



Joined International Conferences on

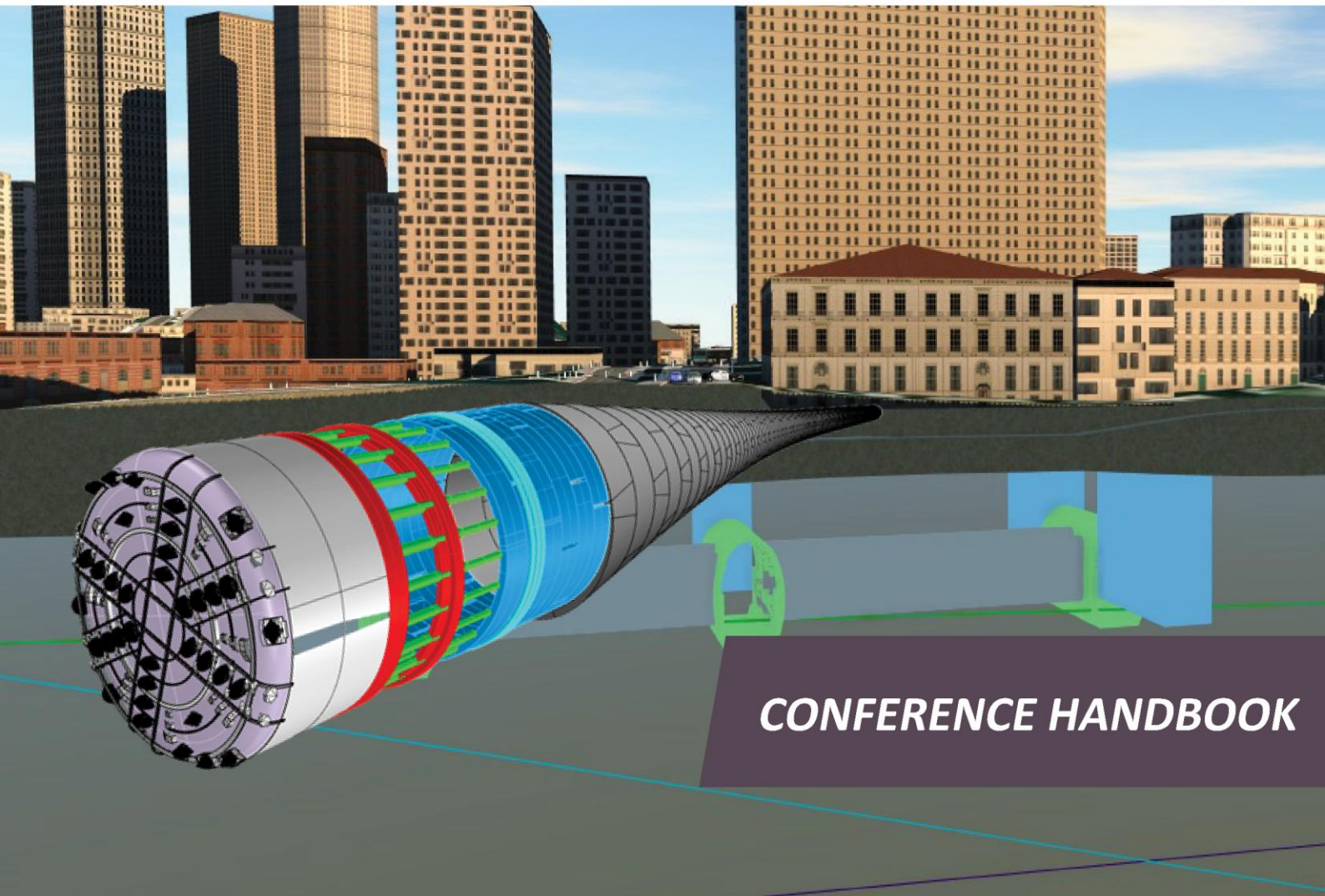
# Construction Technology in Tunnelling and Underground



## Tunnel Boring Machines in Difficult Grounds

19-23 January 2026, Melbourne, Australia

CTTU2026 & TBM DiGs



**CONFERENCE HANDBOOK**

**Innovating Underground:** Resilient and Intelligent  
Solutions for Next-Generation Tunnelling



**MONASH**  
University



# Joined Conferences on CTTU and TBM DiGs 2026

Construction Technology in Tunnelling and Underground (CTTU)  
and  
Tunnel Boring Machines in Difficult Grounds (TBM DiGs)

## Handbook

19-23 January 2026

Monash University, Australia

## Organiser



## Co-Organisers and Supporting Institutions





## Getting to Campus and Monash Guest wi-fi

### By Train

- Pakenham/Cranbourne line trains – Take the train to Huntingdale Station, then the 601, 630 or 900 bus to campus

### By Bus

- 601 bus is a direct shuttle to Huntingdale Station
- 630, 631, 703, 733, 737, 802/804/862, and 900 bus routes stop in the Bus Interchange (Monash University stop)

### Taxi and Uber

- 17 Scenic Boulevard, Clayton, VIC 3168

### Meter parking

- Many of our parking meters accept coins and credit cards. You can also download the [OPark app](#) to pay for all-day parking and hourly parking at Clayton (multi-level car park only), Parkville and Peninsula from your smart phone.

## Connect to Monash Guest wi-fi

The Monash guest wi-fi network is available at all our Australian campuses for guests of the University.

1. In your wi-fi settings, select the **Monash Guest Wi-Fi** network.
2. If you're connecting to the network for the first time, click **Don't have an account?** at the bottom of the page.
3. Complete the registration by entering your:
  - A. username
  - B. first name
  - C. family name
  - D. email address
  - E. mobile number.
4. Read and accept our *Acceptable Use Procedure*. You'll then be connected to the guest wi-fi.

Your guest w-fi account is valid for seven days from registration, and your session will be active for 24 hours. After that, you'll need to log in to reconnect. The account can be used across a maximum of three devices (no more than two devices can be connected at the same time).

**Monash security services are available on all our campuses 24/7.**

### Emergencies On Campus

Call 03 9905 3333 or 333 from a Monash phone (security, 24 hours)

### Emergencies Off Campus

Call 000 (police, ambulance, fire)

## **Organising Committee**

**Chair:** Qianbing Zhang

**Co-Chairs:** Wei Wu, Jelena Ninic, Zhenhao Xu, Amanda Huang, Jurij Karlovsek

**Members:**

Qing Ai: Shanghai Jiao Tong University, China  
Xiaohua Bao: Shenzhen University, China  
Jian Chen: Huazhong University of Science and Technology, China  
Ross Digby: Victorian Tunnelling Centre, Holmesglen, Australia  
Yong Fang: Southwest Jiaotong University, China  
Qiuming Gong: Beijing University of Technology, China  
Xuzhen He: University of Technology Sydney, Australia  
Xing Huang: Wuhan University, China  
Chaojun Jia: Central South University, China  
Mingfeng Lei: Central South University, China  
Zongze Li: Luleå University of Technology, Sweden  
Xiaoli Liu: Tsinghua University, China  
Ke Ma: Dalian University of Technology, China  
Yue Pan: Shanghai Jiao Tong University, China  
Gerard Quigg: CPB Contractors, Australia  
Tong Joo Sia: SMEC, Australia  
CK Tsang: SMEC, Australia  
Philip Tsang: Suburban Connect, Australia  
Huachuan Wang: Shandong University, China  
Jack Wu: EIC Activities, Australia  
Huaina Wu: Hunan University, China  
Nuwen Xu: China University of Mining and Technology-Beijing, China  
Yadong Xue: Tongji University, China  
Haitao Yu: Tongji University, China  
Chengguo Zhang: University of New South Wales, Australia  
Yanlong Zheng: Southeast University, China  
Annan Zhou: RMIT University, Australia  
Mingliang Zhou: Tongji University, China  
Huamei Zhu: Durham University, UK  
Jianbo Zhu: Shenzhen University, China  
Yang Zou: Luleå University of Technology, Sweden



## Advisory Committee

**Chair:** Jian Zhao

**Members:**

Lars Babendererde, Germany

Cemal Balci, Turkey

Nuh Bilgin, Turkey

Karin Böppler, Germany

Wout Broere, Netherlands

Ha Bui, Australia

Linard Cantieni, Switzerland

Xiangsheng Chen, China

Zuyu Chen, China

Mahdi Disfani, Australia

Arnold Dix, Australia

Robert Galler, Austria

Jafar Hassanpour, Iran

Chuan He, China

Tom Iseley, USA

Shucaï Li, China

Quansheng Liu, China

Lars Langmaack, Germany

Hanbin Luo, China

Ulrich Maidl, Germany

Günther Meschke, Germany

Mike Mooney, USA

Guillermo Narsilio, Australia

Priscilla Nelson, USA

Bjorn Nilsen, Norway

Daniele Peila, Italy

Jamal Rostami, USA

Franz Sempelmann, Austria

Shuilong Shen, China

Giovanni Spagnoli, Germany

Markus Thewes, Germany

Kurosç Thuro, Germany

Jenny Yan, China

Chungsik Yoo, Republic of Korea

Zhiguo Zhang, China

Hehua Zhu, China

## **Welcome Message**

Dear Friends and Colleagues,

Welcome to the Joined International Conferences on Construction Technology in Tunnelling and Underground (CTTU) and Tunnel Boring Machines in Difficult Grounds (TBM DiGs) in 2026.

The CTTU conference series was first established in Melbourne in 2020 with the vision of advancing research, fostering knowledge exchange, and promoting technological innovation in tunnelling and underground infrastructure. Since its inception, CTTU has grown into a leading forum that spans a broad spectrum of topics, including advanced technology applications in underground projects, information modelling and digital engineering, sensing and monitoring technologies, machine learning and big data analytics, data structuring and interoperability, automated decision-support systems, process modelling for construction management, semantic web services, and TBM automation.

The TBM DiGs conference series, launched in Singapore in 2015, provides a dedicated global platform for discussing the challenges and opportunities of TBM tunnelling in difficult ground conditions. With previous editions held in Istanbul (2016), Wuhan (2017), Golden, USA (2019), and Leoben, Austria (2022), TBM DiGs has established itself as a premier venue for knowledge exchange on ground characterisation, case histories, field monitoring, physical and laboratory testing, numerical modelling, ground improvement, TBM design and operation, tunnel support systems, instrumentation, and geotechnical risk management.

In 2026, these two internationally recognised conferences will come together for the first time in a landmark joint event hosted in Melbourne, united under the theme:

### **Innovating Underground: Resilient and Intelligent Solutions for Next-Generation Tunnelling**

This joint event brings together the complementary strengths of both conference series, creating a unique and dynamic forum for discussing cutting-edge developments in TBMs, tunnelling methodologies, geotechnical engineering, digital and data-driven technologies, automation, and underground construction management. The convergence of CTTU and TBM DiGs will foster interdisciplinary exchange, deepen collaboration between research and industry, and promote innovative approaches to the design, construction, operation, and maintenance of underground infrastructure.

On behalf of the Organising Committees, we warmly welcome scientists, engineers, researchers, industry professionals, and policymakers from around the world to Melbourne. We look forward to your participation, your insights, and your contributions as we work together to shape the future of resilient, intelligent, and sustainable underground solutions.

We wish you an inspiring and enjoyable conference experience in Melbourne.

