

*Workshop on*  
**NATM & TBM TUNNELLING INCLUDING  
RISK MANAGEMENT – ISSUES & CHALLENGES**

**6 - 8 February 2018, New Delhi**



*Organised by*



**Tunnelling Association of  
India**



**Central Board of  
Irrigation & Power**

*under the aegis of*



**International Tunnelling and  
Underground Space Association**

## INTRODUCTION

Constructing tunnels and caverns in the tectonically active Himalayas is full of challenges and uncertainties. Experience has shown that construction of tunnels and caverns in Himalayas requires a good understanding of geology, adequate site investigation, proper tunnel design and selection of suitable construction methods and technologies. What is the limit of adequate investigation to reduce uncertainty is the question being asked by many professionals; whether it is possible to do complete geological investigation before D&C stage; What is the way out to reduce uncertainties creating problem during execution of work. These issues are of importance for design and construction of tunnel and underground works, design and selection of suitable construction methods based on geological conditions are important for hydropower, road transport, rail network to remote regions of continent size country besides development of infrastructure projects like Metro etc. A proper understanding of all these issues can definitely help in reducing cost and time over run.

To focus on the various issues and challenges being faced for the design and construction of the tunnels on soft and hard rock, it is proposed to organize a Workshop on 'NATM & TBM Tunnelling including Risk Management – Issues & Challenges' on 6-8 February 2018 in the Conference Hall of CBIP at New Delhi.

## OBJECTIVES

The objective of this workshop is to update the knowledge of tunnelling professionals, i.e., Civil Engineers, Geologists and tunnel technician in the field of tunnel and underground works by conventional and mechanised method (including necessary site investigations, design construction, monitoring and contractual aspects) and the technologies, including the risk management process through out a project cycle with specific focus for owners and decision makers consulting engineers, contractor and other with an interest in risk management principles.

## TOPICS

Tuesday 6th February 2018	Topics
09:00 – 09:30	Registration
09:30 – 09:45	Welcome and Inaugural Session
09:45 – 10:30	Challenges in Tunnelling
10:30 – 11:00	Tea Break
11:00 – 12:00	Introduction to the essential pillars of NATM tunnelling
12:00 – 13:00	TBM–tunnelling – when to use which kind of TBM
13.00 – 14:00	Lunch Break
14:00 – 15:00	How to deal with uncertainties in tunneling
15:00 – 16:00	Contractual aspects: how to deal with risks – the NATM approach
16:00 – 16:30	Tea Break
16:30 – 17:30	Contractual aspects for dealing with risks in TBM tunnelling
Wednesday 7th February 2018	
08:30 – 09:30	Geotechnical and Structural Design Steps in NATM Engineering
09:30 – 10:30	Design aspects for lining systems in TBM tunnelling

## WORKSHOP BENEFITS

The Workshop will introduce to the participants, the latest tunneling techniques and will help them to develop their skills so as to:

- Select suitable investigation techniques for tunnelling;
- Analyze ground conditions for tunnelling;
- Assist in tunnel & tunnel shaft construction methods and tunnel linking selection;
- Select and specify the most suitable equipment for tunnelling;
- Develop a better understanding of the application and use of micro-tunnelling techniques;
- Develop techniques to mitigate anticipated and unanticipated tunnelling problems;
- Develop tunnel construction schedules more accurately;
- Manage tunnel construction projects more successfully and safely;
- Develop an awareness for the latest tunnelling techniques and future trends in the industry.

## WHO SHOULD ATTEND

The Workshop is designed for professionals working in public or private sector organizations dealing with the design and construction of tunnel and underground works. The workshop is of interest to tunnel designer and operators, construction and project managers, engineers (both field and design office), construction supervisory personnel, construction cost estimators, geotechnical engineers and individuals in the construction industry wanting a better grounding in modern tunnelling techniques and practices, geologists, regulatory bodies. Government Departments, Tunnel Building Contractors & Consultants. Suppliers of Products & Services for Tunnelling Construction. Fire Authorities

10:30 – 11:00	Tea Break
11:00 – 12:00	Risk management - Standards and Guidelines
12:00 – 13:00	Monitoring Schemes and interpretation in NATM Tunnelling
13:00 – 14:00	Lunch Break
14:00 – 15:30	Monitoring and Data Management in TBM Tunnelling
15:30 – 16:00	Tea Break
16:00 – 17:30	Risk Management Processes and Application - Risk Fact Sheets
<b>Thursday 8th February 2018</b>	
08:30 – 09:30	Auxiliary Methods in NATM tunnelling in difficult geotechnical conditions
09:30 – 10:30	Face Support in soft ground TBMs
10:30 – 11:00	Tea Break
11:00 – 12:00	Risk Management Techniques
12:00 – 12:30	Innovations in TBM tunnelling
12:30 – 13:30	Lunch Break
13:30 – 15:00	Compressed Air Works in TBM – tunnelling
15:00 – 15:30	Tea Break
15:30 – 16:30	Long term behaviour of support elements in tunnels - Results of an Austrian research project
16:30 – 17:00	Questions and Closing

dealing with Infrastructure Tunnels, Technical and Research Institutes, Universities dealing with Tunnelling. Organization & associations active in the Tunnelling World and Funding Agencies.

### VENUE

The workshop will be held in the Conference Hall of Central Board of Irrigation and Power, Malcha Marg, Chanakyapuri, New Delhi - 110021

### OFFICIAL LANGUAGE

The official language of the workshop will be English only.

