system will be available for all attendees who will participate in the Conference, in order to resolve any technical issues that may arise and/or provide guidance through the platform.

**IMPORTANT NOTE**
WTC2023 sessions will be recorded and made available for post-viewing for a period of two (2) months following Congress dates.
Meeting Hub: You will be able to contact all participants and interact with your colleagues through the Meeting Hub section.

INTERNET ACCESS
Wifi will be available in all Conference areas.
Network: WTC 2023

LANGUAGE
English is the official language of the WTC2023. No simultaneous interpretation is provided.

LIABILITY AND INSURANCE
Registration fees do not include participants’ insurance against personal accidents, sickness and cancellations by any party, theft, loss or damage to personal possessions. Participants are requested to make their own arrangements with respect to health and travel insurance. The Greek Tunnelling Society and the Congress Organizer Convin SA accept no liability.

PHOTOS
Photos of sessions and Conference areas will be taken during the WTC2023 Conference. Attendees are advised to contact the Registrations Desk, for any issue or objection with this respect.

PRESS OFFICE
Members of the Press are welcome to register and receive the delegate material from the Registration Desk. Interviews and other Conference material will be made available upon request and through the official social media of the Congress and its Organizers.

SELF-CHECK-IN STATIONS
Conference delegates who do not have outstanding payments may collect their name badges through the Self-check-in stations, located near the main entrance of the Conference venue, thus avoiding queues for badge pick-up.

SOCIAL RESPONSIBILITY
WTC2023 promotes Corporate Social Responsibility taking and supporting actions and initiatives which reflect our
identity and sense of responsibility to society and people. No portion of food wasted: The partner catering company will donate all leftover food portions to the non-profit organization Boroume. Its mission is to reduce food waste and to fight malnutrition in Greece. Through the “Saving & Offering Food” program they save food on a daily basis from many sources and they offer it to charities that help people who are facing food insecurity. Their actions help the most vulnerable in our society as well as the environment by reducing organic food waste.

SUSTAINABILITY
WTC2023 aims to minimize the environmental impact of the event and contribute towards a safe and healthy environment, implements numerous measures, from the planning of the event to execution and from the moment you start looking into your travel arrangements until you are back from the conference. This Congress aspires to bring about sustainable solutions, to act as an inspiration and to raise the level of both learning and awareness, so that the positive impacts will outweigh the negative.
✔ We select local suppliers to avoid long distance transport of goods and people.
✔ We avoid printing and aim for an almost paperless office
✔ We offer contactless check-in for delegates and congress visitors.
✔ We reduce energy consumption by applying LED lighting and screens.
✔ We reduce the number and variety of amenities.

Travel:
✔ Use public transport instead of a taxi when navigating through Athens.
✔ When using a taxi, you might think of sharing it with one of your fellow delegates.

Hotel:
✔ Only use the air conditioning if it is necessary.
✔ Turn off the lights and TV when leaving the room.
✔ Select the type and amount of food during meals sensibly to avoid food waste.

TAXI SERVICES
Delegates can hire taxis at the taxi station located across the Congress Venue or address the Hospitality Desk for orders by phone.
TELECOMMUNICATIONS
There are 3 main GSM operators in Greece: Cosmote, Vodafone, and Wind. The protocols for digital mobile telephone transmissions are based on GSM technology, operating at the frequencies of 900 and 1800 MHz. Please contact your provider for further details.

TIME
Athens follows UTC/GMT +3 hours during the spring period.

TIPPING
In restaurants, hotels, taxis or other services, tipping is optional, and customized per case, depending on whether you are pleased with the service. Approximately 5% of the bill is a good guideline.

WEATHER
The weather in Athens in May is sunny and pleasant, with average temperature ranging between 20°C (68°F) & 25°C (86°F).

REGISTRATION BADGES
Registration badges will be used during the WTC2023 Congress. Participants will receive their badges upon check-in at the Registrations Desk. For identification purposes and admission to scientific sessions, participants are requested to wear their badges at all times. Admission to Congress areas will not be allowed without badge identification.

REGISTRATION & HOSPITALITY DESK
The Registrations Desk and Onsite Secretariat is located near the main entrance of the Congress Venue.

Operating hours:
Sunday 14/5/2023 ➔ 07:30-17:30
Monday 15/5/2023 ➔ 08:00-17:30
Tuesday 16/5/2023 ➔ 08:00-18:00
Wednesday 17/5/2023 ➔ 08:00-18:00

The Hospitality Desk will be operating near the Registrations Desk, offering services to delegates that could facilitate their travel arrangements and make their stay in Athens as pleasant as possible, including information about hotels and the city.

Professional Congress Organizer

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Welcome Reception
WTC2023 Welcome Reception will be held on May 14th, 2023 at 19:30 at Congress Venue, Foyer Labrakis (Level 1).

Conference Dinner
WTC2023 Conference Dinner will be held at the idyllic event space of Golf Prive, at the south suburban of Athens, distinguishing for offering a range of rooms, dining areas and private venues for exclusive functions, on Wednesday, May 17th, 2023 at 20:00. Busses will depart from the Conference Venue at 19:30. Cost per person €140. Please contact the registration desk for additional information.
projects are our heart, tunnels our veins, construction is our life.
WTC2023
Athletic Events

In an athletic spirit, WTC 2023 Organizing Committee invites delegates to participate in two exceptional athletic events which will be held in Athens as parallel activities of the Congress.