**Chair:** Qianbing Zhang

**Co-Chairs:** Wei Wu, Jelena Ninic, Zhenhao Xu, Amanda Huang, Jurij Karlovsek



**Qianbing Zhang** (Chair)  
Monash University, Australia



**Wei Wu** (Co-Chair)  
Nanyang Technological University



**Jelena Ninic** (Co-Chair)  
Durham University, UK



**Zhenhao Xu** (Co-Chair)  
Shandong University, China



**Amanda Huang** (Co-Chair)  
Swinburne University of Technology



**Jurij Karlovsek** (Co-Chair)  
University of Queensland, Australia

**Secretaries:**

Zhihang Li

Xilin Chen

Zeng Ding

Dapeng Wang

Donghao Lan

Ruolin Xu

Yue Liang

Qian Lei

Haohan Xiao

Hassan Tumwiine

Iftikhar Ahmad

Matin Rouhani

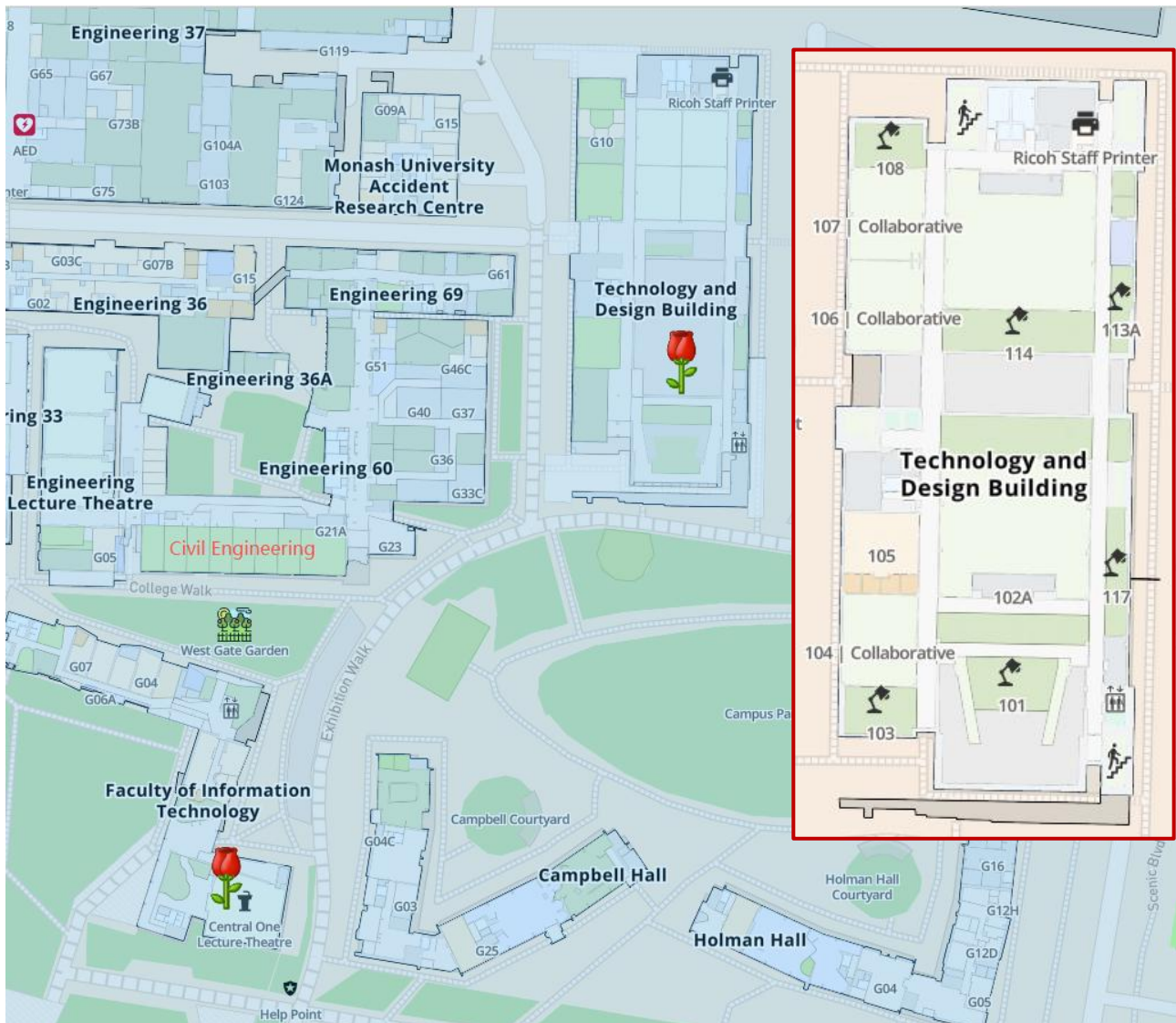
Xuan Ma

Yaolan Tang

**Website:** <https://www.monash.edu/engineering/tunnel2026>

**Email:** [civeng-tunnel@monash.edu](mailto:civeng-tunnel@monash.edu)

## Conference Venue: Monash University Clayton Campus



### Venue Addresses






- **New Horizons:** 20 Research Way, Clayton VIC 3168
- **Building for Technology and Design:** 20 Exhibition Walk, Clayton VIC 3168
- **Central One Lecture Theatre:** 25 Exhibition Walk, Clayton VIC 3168
- **Victorian Tunnelling Centre (VTC):** Corner of Rae Street and Drummond Street, Chadstone VIC 3148
- **PARKROYAL Monash Melbourne:** 872 Blackburn Rd, Clayton VIC 3168

Scan It to Download Map



## Programme of CTTU and TBM DiGs 2026

Date	Monday 19/01/2026	Tuesday 20/01/2026	Wednesday 21/01/2026	Thursday 22/01/2026	Friday 23/01/2026
Programme	UIDC 2026 Design Competition	TUST 40th Anniversary Celebration	Course/Visit Welcome Reception	CTTU and TBM DiGs 2026	
Morning	Opening  S1 Presentation	Anniversary  S1 Presentation	Visit VTC Facility	Opening  Keynote	Keynote
	Building for Technology and Design Room: 102		Victorian Tunnelling Centre (VTC)	Central One Lecture Theatre	
Afternoon	S2 Presentation	S2 Presentation	Short Course  Monash BEST Showcase	Parallel Sessions	Parallel Sessions  Closing Remark
	<b>Building for Technology and Design: Level 1</b>				
	Room: 102		Room:104	Rooms: 102, 104, 106 and 107	
Evening	–	TUST Board Meeting	Welcome Reception	Banquet Awards	–
	–	Monash Club	Building for Technology and Design (102)	PARKROYAL Monash Melbourne	–

## Underground Infrastructure Digital Challenge (UIDC 2026)

### Welcome Message

Underground infrastructure plays a critical role in shaping the future of sustainable and resilient cities. Designed to endure for more than 100 years, underground infrastructure constitutes an essential component of urban systems, supporting daily societal functions while contributing significantly to long-term societal value and environmental sustainability.

Technologies such as simulation, modelling, digitisation, and virtualisation, cornerstones of the Industry 4.0 framework, have transformed how engineering projects are planned, delivered, and maintained. As climate change imposes urgent challenges on the built environment, infrastructure resilience has emerged as a strategic priority aligned with the United Nations Sustainable Development Goals (SDGs). The transition toward Industry 5.0 underscores this evolution, placing sustainability, resilience, and human-centric values at the heart of how we design and manage infrastructure systems.

At the core of this transformation is the Digital Twin (DT) paradigm, powered by the convergence of data science, AI, and cross-disciplinary digital technologies. DTs offer a transformative shift, from a technology-driven approach to one that prioritises long-term public value through adaptive, intelligent, and sustainable infrastructure systems.

The **1st International Underground Infrastructure Digital Challenge (UIDC 2026)** brings together students and early-career professionals to tackle these critical challenges. With a focus on **Digitalisation, AI, and Sustainability**, this design competition invites forward-thinking individuals to develop innovative solutions that enhance the performance, resilience, and environmental responsibility of underground infrastructure.

A core objective of UIDC 2026 is to establish **open benchmark datasets and reproducible methodologies** that support future research, education, and industry innovation. By participating, you contribute to building a shared digital foundation for analysing and improving underground infrastructure performance.

Hosted by Monash University, in collaboration with international academic and industry partners, and held in conjunction with the TBM DiGs & CTTU 2026 Conference, this free-to-enter event offers a range of technical challenges, from 3D TBM simulation and machine learning-based tunnel inspection to digital twin development and lifecycle carbon assessment.

Participants will have the opportunity to demonstrate their expertise in digital modelling, data analytics, and sustainable engineering. Outstanding submissions will be recognised through awards, presentation opportunities, and potential publication in special issues of leading academic journals.

We warmly welcome you to this global competition and look forward to the creativity and talent you will bring in shaping the future of underground infrastructure.



## Objective

**UIDC 2026** invites students and early-career professionals to address the most pressing challenges shaping the future of underground infrastructure through a multidisciplinary, innovation-driven lens. While Tunnel Boring Machines (**TBMs**) are a key focus, the challenge also embraces a broader technological landscape, leveraging **Digital Twins**, **artificial intelligence (AI)**, and **sustainability analytics** as transformative enablers of next-generation solutions. The goal is to develop forward-thinking, value-driven proposals that demonstrate how digitalisation and cross-disciplinary collaboration can enhance the long-term performance, societal value, and environmental sustainability of underground infrastructure.

## Team Composition (2 to 5 Participants)

- Each team consists of **2 to 5** participants. Interdisciplinary teams are strongly encouraged.
- Academic supervisors may also be included if they provide support to the team.

## Challenge Themes

Participants are invited to select **one or more challenges** that align with the competition themes: **Digitalisation, AI, and Sustainability**. The table below provides example challenges. Participants may also define their own topics under “Other Emerging Topics,” as long as the topic aligns with one or more of the three themes.

Participants may use **publicly available datasets**, including **example datasets** provided for specific challenges. Where applicable, a list of recommended datasets will be made available. Alternatively, participants may utilise **self-collected data**, **simulation outputs**, or **synthetic datasets**, provided the sources and preparation processes are clearly documented. To support transparency and replicability, participants are **encouraged** to submit source files.

No.	Challenge Themes	Key Tools/Data (Example)
1	3D Modelling TBM Excavation	FLAC3D, Plaxis, Kratos, Midas GTX
2	AI-Driven Ground Condition Prediction	TBM datasets, machine learning algorithms
3	Tunnel Condition Monitoring and Maintenance	Leakage data, crack detection images (ML/CV)
4	Sustainability and Carbon Assessment	BIM, Power BI, Excel, Python
5	Other Emerging Topics	Self-defined (e.g. resilience, safety)

## Deliverable and Key Dates

Deliverable	Brief Description	Due date
<b>Registration</b>	Completion of Registration Form ( <a href="#">Download from Website</a> )	<b>31 July 2025</b>
<b>Technical Report</b>	Max 10,000 words, include objectives, methodology, findings, discussion, and recommendations	<b>31 December 2025</b>
<b>Model Files/Source Code</b>	Organised folders or GitHub repository with instructions	<b>31 December 2025</b>
<b>Presentation</b>	10-minute presentation + 5-minute Q&A	<b>19 January 2026</b>

## Evaluation Criteria

All components will be evaluated using the **ADVICE** criteria.

### Technical Report (60%):

- **Automation:** Automated workflow for replicability, simplicity, and accessibility for model implementation (10%)
- **Digitalisation:** Use of digital technologies to enhance integration and traceability (10%)
- **Visualisation:** Clear and effective presentation of results through high-quality visualisation (10%)
- **Innovation:** Technological innovation in data preparation, model computation, and result validation (10%)
- **Comprehension:** Comprehensive understanding of technical challenges and solutions (10%)
- **Efficiency:** Computation efficiency for rapid and accurate modelling (10%)

### Presentation (40%)

- **Content & Knowledge:** Demonstrates understanding; comprehensive information; addresses all issues. (10%)
- **Organisation & Structure:** Logically organized with clear structure and smooth transitions between points. (10%)
- **Visual & Delivery:** Visuals are relevant; engaging presentation; Effectively integrated. (10%)
- **Q&A:** Response to questions knowledgeably, thoughtfully, and with confidence. (10%)

## Awards and Certificates

Announcements will be made at the Conference Banquet on 22 January and during the Closing Remarks on 23 January.

- Best Integrated Solution – For excellence across multiple challenge paths
- Engineering Innovation Award – For novel simulation or modelling approaches
- Best Visualisation – For clarity and creativity in presenting findings
- Sustainability Impact Award – For significant contribution to decarbonisation
- Best Student Team – For overall team collaboration and technical depth

## TUST Special Issue on Open-source Datasets and Benchmarks for Tunnelling

Selected teams may be invited to publish their methodologies and datasets in the journal of ***Tunnelling and Underground Space Technology Special Issue on Open-source Datasets and Benchmarks for Tunnelling***, subject to mutual agreement and peer-review procedures.