### REGISTRATION FEE

The registration fee for participation in the workshop is Rs.15,000/- plus GST 18% per participant by cash/cheque at par/demand draft drawn in favour of “**Central Board of Irrigation and Power**”, payable at New Delhi. 10% discount in the registration fee will be extended to the members of TAI and CBIP.

The registration fee includes working lunch, tea/coffee during the workshop. Registration fee does not include payment for hotel accommodation or meals except those specifically indicated in the Workshop Programme. **Registration fee once paid will not be refunded.**

### SPONSORSHIP

Scope exists for organizations to be the Sponsor on lumpsum payment with following benefits:

### Sponsor – Rs. 2,00,000/-

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- Name of the organization in the list of Supporter
- Organization may nominate three delegates
- Half page advertisement in the proceeding volume
- Distribution of literature/brochures

### WORKSHOP SECRETARIAT

#### Tunnelling Association of India

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### CONTACT PERSON

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### NOTES:

1. Participants will have to make their own arrangement for travel, boarding and lodging, etc.
2. Last date for receipt of Registration Form is 31st January 2018. Spot registration facility will also be available, provided prior information is received.

## RESOURCE SPEAKER

The Lectures' will be delivered by eminent international experts of International Tunnelling and Underground Space Association (ITA) during the Three days deliberations of the Workshop.



**Robert Galleris** Mining Engineer with specialization in Geotechnics and Tunnelling; he graduated at Montanuniversität Leoben (MUL), Austria. In 1997 he obtained a Ph.D. in Tunnelling. From 1997 to 2007 he worked with GEOCONSULT, an international consultant in the field of underground constructions. From 2001 to 2004 he was head of the underground construction division with about 50 employees and as such Project Manager for several underground projects. From end of 2004 until becoming Professor at MUL in November 2006 he was head of GEOCONSULT Innsbruck and as such Project Manager of an international JV working on the design of the Brenner Base Tunnel. He has experience in several national and international research projects e.g. being involved in the European research project "UPTUN – upgrading of existing tunnels" in which 41 companies and institutions were involved. From 2011 to 2016 he was Project Coordinator of the Research Project "DRAGON – Development of Resource-efficient and

Advanced underground technologies" funded by the EU-commission within the 7th Framework Programme. Since 2015 he is project coordinator of the Horizon 2020 Projekt "RICAS - Underground Research Infrastructure for Advanced Adiabatic Compressed Air Energy Storage" and is involved in several tunnel projects

Robert Galler is head of Department ZAB – Zentrum am Berg, an underground 1:1 scale research and training center for all fields of underground engineering. He is also head of department "Mineral Resources Engineering".

Since the year of 2000 Robert Galler is Member of the management board of the Austrian Society for Geomechanics (ÖGG – [www.oegg.at](http://www.oegg.at)), since 2005 he is the Austrian representative of the International Tunnelling Association ([www.ita-aites.org](http://www.ita-aites.org)) and head of the editorial board of the journal Geomechanics and Tunnelling". Since 2013 Robert Galler is Chairman of ITA-CET, the committee for communication, education and training within the International Tunnelling Association.



**Martin Entacheris** a civil engineer specialized in tunnelling, ground engineering, risk and construction management. He graduated from Vienna University of Technology (MSc) and obtained a Ph.D. in Tunnelling from Montanuniversität Leoben under the supervision of Professor Robert Galler. His research is focused on performance prediction of tunnel boring machines and risk management and has led to in multiple international publications, patents and research awards.

Martin Entacher worked as a construction manager for Züblin / Strabag (2014–2017) where he was responsible for delivering ground engineering and interdisciplinary ground engineering / tunneling projects. Since 2017 he works as a project manager for RiskConsult, an Austrian engineering consultancy specialized in risk management of large scale infrastructure projects. RiskConsult is involved in the cost

and risk management of numerous major tunneling projects in the Alps including the Gotthard Base Tunnel, Brenner Base Tunnel or the Koralm Tunnel.



**Lars Babendererde** is a Mechanical Engineer with the specialization in mechanized tunnelling and monitoring systems. He graduated in 1991 from the University of Applied Sciences in Friedberg, Germany. During his studies he worked on construction projects involving TBMs and with TBM manufacturers in Canada, France and Germany. He represented a UK-based TBM guidance system manufacturer in the German speaking countries. After graduating he founded together with Dr.-Ing. Siegmund Babendererde a consultancy specialising in TBM operation and projects worldwide. In 1996 he become managing partner of the Babendererde Engineers GmbH, based in Germany. A sister company, based in Seattle WA, US was founded in 2002 and Lars became managing partner in this company which serves the North American market with consulting, construction management and engineering services for TBM tunnelling.

In 2002, Babendererde Engineers started with marketing TPC (Tunnelling Process Control), a software to manage and visualise all generated data on a TBM project. Since 2005, now together with Dipl.-Ing.

Tim Babendererde, the company grew into a full service engineering consultancy, operating world-wide from offices in Seattle, Bad Schwartau and Hanover to support the TBM tunnelling industry with design, construction management, trouble shooting and software solutions. With the accrued knowledge in softground and hard-rock tunnelling, the whole team around the management assists owners, designers and contractors with customized services. This includes projects from small, challenging remote controlled pipe-jacking to XXL TBMs for road tunnels, but as well special projects like underground energy storage plants, custom compressed air applications or tunnel lining alternatives.

In national and international proceedings, Lars Babendererde served as Technical Witness or Court Appointed Expert in DRBs or legal cases, including appearances in front of courts.

Further, he engaged himself in national and international institutions. He has memberships with the UCA of SME, the BTS and TAC. He is member of the Executive Council with the ITA and member of the German DAUB. Occasionally, he enjoys giving lectures during congresses and workshops.