1. Cricket Competition
The Tunnelling Societies of Australia and Greece invite you to an athletic event that unites nations on a cricket pitch! During the World Tunnelling Congress of 2023, on May 17th, we welcome our latest Member Nation Pakistan with a cricket competition! All Member Nations are welcome to join us! Teams may comprise 3-6 participants, equipment will already be available. Check out the video below for more.

**Wednesday, May 17th, 2023**

📅 8.30 AM Departure from the Congress Venue by Shuttle
📍 Platon School  El. Venizelou St., 15354, Glyka Nera

2. Symbolic Marathon
Join us in a symbolic marathon at the unique cultural monument of Panathenaic Stadium which served for the revival of the Olympic Games. The event that will include a run of 10 laps, will be held on Thursday, May 18, 16:00 – 18:30, with arrival time set for 15:00.
In the context of the Conference’s Social Responsibility, the specific activity will support the brave children of ELEPAP (Rehabilitation for The Disabled) as the participants will choose during their registration the amount with which they wish to contribute to the organization’s work.

**Thursday, May 18th, 2023**

📅 16.00 (GMT+03:00 | Local Time)
📍 Panathenaic Stadium  Vasileos Konstantinou Anevue, Athens, 11635
ATTIKO METRO S.A. gets down to business again in Athens!

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<td>TERRATEC</td>
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<td>TBM waterproofing</td>
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<td>WUERTH</td>
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<td>Zitron</td>
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**Sponsors - Indoor Space**

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<td>ARCELORMITTAL Fibres</td>
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<td>BEASY</td>
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<td>CEG TBM Germany GmbH</td>
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<td>HERRENREICH AG</td>
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<td>51-52-53-54</td>
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<tr>
<td>Japanese Tunnelling Association</td>
<td>Exhibitor</td>
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<tr>
<td>MAPRI SpA UFT-Underground Technology Team Int.</td>
<td>Platinum</td>
<td>60-61-62-63</td>
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<tr>
<td>Master Builders Solutions Deutschland GmbH</td>
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<td>68-69-70-71</td>
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<tr>
<td>May Power Transmission</td>
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<tr>
<td>NORDIA - CHYSIO</td>
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<td>ROBBINGS COMPANY</td>
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<tr>
<td>Sandvik Mining &amp; Rock Solutions + SO Underground</td>
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<td>78-81</td>
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<td>Sika AG</td>
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<td>ARKAN DRAULUK</td>
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<td>BENTLEY SYSTEMS</td>
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<td>FAMA</td>
<td>Exhibitor</td>
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<td>FISHER</td>
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<td>F. WILLOCH GmbH &amp; Co. KG</td>
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<td>Min المهندس المعماري</td>
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<td>Mobot</td>
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<td>WTC 2026 Montreal Candidate City</td>
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<td>ELIN Motoren GmbH</td>
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<td>Elkuch Group</td>
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<td>GEODATA Surveying &amp; Monitoring Group</td>
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<td>HODMP GmbH &amp; Co. KG</td>
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<td>PEN Herbis Ltd</td>
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<td>Pheonix Precision Systems Gmbh,</td>
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<td>Scholler special machines GmbH &amp; Co. K</td>
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**Sponsors - Outdoor (tent)**

**Exhibitors List**

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<td>Tradebit</td>
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<td>Webac</td>
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<td>ADCOS - International &amp; ADCOS - International Asia</td>
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<td>M1 E</td>
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<td>Foresight</td>
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<td>MH - AS Hellas</td>
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<td>Spinra</td>
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<td>THE ALISMORE</td>
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**Sponsors Outdoor (tent)**

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<td>ADIFL Construction Fibres</td>
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<td>Exhibitor</td>
<td>117-118 F</td>
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<td>COM SM</td>
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<td>123-124 F</td>
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<td>CFF GmbH - Compact Filter Technic</td>
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<td>140-148 F</td>
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<td>NX</td>
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<td>O-Pritlast S.A.</td>
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<td>PROTAN AS - Tunneling &amp; Mining</td>
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<td>Tel</td>
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<td>Taaks</td>
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<td>TRAKKON Engineering &amp; Industries</td>
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<td>Yuneec Traffic</td>
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**Sponsors in Display Zone (Sakkottas Hall)**

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<td>Baumhueter</td>
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<td>S5 Display</td>
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<td>Codel International Ltd</td>
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<td>ELEBOR S.A.</td>
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<td>Sika Services</td>
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<td>Technogena</td>
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<td>Thracia Plastic</td>
<td>Exhibitor</td>
<td>S8 Display</td>
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CRCHI is committed to becoming the world's leading underground engineering equipment and rail transit system provider. Based on the know-how, expertise and experience, CRCHI is at the forefront to promote the effectiveness and quality of underground construction, to reduce the cost and minimize the impact to environment and in the end to make our society and the world better, smarter and more sustainable.
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