## Hybrid Presentations

### Organisers



### Zoom Webinar

ID: 813 4451 4733

Passcode: 20260119



## Underground Infrastructure Digital Challenge (UIDC 2026)

19 January: 09:00-16:00

Building for Technology and Design: Room 102

Scan It to Find Location



Time	Activity	Note
9:00-9:30	Registration and Presentation Slide Submission	
9:30-9:50	Welcome Address	
10:00-12:00	Morning Session	
	In-person Groups in Room 102	Online Groups via Zoom (Room 104)
12:00-13:00	Lunch Break	
13:00-15:00	Afternoon Session	
	In-person Groups in Room 102	Online Groups via Zoom (Room 104)
15:00-15:15	Closing Remarks & Group Photo Building for Technology and Design: Staircase Room 101	

### Presentation Slides

Please prepare your **presentation slide of no more than 10 minutes**, followed by a 5-minute Q&A session.

### Evaluation Criteria

All presentations will be evaluated using the **ADVICE** criteria.

### Awards and Certificates

Announcements will be made at the Conference Banquet on 22 January and during the Closing Remarks on 23 January.

### In-person Presentations: 12 Groups

Time	Group	Institute	Theme
10:00	24	Huazhong University of Science and Technology	C1-3
10:15	21	CutIGA-Group (Ruhr University Bochum, Durham University, Hanoi Electric Power University, Hanoi University of Mining and Geology)	C1
10:30	18	Shanghai Jiao Tong University	C3
10:45	11	Good luck (The University of Melbourne, The Australian National University, RMIT University)	C3
11:00	16	Tongji University	C2
11:15	19	DeepTunnel Seer (University of Birmingham, University College Cork, Durham University)	C3
<b>Lunch Break</b>			
13:00	28	Twin4US (Durham University, University of Birmingham)	C5
13:15	2	Hunan University	C3
13:30	34	Beijing Jiaotong University	C2
13:45	35	MSG (Sichuan University, Central China Normal University, Southwest Petroleum University)	C5
14:00	17	Zhejiang University	C3
14:15	25	SZU Team (Shenzhen University)	C3

### Online Zoom Q&A: 12 Groups

Time	Group	Institute	Theme
10:00	3	Universidad Politecnica de Catalunya-Barcelona, Universidad Nacional de Ingenieria-Lima	C5
10:15	1	Norwegian Geotechnical Institute	C2
10:30	5	Central South University, University of Technology Sydney, Xi'an University of Technology, RIKEN Center for Advanced Intelligence Project, CSIRO	C2
10:45	37	Wuhan University	C2
11:00	14	China University of Mining and Technology, Shandong University	C2
11:15	36	Shenzhen University	C3
<b>Lunch Break</b>			
13:00	23	Central South University	C1
13:15	31	University of Science and Technology Liaoning	C5
13:30	10	Anhui University of Science and Technology	C3
13:45	26	Huazhong University of Science and Technology	C5
14:00	15	SIGC: Anhui University of Science & Technology	C5
14:15	7	Xi'an University of Technology, University of Technology Sydney, Central South University	C5

#### Submission of Recording

For the **online groups**, please prepare a **pre-recorded presentation of no more than 10 minutes** and submit it to [civeng-tunnel@monash.edu](mailto:civeng-tunnel@monash.edu) by **16 January 2026**.

#### Online Q&A Session

The **Q&A session will be conducted online** at the corresponding scheduled time on 19 January 2026.

**Zoom ID:** 830 7199 5344; **Passcode:** 20260119

## TUST 40th Anniversary Celebration

### Anniversary Background and Journal Legacy

**Tunnelling and Underground Space Technology (TUST) Incorporating Trenchless Technology Research** is an international, peer-reviewed journal that helps you stay at the forefront of underground construction and trenchless technology. We bring together original research and real-world case studies to support innovation and progress in the field.

- Explore practical solutions for designing, building, and maintaining tunnels and underground spaces
- Discover new approaches to planning, safety, and comfort in underground environments
- Learn about the latest methods for installing and rehabilitating pipelines, ducts, and cables—without disruptive digging
- Connect with a global community of experts working to shape the future of underground technology



**40th**  
Anniversary



CiteScore **13.0**  
Impact Factor **7.4**

## Tunnelling and Underground Space Technology (TUST)

Incorporating *Trenchless Technology Research*

CiteScore 2024 (Scopus) | 2024 Journal Impact Factor (Journal Citation Reports, Clarivate, 2025)

### TUST Facts



Supports open access



98 editors/board members in 27 countries/regions



Submission to first decision **10 days**



Acceptance rate **26%**

All data correct as of December 2025



### In the last 12 months



3,408 papers submitted



871 papers accepted



45K citations to date



Over 317K article views/downloads

### Editors-in-Chief



**Wout Broere**  
Delft University of Technology, Delft, Netherlands



**Shucui Li**  
Shandong University, Jinan, China



**Jamal Rostami**  
Colorado School of Mines, Golden, Colorado, USA



**Qianbing Zhang**  
Monash University, Victoria, Australia

To submit your paper [sciencedirect.com/journal/tunnelling-and-underground-space-technology](https://www.sciencedirect.com/journal/tunnelling-and-underground-space-technology)

### 50th Anniversary: Underground Space (1976–1985)

Published by Pergamon Press as the official journal of the American Underground Space Association, *Underground Space* ran for 10 volumes and published 488 papers. Led by Senior Editor Prof. Charles Fairhurst, it focused on engineering, planning, and utilisation of underground environments.

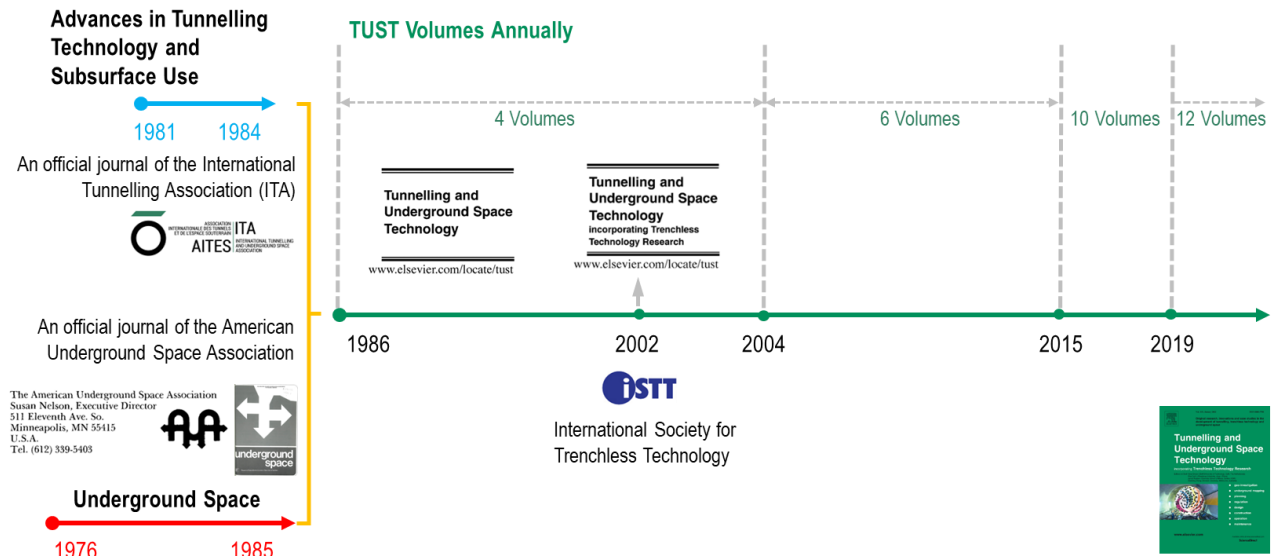
### 45th Anniversary: Advances in Tunnelling Technology and Subsurface Use (ATTSU) (1981–1984)

ATTSU served as the official journal of International Tunnelling and Underground Space Association (ITA-AITES) and was edited by Prof. Einar Broch. Though its publication span was brief, it played an important role in shaping early ITA collaboration and addressing emerging topics such as tunnel safety and international standardisation.

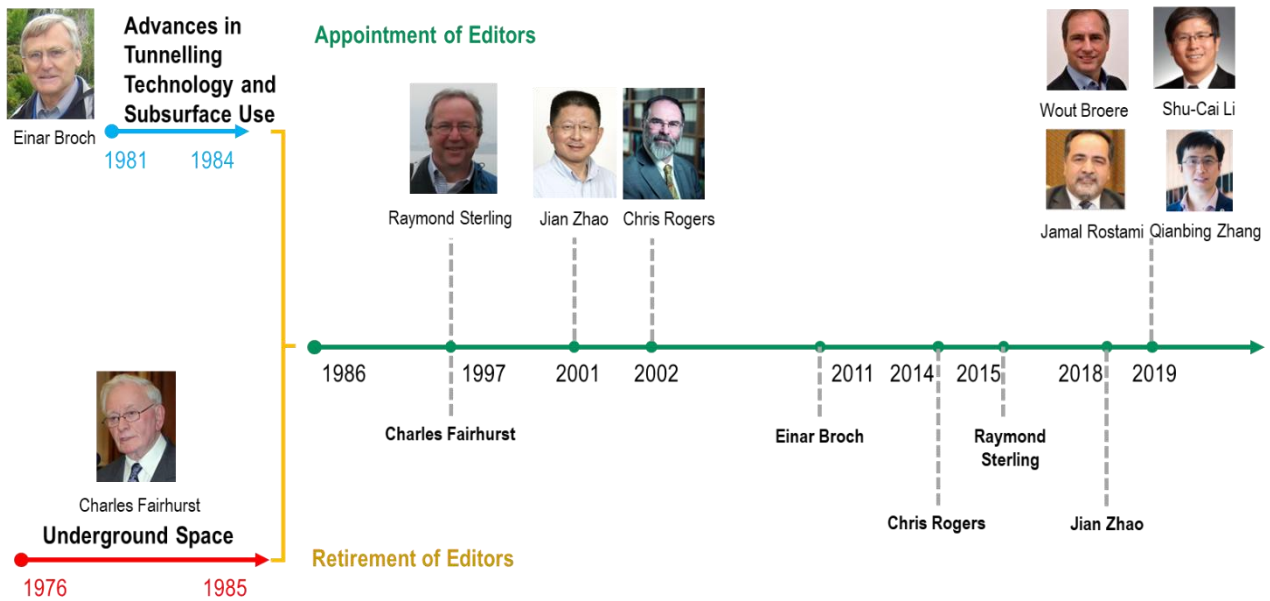
### 40th Anniversary: Tunnelling and Underground Space Technology (since 1986)

In 1986, *Underground Space* and *ATTSU* merged to form *Tunnelling and Underground Space Technology (TUST)*. It became the official journal of ITA and quickly established itself as the leading publication in the field, publishing research on tunnelling, underground infrastructure, urban development, policy, and sustainability. TUST also publishes ITA Working Group reports, strengthening the academic-industry bridge. In 1986, the *International Society for Trenchless Technology (ISTT)* was founded. TUST introduced a special section titled *Trenchless Technology Research (TTR)* with Prof. Chris Rogers as the Editor. TTR was integrated with TUST in 2002. TUST was retitled: *Tunnelling and Underground Space Technology incorporating Trenchless Technology Research*.

### Milestone and Publication Volumes of TUST since 1976



### List of Editors-in-Chief since 1976



### Organisers



### Zoom Webinar

ID: 879 7605 0959

Passcode: 20260120

## TUST 40th Anniversary Celebration

20 January: 09:00-17:00

Building for Technology and Design: Room 102

Scan It to Find Location



Time	Activity and Presentations	Chair
9:00-9:20	Registration at 20 Exhibition Walk, Clayton VIC 3168	
9:20-9:30	Opening Ceremony and Welcome Address	Qianbing Zhang
9:30-10:30	Elsevier Journals: History and Achievements of TUST by Former Editors Raymond Sterling (online), Christopher Rogers (online), Jian Zhao	Queency Xu
<b>Invited Presentations by Editorial Board Members and Guest Editors</b>		
10:30-10:50	<b>Prof. Guillermo Narsilio</b> , The University of Melbourne Beyond Transit: Turning Underground Infrastructure into Renewable Energy Systems	Annan Zhou
10:50-11:10	<b>Prof. Shuilong Shen</b> , Shantou University Towards Machine Intelligence for Shield Tunnelling	
11:10-11:30	<b>Prof. Tai-Tien Wang</b> , National Taiwan University Digital Twin-Based Multiple Models Integration for Enhancing Tunnel Construction Monitoring: Applying to Break Through Shallow Overburden of a Large Tunnel	
11:30-12:00	<b>Tea Break</b>	
12:00-12:20	<b>Prof. Yu Wang</b> , The Hong Kong University of Science and Technology Bayesian Sequential Learning of Rock Mass Classifications Along Tunnel Trajectory Using TBM Operational Data and Spatially Autocorrelated Geo-Data	Jelena Ninic
12:20-12:40	<b>Prof. Dongmei Zhang</b> , Tongji University Long-term Performance of Shield Tunnels: From Physical and Numerical Modelling to AI-Driven Approaches	
12:40-13:00	<b>A/Prof. Tae Young Ko</b> , Kangwon National University Development of Data-Driven Models for Cerchar Abrasivity Index Based on Geomechanical and Mineralogical Properties	
13:00-14:00	<b>Lunch Break</b>	

Time	Activity and Presentations	Chair
<b>Invited Presentations and Early Career Researcher (ECR) Presentations</b>		
14:00-14:20	<b>Prof. Xiaohua Bao</b> , Shenzhen University The Seismic Resilience of Shield Tunnels in Liquefiable Ground	Zhenhao Xu
14:20-14:40	<b>A/Prof. Xuesong Shen</b> , UNSW Sydney Automatic Construction of Knowledge Graph for Tunnel Specifications in Australia	
14:40-15:00	<b>Dr. Pin Zhang</b> , National University of Singapore Intelligent Construction and Maintenance in TBM Tunnelling	
15:00-15:30	<b>Tea Break</b>	
15:30-15:50	<b>A/Prof. Mingliang Zhou</b> , Tongji University Towards Smarter Risk Evaluation in Tunnelling: Integrating Multimodal Field Data with Simulation	Jurij Karlovsek
15:50-16:10	<b>Dr. Xuzhen He</b> , University of Technology Sydney From Grids to Graphs: Efficient Tunnel Stability Analysis with Pre-trained Graph Neural Networks	
16:10-16:30	<b>Dr. Huamei Zhu</b> , Durham University Digital Twin for Predictive Maintenance of Underground Infrastructure	
16:30-17:00	<b>Elsevier Journals: Panel Discussion with Editors-in-Chief</b> Wout Broere, Shucai Li, Jamal Rostami, Qianbing Zhang	Queency Xu
17:00-17:15	<b>Group Photo and Networking</b> Building for Technology and Design: Staircase Room 101	
17:30-21:00	<b>TUST Editorial Board Meeting and Dinner</b> Monash Club: Peter Marshall Dining Room	
17:30-21:00	<b>Dinner for Speakers and Invited Guests</b> Monash Club: Long Room - Bistro Dining	

## Invited Speakers of TUST 40th Anniversary Celebration



**Prof. Guillermo Narsilio**

Melbourne



**Prof. Shuilong Shen**

Shantou



**Prof. Tai-Tien Wang**

Taipei



**Prof. Yu Wang**

Hong Kong



**Prof. Dongmei Zhang**

Shanghai



**A/Prof. Tae Young Ko**

Chuncheon



**Prof. Xiaohua Bao**

Shenzhen



**A/Prof. Xuesong Shen**

Sydney



**Dr. Pin Zhang**

Singapore



**A/Prof. Mingliang Zhou**

Shanghai



**Dr. Xuzhen He**

Sydney



**Dr. Huamei Zhu**

Durham

## Digital Engineering Short Course and Visit

As part of the Joint International Conferences on CTTU and TBM DiGs 2026, a rare collaboration between academia, industry, and professional associations delivers a one-day workshop focused on the timely topic of automation and digitalisation in underground space. The event features research, industry expertise, and interpretations of emerging guidelines. This Site Visit and Short Course in Digital Engineering (DE) is designed to provide hands-on experience and expert insights into advanced digital technologies for tunnelling and underground construction.

The **Victorian Tunnelling Centre (VTC)** at Holmesglen Institute's Drummond Street campus trains and upskills thousands of workers in underground construction and tunnelling. Training up to 5,000 learners annually, the Australian-first tunnelling facility ensures that Victorians are leaders in underground construction, operations and workplace health and safety.



**Victorian Tunnelling Centre (VTC)**

### VTC Dress Code

- **NO** high heels, open-toe shoes, or skirts are permitted.
- Attendees **MUST** wear long pants, long sleeve shirts, closed-toe shoes (runners, boots, steel cap boots are acceptable)
- Hi vis vests and hard hats will be provided at **VTC** on arrival.



## Short Course and Site Visit (For Registered Participants Only)

21 January: 08:30-17:00

Victorian Tunnelling Centre and Monash

Scan It to Find Location



Time	Activity and Workshop	Lecturers
8:30-8:40	<b>Registration and Meeting Point</b> 20 Research Way, Clayton VIC 3168	Ms. Ruolin Xu Mr. Matin Rouhani
8:40-9:00	<b>Departing to Victorian Tunnelling Centre (VTC)</b>	
9:00-11:00	<b>VTC Facility and Sensing Demonstration</b> Victorian Tunnelling Centre (VTC)	Dr. Ross Digby Mr. Martin White
11:00-12:00	<b>Transport back to Monash &amp; Light Lunch</b> New Horizons Building (Ground Level): Cafelito Café	
<b>Afternoon Workshop at Building for Technology and Design: Room 104</b>		
12:00-13:00	<b>Digital Modelling and Building Information Modelling</b>	Prof. Jelena Ninic Dr. Amanda Huang
13:00-14:00	<b>Digitalisation and Automation</b>	Dr. Jurij Karlovsek Dr. Philip Tsang
14:00-14:20	<b>Tea Break</b>	
14:20-15:20	<b>Geological Modelling and TBM Performance Prediction</b>	Prof. Jamal Rostami Dr. Georg Erharter
15:20-16:20	<b>Smart Sensing and Sustainability Evaluation</b>	Prof. Wout Broere Dr. Xilin Chen
16:20-17:00	<b>Certificate Presentation, Group Photo and Conference Reception</b> Building for Technology and Design: Staircase Room 101	Dr. Amanda Huang

**Engineers Australia: 6.5 hours CPD (Continuing Professional Development)**



## Lecturers of Short Course and Visit



**A/Prof. Qianbing Zhang**  
Monash University



**Dr. Yihai Fang**  
Monash University



**Dr. Amanda Huang**  
Swinburne University of  
Technology



**Prof. Jelena Ninic**  
Durham University



**Prof. Wout Broere**  
Delft University of  
Technology



**Prof. Jamal Rostami**  
Colorado School of Mines



**Dr. Ross Digby**  
Holmesglen



**Mr. Martin White**  
Geomotion



**Dr. Jurij Karlovsek**  
University of Queensland



**Dr. Georg Erharter**  
Norwegian Geotechnical  
Institute



**Dr. Philip Tsang**  
Suburban Connect



**Dr. Allen Chen**  
Monash University

## Monash BEST Showcase and Welcome Reception

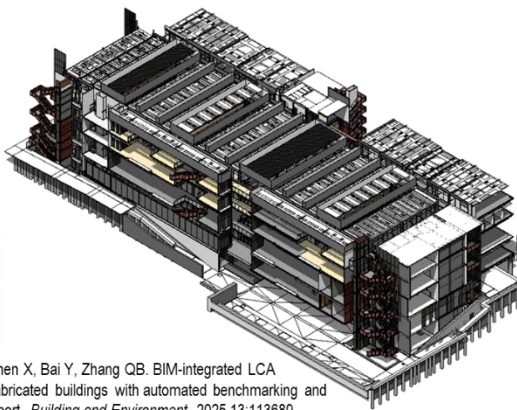
**Building for Technology and Design** is a five-story prefabricated steel-frame building located at Monash University, Clayton Campus, presenting a 19,000 m<sup>2</sup> facility for education, research and office spaces. Completed in February 2020, the building has more than 30 different learning spaces, including an interactive, layered collaborative space that can accommodate 360 people.

**Monash Boring & Excavating Student Team (BEST)** is an engineering-focused student team founded in 2022 with the aim of advancing and reimagining modern tunnelling technologies. Since its establishment, the team has grown rapidly to a cohort of 64 students who share a common vision, objectives, and ambitions. Through a range of technical projects, competitions, and industry engagement activities, Monash BEST's ultimate goal is to win the Not-A-Boring Competition hosted by The Boring Company.

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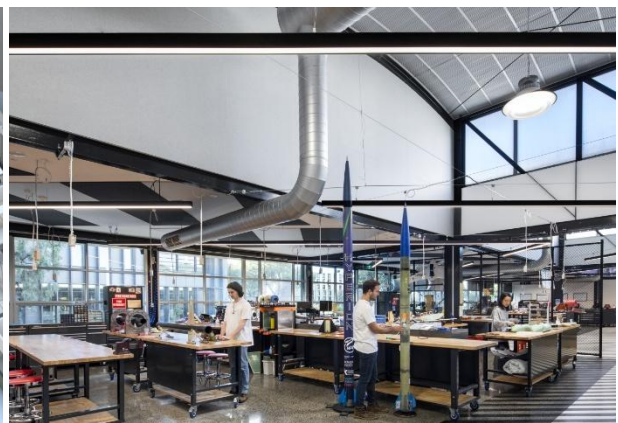
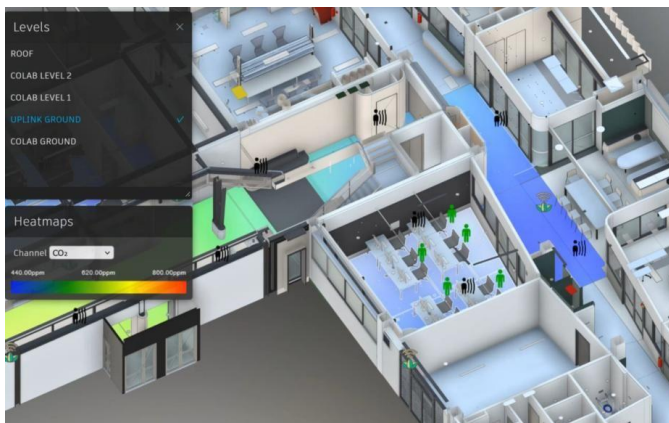


Ma X, Huang M, Chen X, Bai Y, Zhang QB. BIM-integrated LCA framework for prefabricated buildings with automated benchmarking and visual decision support. *Building and Environment*. 2025,13,113689.



The **Monash Innovation Lab (MIL)** is a growth and development ecosystem. Since opening its doors in 2023, organisations within the MIL have secured over \$10 million in funding, won a BOSS AFR Most Innovative Company award and developed a number of industry disrupting technologies.

The **Monash Makerspace Network** is a cluster of state-of-the-art fabrication facilities where students engage with authentic projects and develop skills for their future career. The Network supports exciting hands-on teaching, is the active and ambitious home of our student teams initiative and provides Monash researchers with access to cutting edge manufacturing technology.



## Monash BEST Showcase and Welcome Reception

21 January: 15:00-19:00

Building for Technology and Design: Level 1

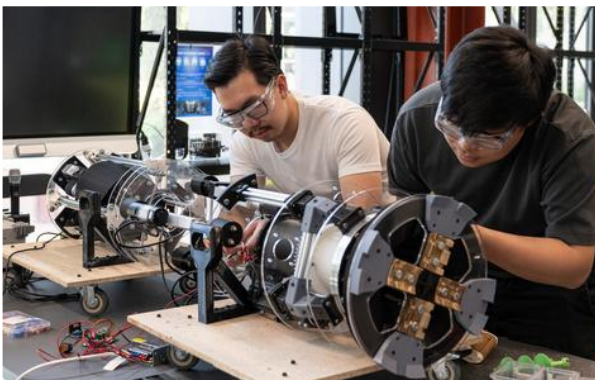
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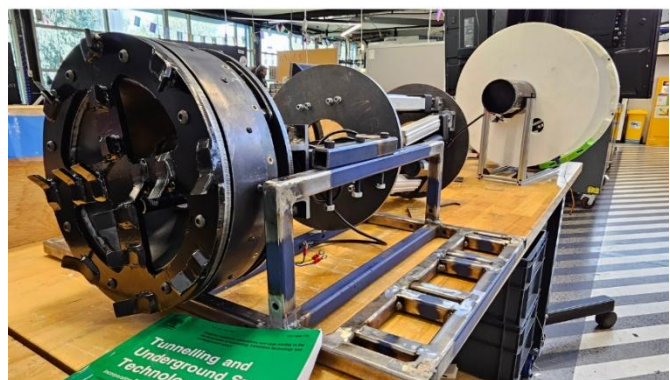
Time	Activity and Workshop	Lecturers
15:00-16:00	<b>Visit to Monash Innovation Labs</b> Registration of Interest for the Site Visit (First Come, First Served Basis)	Dr. Yihai Fang
15:00-16:00	<b>Visit to Monash Makerspace</b> Registration of Interest for the Site Visit (First Come, First Served Basis)	Monash BEST
16:00-17:00	<b>Monash BEST: Overview and TBM Prototype Demonstration</b> Building for Technology and Design: Level 1	Monash BEST
17:00-19:00	<b>Registration and Welcome Reception</b> Networking drinks and finger food / canapes	

**Monash Boring & Excavating Student Team (BEST)** is Australia's only student-led engineering team dedicated to developing innovative solutions specifically for the tunnelling industry. We are proud of the diversity within our team across several dimensions. Our skill-targeted recruitment process has ensured that approximately 30% of our members are international students, with the remainder being domestic students. We also value disciplinary diversity: while the majority of our members are pursuing Bachelor's degrees in Engineering,

Monash BEST is also home to students studying Commerce, Arts, Business, Law, and Science. Since its inception, Monash BEST has operated through technical subteams: **Propulsion, Excavation, Civil & Geotech, Software and Electrical**, working collaboratively to deliver a complete TBM mission planning and operation package. This integrated package comprises both a physical TBM model with associated ground infrastructure and a comprehensive digital TBM design and operation software platform.



First-generation of TBM prototype in 2024



Second-generation of TBM prototype in 2025

## CTTU and TBM DiGs 2026: Keynote Presentations

22 January at Central One Lecture Theatre

Scan It to Find Location



Time	Speakers and Title	Chairs
<b>Opening Ceremony</b> at Central One Lecture Theatre, 25 Exhibition Walk, Clayton VIC 3168		
08:30-08:40	<b>Prof. Yiannis Ventikos FEng</b> , <i>Dean of Engineering, Monash University</i> Welcome Address	QB Zhang Ha Bui
08:40-09:00	<b>Ms. Bernadette Foley</b> , <i>Group Executive, Engineers Australia</i> Professional Standards and Engineering Practice	
<b>Session 1: Keynote Presentations</b>		
09:00-09:30	<b>Prof. Robert Galler</b> , <i>Technical University of Leoben, Austria</i> Performance Evaluation of Segmental Tunnel Linings and Sprayed Concrete	Jian Zhao Arnold Dix
09:30-10:00	<b>Mr. Chris Lyons</b> , <i>Suburban Rail Loop Authority, Australia</i> Delivering 26 km Suburban Rail Loop East: Progress, Challenges, and Innovation	
10:00-10:30	<b>Prof. Mike Mooney</b> , <i>Colorado School of Mines, USA</i> Implementing Information Engineering and AI to Reduce Geotechnical Risks in Tunnels	
10:30-11:00	<b>Tea Break</b>	
<b>Session 2: Keynote Presentations</b>		
11:00-11:30	<b>Prof. Hanbin Luo</b> , <i>Huazhong University of Science and Technology, China</i> Intelligent Platform for Shield Tunnel Construction	Wei Wu Ross Digby
11:30-12:00	<b>Mr. Mitchell Erickson</b> , <i>John Holland, Australia</i> Digital Engineering Process/Framework for Consecutive Large Lineal Infrastructure Projects	
12:00-12:30	<b>Dr. Karin B�appler</b> , <i>Herrenknecht AG, Germany</i> German-Engineered Giant: Mainland China's Largest TBM	
12:30-13:30	<b>Lunch</b>	
13:30-17:30	<b>Parallel Sessions</b> at Building for Technology and Design: Rooms 102-107	
17:30-17:45	<b>Group Photo</b> at Building for Technology and Design: Staircase Room 101	
18:00-22:00	<b>Banquet and Awards</b> at PARKROYAL Monash Melbourne (872 Blackburn Rd, Clayton VIC 3168)	

## Opening and Keynote Speakers of CTTU and TBM DiGs 2026



**Prof. Yiannis Ventikos**  
*Dean of Engineering  
Monash University*



**Ms. Bernadette Foley**  
*Group Executive  
Engineers Australia*



**Prof. Robert Galler**  
*Chair of Subsurface Engineering  
Technical University of Leoben, Austria*



**Mr. Chris Lyons**  
*Deputy Package Director, Principal Geotechnical Engineer  
Suburban Rail Loop Authority, Australia*



**Prof. Mike Mooney**  
*Grewcock Chair Professor  
Colorado School of Mines, US*



**Prof. Hanbin Luo**  
*Director of National Center of Technology Innovation for  
Digital Construction, HUST, China*



**Mr. Mitchell Erickson**  
*Group Manager – Digital Engineering  
John Holland, Australia*



**Dr. Karin Bäßler**  
*Head of Business Development  
Herrenknecht AG, Germany*

## Parallel Session-1: Digital and Intelligent Technologies

22 January at Building for Technology and Design: Room 104

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Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Yu Wang</b> The Hong Kong University of Science and Technology	Generative AI for 3D Subsurface Geological Modelling Using Limited Site-specific Data and Prior Geological Knowledge	Amanda Huang
13:45-14:00	<b>Wei Wu</b> Nanyang Technological University	An Integrated Seismic Scattering Approach for Detecting Limestone Cavity Groups	
14:00-14:15	<b>Jelena Ninic</b> Durham University	Segmentation of All Elements in Shield Tunnels Using Large Vision Model	
14:15-14:30	<b>Oliver Lin</b> Metro Tunnel Project Office	Melbourne Metro Tunnel-A Transformative Urban Infrastructure Project	
14:30-14:45	<b>Shaojie Qin</b> Southwest Jiaotong University	Intelligent Detection System for Muck Information of Earth Pressure Balance Shield	
14:45-15:00	<b>Yingming Xiao</b> Central South University	Excavation-Induced Ground Reaction of Deeply Buried Tunnels in Strain-Hardening and Strain-Softening: A PINN-Based Solution	
15:00-15:15	<b>Yizeng Wang</b> Shanghai Jiao Tong University	Understanding Metro Station Attractiveness Through the Interaction Between Built Environment and Network Structure in Extreme Weather	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Xiangyu Chang</b> Nanyang Technological University	A CNN-Based Digital Twin Framework for Full-Field Prediction of Ground Settlement During Adjacent Tunnel Excavation	Elton J. Chen
16:00-16:15	<b>Huamei Zhu</b> Durham University	Streamlining GPR C-scan Simulation for Predictive Maintenance of Underground Infrastructure	
16:15-16:30	<b>Wei Zhang</b> Tongji University	Longitudinal Safety Assessment of Existing Tunnel Induced by Adjacent Construction Considering Soil Spatial Variability	
16:30-16:45	<b>Xicao Zha</b> Central South University	Study on Risks and Support Safety in In-Situ Expansion of Urban Large-Section Tunnels: Considering Diverse Geological Conditions	

<b>16:45-17:00</b>	<b>Junjie Liu</b> Shanghai Jiao Tong University	Solving the Longitudinal Deformation Problems of Tunnels Based on Physics-Informed Neural Network	
<b>17:00-17:15</b>	<b>Yueyan Peng</b> Central South University	Meta-Learning for Cross-Domain Parameter Prediction of Multi Cutterhead Configuration Slurry Shield Machines A Case Study in Subsea Parallel Tunnelling Project	
<b>17:15-17:30</b>	<b>Haoze Wu</b> Shantou University	Segment Uplift Risk Evaluation Based on Integrated CGT-VW-CM Method	
<b>17:30-17:45</b>	<b>Group Photo</b> at Building for Technology and Design: Staircase Room 101		
<b>18:00-22:00</b>	<b>Banquet and Awards</b> PARKROYAL Monash Melbourne (872 Blackburn Rd, Clayton VIC 3168)		

**MC: Iftikhar Ahmad**

### Parallel Session – Best Presentation Award

To recognise outstanding contributions, **one Best Presentation Award** will be presented for **each Parallel Session**.

Presentations will be **evaluated by the Session Chair(s)** and Session Coordinator during the session. Assessment will be based on:

- Technical quality and originality
- Clarity and structure of the presentation
- Quality and effectiveness of presentation slides
- Quality of discussion and responses to questions

**Priority will be given to Early Career Researchers and Student Presenters**, while maintaining the same evaluation criteria for all presentations.

The conference will conclude with **Closing Remarks**, followed by the announcement of the **Conference Presentation and Poster Awards**. Award recipients will be announced by the Organising Committee and recognised during the Closing Remarks.

We encourage all presenters to prepare clear, concise, and engaging presentations, and we wish all participants the best of luck.

## Parallel Session-2: TBM Tunnelling

22 January at Building for Technology and Design: Room 106

Scan It to Find Location



Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Andrew Merritt</b> PSM, Australia	TBM Selection Considerations for Recent Tunnels Crossing Sydney Harbour	Chaojun Jia
13:45-14:00	<b>Hongsu Ma</b> Beijing Research Institute of Uranium Geology	Evolution Characteristics of Cutter Edge Shape during TBM Excavation	
14:00-14:15	<b>Tae Young Ko</b> Kangwon National University	Shield TBM Disc Cutter Wear Prediction Using Ground Properties and Operating Parameters	
14:15-14:30	<b>Vincent Zhang</b> SPARK NEL D&C	Logistics and Preparation for TBM Tunnelling Site Layout in Australia	
14:30-14:45	<b>Jing Xue</b> Beijing Research Institute of Uranium Geology	Intelligent Classification of Rock Types Based on Stable Segment Data from TBM Construction	
14:45-15:00	<b>Huanzhu Zhou</b> Wuhan University	Dynamic Centrifuge Tests of Mitigation of Liquefaction-Induced Uplift of Immersed Tunnel Using Stone Columns	
15:00-15:15	<b>Haiwei Shang</b> Central South University	Analysis Method of Load Transfer Mechanism of Pipe Roof in Shallow Buried Tunnel Considering End Support Effect	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Zhigang Yao</b> Southwest Jiaotong University	The Performance and Failure Mechanism of TBM Disc Cutter in Mixed Strata	Yanlong Zheng
16:00-16:15	<b>Wenpei Xie</b> Tongji University	Study on the Deformation Characteristics of the Initial Negative Ring Segments in Large-Diameter Shield Tunneling	
16:15-16:30	<b>Yu Tang</b> Central South University	A CatBoost-GMDH Two-Stage Approach for Interpretable TBM Thrust Prediction with Intelligent Rock Mass Classification	
16:30-16:45	<b>Yuechao Pei</b> Southeast University	Estimation of Discontinuity Roughness on The Excavation Face Considering Actual Orientation and Drilling Strategy	

<b>16:45-17:00</b>	<b>Zihao Liu</b> Shanghai Jiao Tong University	Rapid Prediction of TBM Shield Jamming Risk Based on Parametric Finite Element Modeling and XGBoost	
<b>17:00-17:15</b>	<b>Le-chen Wang</b> Beijing Jiaotong University	A TBM Jamming Probabilistic Perception Framework for Real-Time Decision	
<b>17:15-17:30</b>	<b>Zixu Zhu</b> Central South University	Intelligent Prediction and Graded Evaluation Method for Shield Cutter Mud Adherence Risk	
<b>17:30-17:45</b>	<b>Group Photo</b> at Building for Technology and Design: Staircase Room 101		
<b>18:00-22:00</b>	<b>Banquet and Awards</b> PARKROYAL Monash Melbourne (872 Blackburn Rd, Clayton VIC 3168)		

**MC: Matin Rouhani**

### Parallel Session – Best Presentation Award

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## Parallel Session-3: Engineering Practice

22 January at Building for Technology and Design: Room 107

Scan It to Find Location



Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Yinghui Tian</b> The University of Melbourne	Engineering Challenges and Geotechnical Solutions for Offshore Tunnels	Georg Erharter
13:45-14:00	<b>Jian Sun</b> Beijing Research Institute of Uranium Geology	Study on the Rock Fragmentation Mechanism of Disc Cutter Assisted by Blasting Pre-fracturing	
14:00-14:15	<b>Kaiwei Chu</b> Shandong University	An Elastoplastic Model Based on the Discrete Element Method with Parallel Bond Model and its Applications	
14:15-14:30	<b>Ki-IL Song</b> Inha University	Detection of Backfill Grouting Between Steel Plate Lining and Segment Lining	
14:30-14:45	<b>Zhen Zhang</b> Jiangnan University	Dynamic Effects of Pile of Building Under Blasting Excavation of Metro Tunnel	
14:45-15:00	<b>Liang Wang</b> Central South University	Effect of Intermediate Principal Stress on Mechanical Behavior of Jointed Rock Masses Integrated Experimental and DEM Study	
15:00-15:15	<b>CK Tsang</b> SMEC	Artificial Intelligence-Driven Framework for Intelligent Use of the Q-System Support Chart in Tunnel Design	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Wan Ki Chow</b> Civil Aviation Flight University of China	Analysis of Ejected Flame Behaviour Following Window Breakage in High-Speed Train Compartment Fires inside a Tunnel	Kaiwei Chu
16:00-16:15	<b>Ian Gray</b> Sibra Pty Ltd	Exploration Drilling for Tunnelling	
16:15-16:30	<b>Peng Lin</b> Tsinghua University	Cracking Control of Concrete Lining of Hydraulic Tunnel Relating to Temperature Gradient	
16:30-16:45	<b>Zongze Li</b> Luleå University of Technology	Experimental Study on the Graded Creep Mechanical Properties of Sandstone under Cyclic Gas Pressure	

<b>16:45-17:00</b>	<b>Hongyi Xu</b> East China Jiaotong University	Experimental Study on The Hard Rock Cutting Performance of Self-Excited Oscillating Pulsed Jets	
<b>17:00-17:15</b>	<b>Zhiyi Jin</b> Xinjiang University	Seismic Response of a Shallow Buried Asymmetric Prefabricated Underpass Considering the Effects of Burial Depth and Retaining Structures: Case Study	
<b>17:15-17:30</b>	<b>Bin Tang</b> Huazhong University of Science and Technology	Adaptive Shield Tunneling Thrust Control: Multi-Objective Weighted Robust QP Optimization with Large Language Model	
<b>17:30-17:45</b>	<b>Group Photo</b> at Building for Technology and Design: Staircase Room 101		
<b>18:00-22:00</b>	<b>Banquet and Awards</b> PARKROYAL Monash Melbourne (872 Blackburn Rd, Clayton VIC 3168)		

**MC: Hassan Tumwiine**

### Parallel Session – Best Presentation Award

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## CTTU and TBM DiGs 2026: Banquet, Music and Awards

22 January, 18:00-22:00 at PARKROYAL Monash Melbourne

### Food & Beverage

Please let us know if you have any dietary requirements after reviewing this electronic copy.

- 30 Minutes Chefs Selection Canapes on Arrival
- Beverages on Consumption
- 3 Course Set Dinner Menu

~ **Entrée:** Wild mushroom and truffle risotto, Grana Padano cheese (V, GF, NF)

~ **Main:** Atlantic grilled salmon, Kipfler potato mash, green beans, lemon butter sauce (GF, NF), **OR**

Gippsland beef eye fillet, celeriac puree, seasonal mushrooms & red wine sauce

~ **Dessert:** Warm Sticky date pudding, toffee sauce, vanilla ice cream (V)



### Live Performance by Calico x Cantilever

Calico x Cantilever brings together four **Monash alumni** across disciplines—two from the Department of Civil and Environmental Engineering and two from the School of Music and Performance.

Tonight's set is our small "interdisciplinary collaboration," translating structure and rhythm into one shared sound.



### Awards and Celebrations

- Acknowledgement of Sponsorship
- Underground Infrastructure Digital Challenge (UIDC 2026) Awards
- TUST 2024: Best Papers
- TUST 2024-25: Top Reviewers
- TUST 40th Anniversary: Highly Cited Papers





## Sponsorship

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Bronze  
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## Endorsement



## CTTU and TBM DiGs 2026: Keynote Presentations

23 January at Central One Lecture Theatre

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Time	Speakers and Title	Chairs
<b>Session 3: Keynote Presentations</b>		
08:30-09:00	<b>Prof. Jelena Ninic</b> , <i>Durham University, UK</i> Automation in Digital Modelling and Assessment for Optimised Design and Operation of Buried Infrastructure	Zhenhao Xu Jurij Karlovsek
09:00-09:30	<b>Prof. Brian Sheil</b> , <i>University of Cambridge, UK</i> Digital Reconstruction of Underground Infrastructure	
09:30-10:00	<b>Mr. Will Curlewis</b> , <i>GS E&amp;C Australia</i> Key Considerations for Planning and Implementing TBM Site Establishment in Melbourne, Australia	
10:00-10:30	<b>Ms. Ruby Chan</b> , <i>Bouygues Construction, Australia</i> Sustainable Innovation in Tunnelling: Rethinking Methods, Machines, and Mindsets	
10:30-11:00	<b>Tea Break</b>	
<b>Session 4: Keynote Presentations</b>		
11:00-11:30	<b>Dr. Georg Erharter</b> , <i>Norwegian Geotechnical Institute, Norway</i> From Bits to Bytes: Deciphering Ground Conditions through TBM Drilling Data	Jelena Ninic Amanda Huang
11:30-12:00	<b>Ms. Kaylah MacIntosh</b> , <i>John Holland, Australia</i> From Abandoned Mines to Renewable Energy: The Journey of Kidston Pumped Storage Hydro Project, Australia	
12:00-12:30	<b>Dr. Olga Mikhaylova</b> , <i>CPB Contractors, Australia</i> Contractor Perspectives on Challenges and Solutions in Tunnel Design and Construction	
12:30-13:30	<b>Lunch</b>	
13:30-17:45	<b>Parallel Sessions</b> at Building for Technology and Design: Rooms 102-107	
17:45-18:00	<b>Closing Remark and Conference Presentation/Poster Awards</b> Building for Technology and Design: Staircase Room 101	

## Keynote Speakers of CTTU and TBM DiGs 2026



**Prof. Jelena Ninic**  
*Professor in Engineering Management  
Durham University, UK*



**Prof. Brian Sheil**  
*Director of Centre for Smart Infrastructure and Construction  
University of Cambridge, UK*



**Mr. Will Curlewis**  
*Construction Manager  
GS E&C, Australia*



**Ms. Ruby Chan**  
*Engineering Manager  
Bouygues Construction, Australia*



**Dr. Georg Erharter**  
*Lead Engineering Geologist  
Norwegian Geotechnical Institute, Norway*



**Ms. Kaylah MacIntosh**  
*Tunnel Manager  
John Holland, Australia*



**Dr. Olga Mikhaylova**  
*Engineering Director  
CPB Contractors, Australia*

## Parallel Session-4: Digital and Intelligent Technologies

23 January at Building for Technology and Design: Room 104

Scan It to Find Location



Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Jurij Karlovsek</b> The University of Queensland	BIM-Enabled Sustainable Operation and Maintenance of Tunnel Infrastructure	Huamei Zhu
13:45-14:00	<b>Lanbo Liu</b> Shandong University	Seismic Forward-Probing in Tunnels with Endfire Beamforming with TBM Noise	
14:00-14:15	<b>Amanda Huang</b> Swinburne University of Technology	Development of Ontology for Road Tunnel Maintenance	
14:15-14:30	<b>Zhongkai Huang</b> Tongji University	Quantifying Tunnel Resilience: Restoration Models and Global Seismic Survey Insights	
14:30-14:45	<b>Jun Shen</b> Shenzhen University	GPR-Copula Based Modeling of Energy Consumption in Shield Tunneling under Complex Geological Conditions	
14:45-15:00	<b>Keyue Zheng</b> Central South University	A Computational Method for Energy Evolution of Deep Soft Rock Tunnels Considering the Interaction Between Surrounding Rock and Anchor Bolts	
15:00-15:15	<b>Ziwei Yin</b> Huazhong University of Science and Technology	A Hybrid Mechanism-Data-Driven Model for Predicting Cutter Wear in Shield Tunneling	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Weibin Chen</b> Shenzhen University	Noise Reduction Processing for Crack Images Based on Improved OTSU Algorithm	Hoang Giang Bui
16:00-16:15	<b>Ru He</b> East China University of Technology	Multi-Scale Influence of Foaming Agent Residue on the Performance of Synchronous Grouting Using Shield Muck	
16:15-16:30	<b>Yun-Bo Zhang</b> Central South University	Intelligent Semantic Segmentation and 3D Joint Mapping of Tunnel Faces Using Swin-DeepLabv3+ and Edge Computing	
16:30-16:45	<b>Xin Li</b> Sichuan University	Prediction of The Occurrence Time of Rockbursts Using Microseismic Data and Machine Learning Methods	

<b>16:45-17:00</b>	<b>Beiyang Yu</b> Huazhong University of Science and Technology	Probabilistic 3D Settlement Reconstruction for Shield Tunnelling in Multilayered Spatially Variable Soils: A CRF-CNN-POD Surrogate with Uncertainty Quantification	
<b>17:00-17:15</b>	<b>Heqi Kong</b> Shenzhen University	Topological Fragility Mapping of City-Scale Metro Systems Under Seismic Scenarios: Integrating Structure, Function, and Spatial Connectivity	
<b>17:15-17:30</b>	<b>Yuyang You</b> Central South University	An Intelligent Analysis Framework for Tunnel Rock Particle Size Distribution and Shape Based on Few-Shot Machine Vision	
<b>17:30-17:45</b>	<b>Keyu Chen</b> Huazhong University of Science and Technology	Intelligent Quality Inspection Method for Segment Assembly Based on Structured Light 3D Camera	
<b>17:45-18:00</b>	<b>Closing Remark and Conference Presentation/Poster Awards</b> Building for Technology and Design: Staircase Room 101		

**MC: Iftikhar Ahmad**

### Parallel Session – Best Presentation Award

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- Quality and effectiveness of presentation slides
- Quality of discussion and responses to questions

**Priority will be given to Early Career Researchers and Student Presenters**, while maintaining the same evaluation criteria for all presentations.

The conference will conclude with **Closing Remarks**, followed by the announcement of the **Conference Presentation and Poster Awards**. Award recipients will be announced by the Organising Committee and recognised during the Closing Remarks.

We encourage all presenters to prepare clear, concise, and engaging presentations, and we wish all participants the best of luck.

## Parallel Session-5: Advances in Shield Machines

23 January at Building for Technology and Design: Room 106

Scan It to Find Location



Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Tai-Tien Wang</b> National Taiwan University	Investigation of Cutter Bit Wear Behavior During Shield Tunneling in Gravel Using Discrete Element Method: Effects of Gravel Content and Particle Breakage	Mingliang Zhou
13:45-14:00	<b>Yanning Wang</b> Shantou University	Key Technologies for Safe Shield Tunnelling and Intelligent Construction in Water-Rich Karst Regions	
14:00-14:15	<b>Dongxin Liu</b> Beijing University of Technology	The Study of Rock-Breaking Vibration Response and Transmission Characteristics of Key Components in the Double-Shield TBM	
14:15-14:30	<b>Zhen Liu</b> Tongji University	Multi-fidelity DeepONet framework for Real-Time Surface Settlement Reconstruction in Shield Tunnelling: Shanghai Airport Contact Link	
14:30-14:45	<b>Xianlong Wu</b> Shenzhen University	A Dynamic Prediction Model for Seismic Damage Fields of Shield Tunnels Based on an Improved Graph Neural Network	
14:45-15:00	<b>Hao Zhou</b> Huazhong University of Science and Technology	Digital Modeling and Assembly Optimization Method for Shield Tunnel Lining Structures	
15:00-15:15	<b>Haoyu Li</b> Central South University	Global Sensitivity Analysis of Ground Settlement Caused by Shield Tunneling Based on Machine Learning	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Bo Liu</b> Nanjing Forestry University	Seismic Responses of Underground Tunnel-Soil-Aboveground Frame Structure Coupling System Under Near-Field Earthquakes: A Shaking Table Test	Zhen Liu
16:00-16:15	<b>Mengqi Zhu</b> Tongji University	An Interpretable Shapelet-MoE Head Framework for TBM Rock Classification	
16:15-16:30	<b>Yajie Wang</b> Shantou University	Research on Risk Assessment of Slurry Shield Tunnel Construction in Complex Urban Environments	
16:30-16:45	<b>Huan-jiang Wu</b> Central South University	Stability Analysis of Tunnel in Inclined Layered Soils with Unsaturated Transient Flow	

16:45-17:00	<b>Weiwei Zhao</b> Shantou University	Cloud-Based Intelligent Platform for Automated and Resilient Shield Tunnel Construction	
17:00-17:15	<b>Jingjie Lei</b> Huazhong University of Science and Technology	Hybrid Arrangement Cutterhead Model of New and Worn Full-Scale Cutters: Digital Twin and Computer-Aided Engineering	
17:15-17:30	<b>Xinhao Min</b> Shantou University	LLms Based on Multi-Source Data for Geological Identification During Shield Tunnelling	
17:30-17:45	<b>Zhu Peng</b> Central South University	The Law of Deterioration of Mechanical Properties of Lining Structure Concrete Under the Initial Thermal Effect of High Geothermal Tunnel	
17:45-18:00	<b>Closing Remark and Conference Presentation/Poster Awards</b> Building for Technology and Design: Staircase Room 101		

**MC: Matin Rouhani**

### Parallel Session – Best Presentation Award

To recognise outstanding contributions, **one Best Presentation Award** will be presented for **each Parallel Session**.

Presentations will be **evaluated by the Session Chair(s)** and Session Coordinator during the session. Assessment will be based on:

- Technical quality and originality
- Clarity and structure of the presentation
- Quality and effectiveness of presentation slides
- Quality of discussion and responses to questions

**Priority will be given to Early Career Researchers and Student Presenters**, while maintaining the same evaluation criteria for all presentations.

The conference will conclude with **Closing Remarks**, followed by the announcement of the **Conference Presentation and Poster Awards**. Award recipients will be announced by the Organising Committee and recognised during the Closing Remarks.

We encourage all presenters to prepare clear, concise, and engaging presentations, and we wish all participants the best of luck.

## Parallel Session-6: Rock Engineering Challenges

23 January at Building for Technology and Design: Room 107

Scan It to Find Location



Time	Speakers	Paper Title	Chair
13:30-13:45	<b>Yang Zou</b> Luleå University of Technology	Sensitivity of Destress Blasting Response to Residual Rock Mass Parameters: A Numerical Assessment	Huachuan Wang
13:45-14:00	<b>Yanlong Zheng</b> Southeast University	Experimental Study on Microwave-Assisted Rock Splitting by Hydraulic Hammer	
14:00-14:15	<b>Jun Zhou</b> Jiangnan University	Effect of Transient Unloading in Surrounding Rock by In-Situ Stress in Circular Tunnel	
14:15-14:30	<b>Ning Zhang</b> Nanjing Tech University	Constitutive Model for Hard Rock Chamber Surrounding Rock Damage Prediction Induced by Drilling and Blasting Construction	
14:30-14:45	<b>Tao Zhu</b> Central South University	Research on Pre-Grouting Reinforcement and Control of Deep-Buried Large-Diameter Tunnel in Fractured Strata by Surface Directional Drilling	
14:45-15:00	<b>Yingpeng Li</b> Shenzhen University	Full-Scale Investigation of Fiber-Low-Reinforcement Resilient Tunnel Structures Under Extreme Loading	
15:00-15:15	<b>Yili Lou</b> Central South University	Study On the Three Directional Permeability Evolution Characteristics of Layered Sandstone Under True Triaxial Conditions	
15:15-15:45	<b>Tea Break</b>		
15:45-16:00	<b>Huachuan Wang</b> Shandong University	Global Development Potentials of Underground Energy Storage Systems: From a Prospective of Geological Reservoir Type	Yang Zou
16:00-16:15	<b>Zhongjun Ma</b> Southeast University	Experimental Investigation of Microwave-Assisted Roadheader Excavation in Hard Rock	
16:15-16:30	<b>Yuxuan Li</b> Tongji University	Preliminary Derivation of a Constitutive Model for Damage under Cyclic Loading in Transversely Isotropic Rock Masses	
16:30-16:45	<b>Minglong You</b> China University of Geosciences	Study on the Deformation Characteristics and Progressive Failure Mechanism of Surrounding Rock in Layered Carbonaceous Slate Tunnels Based on a Discrete-Continuum Coupled Method	

<b>16:45-17:00</b>	<b>Tai Cheng</b> Tongji University	Experimental and Numerical Investigations into the Influence of Intermediate Principal Stress on Granite Strainburst	
<b>17:00-17:15</b>	<b>Chengwu Gao</b> Anhui University of Science and Technology	Influence of Millisecond Delay Time on Pre-Splitting Blasting Effect and Surrounding Rock Stability	
<b>17:15-17:30</b>	<b>Chen Lei</b> Central South University	A Discrete-Continuous Coupled Numerical Method for Stability Analysis of Layered Rock Tunnels	
<b>17:30-17:45</b>	<b>Hu Zhang</b> Central South University	Deformation And Failure Mechanisms of Surrounding Rock in Sandstone Tunnels with Straight Walls: Insights From AE, DIC, And DEM Analysis	
<b>17:45-18:00</b>	<b>Closing Remark and Conference Presentation/Poster Awards</b> Building for Technology and Design: Staircase Room 101		

**MC: Hassan Tumwiine**

### Parallel Session – Best Presentation Award

To recognise outstanding contributions, **one Best Presentation Award** will be presented for **each Parallel Session**.

Presentations will be **evaluated by the Session Chair(s)** and Session Coordinator during the session. Assessment will be based on:

- Technical quality and originality
- Clarity and structure of the presentation
- Quality and effectiveness of presentation slides
- Quality of discussion and responses to questions

**Priority will be given to Early Career Researchers and Student Presenters**, while maintaining the same evaluation criteria for all presentations.

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We encourage all presenters to prepare clear, concise, and engaging presentations, and we wish all participants the best of luck.

## Parallel Session-7: Poster Session

22-23 January at Building for Technology and Design: Room 102

Scan It to Find Location



Speakers	Paper Title
<b>Qicheng Luo</b> Shenzhen University	Unsupervised Deep-Learning Model for Quantitative Diagnosis of Tunnel Lining Cavity Condition Using Interfering GPR Data
<b>Zhihua Wang</b> Huazhong University of Science and Technology	Beyond ACTT 2.0: A Digital Twin-Driven Framework for Adaptive Shield Tunnelling Considering Spatial Uncertainty in Shanghai Soft Soil
<b>Wei Luo</b> Tongji University	A Multi-Source Spatiotemporal Data Fusion Approach for Dynamic Settlement Prediction in Twin Shield Tunnels with Small Clear Distance
<b>Yu Zhou</b> Civil Aviation Flight University of China	Firefighting With PPV For High-Speed Railway Train in Tunnel
<b>Haohan Xiao</b> China Institute of Water Resources and Hydropower Research	Can AI assist intelligent TBM performance? Review of the China Second TBM Machine Learning Contest
<b>Zhenhao Xu</b> Shandong University	A Data-Driven Numerical Simulation Method for Dynamic Water Grouting in Fractured Media
<b>Yihui Li</b> Shandong University	Intelligent Identification Method of Rock Discontinuities Based on Edge Modelling Using Point Clouds Normal Geometric Features in Tunnel
<b>Iftikhar Ahmad</b> Monash University	Hydro-Mechanical Behaviour and Digital Workflow for Segmental Tunnel Linings in Pumped Hydro Energy Storage Systems
<b>Zeng Ding</b> Monash University	DEM–FDM Simulation of Fiber-Reinforced Concrete Under Multiple Impacts with Application to Tunnel Lining
<b>Qian Lei</b> Monash University	A Digital Platform for Integrating Tunnel Stability Analysis, Ground Performance Evaluation, and Carbon Assessment in TBM Tunnel Design
<b>Zhihang Li</b> Monash University	Deep Learning-Based Prediction of TBM Operating Parameters Using Long Short-Term Memory (LSTM)
<b>Mohammad Matin Rouhani</b> Monash University	A Hybrid Neural Network Architecture for Drag Bit Performance Prediction in Mechanized Excavation



Hassan Tumwiine Monash University	Blast Damage Effects on the Joint Property in a Large-Scale Cavern
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MC: Xilin Chen

### Poster Presentation Instructions & Awards

Please note the following requirements:

- The poster should be prepared as a **digital poster in landscape 16:9 format**, suitable for large-screen display.
- The poster should be submitted as **one PPT slide (1 page)** per poster.
- **Animations or dynamic elements (e.g. GIFs or videos)** are welcome, as the poster will be shown electronically.
- **No printed poster is required.**
- During the poster session, presenters are expected to **briefly present and discuss their work** with attendees and judges.

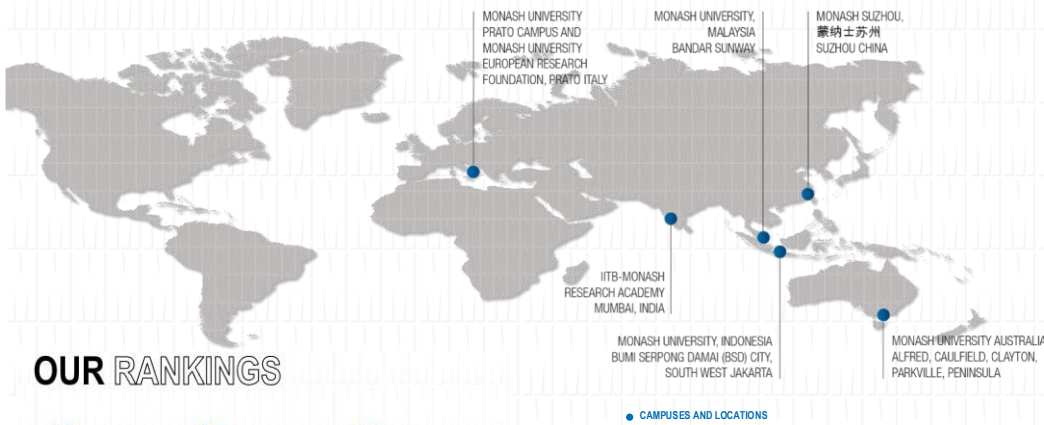
Poster presentations will take place **during the tea-break sessions** and will be displayed on **classroom screens** (landscape format).

Poster presentations will be **assessed by a panel of judges**, and **Best Poster Presentation Awards** will be presented.

## Monash University

**Monash University** is a global institution with a proud 60-year history of questioning conventions, challenging boundaries, and driving impact. Since its establishment in 1958, Monash has grown from an inaugural cohort of 347 undergraduate students to a diverse global community of more than 98,000 students in 2025. The University's commitment to creativity, innovation, and inclusion continues to empower people to make a positive and lasting difference.

### OUR GLOBAL FOOTPRINT



### OUR RANKINGS

- =36** QS WORLD UNIVERSITY RANKINGS 2026\*
- 38** US NEWS AND WORLD REPORT 2024-25 BEST GLOBAL UNIVERSITIES\*
- 63** TIMES HIGHER EDUCATION WORLD REPUTATION RANKINGS 2025
- =58** TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS 2025
- 82** SHANGHAI RANKING ACADEMIC RANKING OF WORLD UNIVERSITIES 2024

### TOP 50 UNIVERSITY\*

- 8** CAMPUSES ACROSS 4 COUNTRIES
- 2** CAMPUS PARTNERSHIPS IN INDIA AND CHINA
- 100+** PARTNER UNIVERSITIES
- 95,000** STUDENTS
- 20,000+** STAFF
- 500,000+** ALUMNI COMMUNITY ACROSS 156 COUNTRIES

### AREAS OF STUDY



Monash offers one of the broadest range of degree and double degree courses in Australia in the areas of:

- ART, DESIGN AND ARCHITECTURE
- ARTS, HUMANITIES AND SOCIAL SCIENCES
- BUSINESS
- EDUCATION
- ENGINEERING
- INFORMATION TECHNOLOGY
- LAW
- MEDICINE, NURSING AND HEALTH SCIENCES
- PHARMACY AND PHARMACEUTICAL SCIENCES
- SCIENCE

Australia's largest scholarship program:

- 5591** SCHOLARSHIP RECIPIENTS IN 2024\*
- 197** TYPES OF SCHOLARSHIPS AVAILABLE IN 2024\*

\* INCLUDES MONASH ABROAD GRANTS



## Monash Engineering

### Our Story

From a small cluster of students back in 1961, Monash Engineering has grown to become one of the largest engineering faculties in the country. And we're making our mark. With our equal emphasis on teaching excellent engineering skills as well as well-rounded people, Monash engineering graduates are endeavouring to solve the major issues of our time. In March 1961, the very first students to study at what was then the new Monash University stepped onto the semi-rural Clayton campus on the outskirts of Melbourne to commence their studies. Among this first group of 363 students, were 23 students about to embark on their Bachelor of Engineering degrees.

### Top 50

**Monash Engineering** is ranked in the global top 50 for engineering and number 1 nationally. Distinguished by our inclusive, international and enterprising culture, we continually strive to deliver outstanding engineering education, research and industry partnership opportunities.

Monash Engineering is the home of the **Monash Student Teams**, a unique blend of student initiatives, that routinely win competitions nationally and internationally and prepare our students for eminent careers in the most competitive industries world-wide. There is no stronger endorsement that boosts employability for engineering students than participation and leadership in the Monash Student Teams.

We invite you to get in touch with us: prospective students, alumni, industry partners, current and future, we would love to hear from you. If you are an alumnus, we welcome you to join us on LinkedIn at Engineering Alumni Monash University or contact our Alumni Engagement Team. The opportunities to interface with Monash Engineering are broad and exciting: we can provide networking opportunities, we can connect you to our student communities through initiatives such as our **CO-OP program**, our **Industry Doctoral Program (IDP)** and many others, and of course our professors will be delighted to connect and examine, together with you, ways that their research can be used in practice.

### Discover Research Themes in Monash Engineering

Explore our different research themes and see how our research is helping to transform the future.



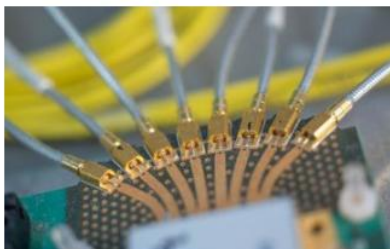
**All research themes**



**Chemical and Biological  
Engineering**



**Civil and Environmental  
Engineering**



**Electrical and Computer Systems  
Engineering**



**Materials Science and  
Engineering**



**Mechanical and Aerospace  
Engineering**

## Monash Civil and Environmental Engineering (CEE)

### A Legacy of Impact. A Future of Possibility.

Since 1961, the Department of Civil and Environmental Engineering has been at the forefront of engineering education and research. Our expertise spans construction and project management, environmental engineering, geomechanics, resources, structural systems, transport, and water engineering—equipping generations of engineers to shape the world around us. Today, we continue to lead through innovative, interdisciplinary research focused on building sustainable infrastructure, addressing climate challenges, and creating resilient communities for the 21st century.

### Transformative Education

We offer a diverse range of undergraduate degrees (including double degrees) and postgraduate coursework programs, taught across three campuses. Our student community of over 1400 undergraduates, 270 postgraduates, and 180 research students learns through a student-focused, problem-based approach—designed to foster creativity, collaboration, and critical thinking. Our global outlook is reflected in programs like the 2+2 undergraduate and 3+2 postgraduate degrees with Central South University in China. Real-world experience is embedded in our teaching, with 12-week industry placements and access to state-of-the-art labs and learning environments.

### Our Vision

Advance transformative solutions to the world's most pressing infrastructure, environmental, and societal challenges, while cultivating visionary leaders who will shape a resilient and sustainable future

### Our Mission

- Drive educational and research excellence through dynamic interdisciplinary collaboration to address emerging global challenges with innovative and sustainable solutions.
- Serve community and industry needs through practical and sustainable approaches to real-world problems.

### Discover Research Themes

Research in Civil and Environmental Engineering explores some of society's biggest challenges with the goal of making long lasting, impactful contributions to global communities.



Environment, Energy and Resources



Modelling, Simulation, Data and AI



Sensing and Automation Technologies



Smart, Safe and Sustainable Transport



Sustainable and Resilient Infrastructure



Water in a Changing Environment



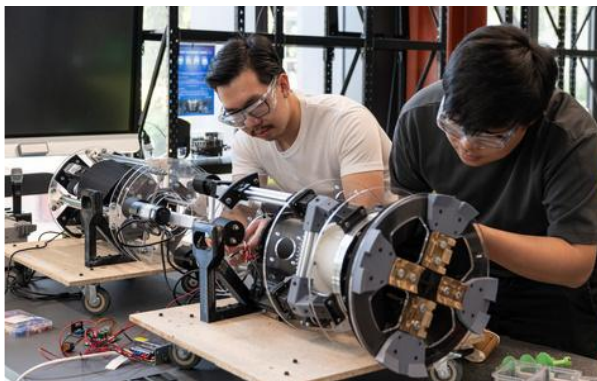
## Monash Boring & Excavating Student Team (BEST)

### Who is Monash BEST?

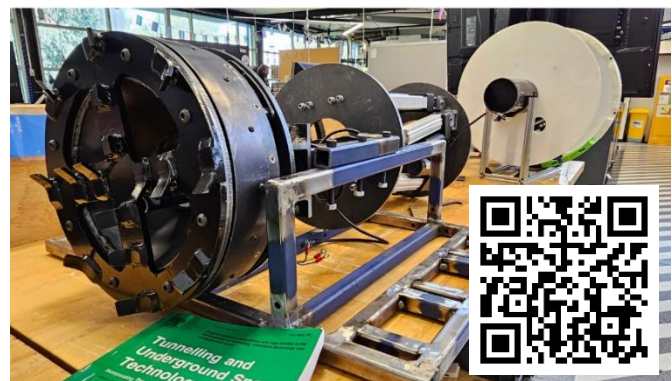
Monash BEST is an engineering-focused student team founded in 2022 with the aim of advancing and reimagining modern tunnelling technologies. Since its establishment, the team has grown rapidly to a cohort of 64 students who share a common vision, objectives, and ambitions. Through a range of technical projects, competitions, and industry engagement activities, Monash BEST's ultimate goal is to win the Not-A-Boring Competition hosted by The Boring Company.

Monash BEST is Australia's only student-led engineering team dedicated to developing innovative solutions specifically for the tunnelling industry. We are proud of the diversity within our team across several dimensions. Our skill-targeted recruitment process has ensured that approximately 30% of our members are international students, with the remainder being domestic students. We also value disciplinary diversity: while the majority of our members are pursuing Bachelor's degrees in Engineering, Monash BEST is also home to students studying Commerce, Arts, Business, Law, and Science.

Since its inception, Monash BEST has operated through technical subteams: **Propulsion, Excavation, Civil & Geotech, Software and Electrical**, working collaboratively to deliver a complete TBM mission planning and operation package. This integrated package comprises both a physical TBM model with associated ground infrastructure and a comprehensive digital TBM design and operation software platform.



First-generation of TBM prototype in 2024



Second-generation of TBM prototype in 2025

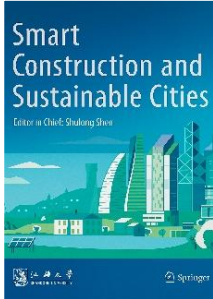
### Our Sponsors and Partners

We are tremendously grateful for the resources and assistance that our Partners and Sponsors provide to the team. We look forward to representing your brand in our team activities.



## Journal of Smart Construction and Sustainable Cities

### Introduction



**Smart Construction and Sustainable Cities (SCSC)** is a fully English, open-access journal launched in 2023 and led by Editor-in-Chief Prof. Shuilong Shen. SCSC is an international journal focusing on the application of information science and advanced digital technologies in construction, green sustainability, and urban operation and management toward SDG11. Published by Springer Nature, Smart Construction and Sustainable Cities (SCSC, E-ISSN: 2731-9032) was officially indexed in Scopus on 27 July 2025.

### Editorial Board & Submission



**Editor-in-Chief**

| **Shui-Long Shen**

Non-EU Fellow, European Academy of Sciences;  
Fellow, European Academy of Sciences and Arts;

Shantou University



### Managing Editor



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| **Zhen-Yu Yin**

The Hong Kong Polytechnic University  
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| **Annan Zhou**

Royal Melbourne Institute of  
Technology, Melbourne, Australia



### WELCOME!

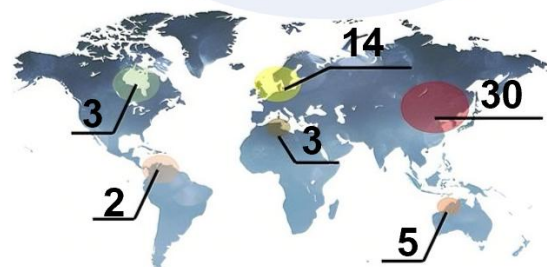


**Submission  
Links**

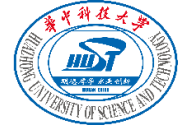


**No  
APC\***

**Over 50 Editorial  
board members  
Over 20 Countries**



## National Center of Technology Innovation for Digital Construction



National Center of Technology Innovation for Digital Construction (“NCTI-DC”) is positioned as a national strategic scientific and technological force in the field of new urbanization, with the core mission of breaking through the key technologies of digital construction and realizing the industrialisation of major research deliveries.

NCTI-DC maintains a strong research capacity, underpinned by an annual budget exceeding 20 million and a portfolio of more than 30 active research projects. This capability is supported by over 300 full-time researchers distributed across 10+ dedicated research divisions, providing a robust foundation for large-scale, interdisciplinary research initiatives.



### Key Technical Labs

Digital Design and CIM

Smart Perception and Construction IoT

Smart Construction Machinery & Robotics

Construction Big Data Platform and Smart...



Construction Industry Internet



Smart Bridge Construction



Digital Construction Software



Smart Steel Structure Construction



BIM Lifecycle Management Platform DT (Digital Thread)-BIM



Intelligent Shield capable of synchronized tunnel excavation and lining assembly



“Yue Hu Zun” Lunar Base

## Bekaert

N.V. Bekaert S.A. (Euronext Brussels: BEKB) is a global company with headquarters in Belgium, employing 28,000 people worldwide. Its primary business is steel wire transformation and coatings. Operating in 45 countries, Bekaert generated combined sales of €5.1 billion in 2019.

Bekaert is a global leader in steel fibre reinforcement, dedicated to delivering high-performance, durable and efficient solutions for concrete structures. With its flagship Dramix® steel fibres, the company provides a proven reinforcement technology widely applied in tunnelling, underground construction, industrial floors, precast elements and shotcrete. Dramix® steel fibres enable higher ductility, improved crack control, enhanced safety performance and superior long-term durability across a wide range of engineering applications.

Guided by continuous innovation, Bekaert works closely with designers, contractors and asset owners to improve construction efficiency and structural performance. Its steel fibre reinforced concrete solutions eliminate conventional rebar in many applications, simplify construction processes and provide reliable reinforcement tailored to project demands. With a strong presence in the Asia-Pacific region, Bekaert supports infrastructure projects with technical expertise, design optimisation and on-site engineering services.

Upholding the values of quality, innovation and sustainability, Bekaert remains committed to advancing smart, efficient and resilient concrete reinforcement technologies for the global construction and tunnelling industries.

Steel fiber concrete reinforcement

**Dramix** ® 

**No rebar, steel fibre only**

 1000 tons CO <sub>2</sub> savings per km of tunnel	 EPD certified	 No rebar
 Safer working conditions	 Increased durability	 Less labour Faster construction

David Clague  
Email: [David.Clague@bekaert.com](mailto:David.Clague@bekaert.com)  
M +61 455 052 025  
[construction.bekaert.com](http://construction.bekaert.com)



## Normet

Normet is a private Finland-headquartered, global technology company. The company manufactures underground equipment and applications and provides aftermarket services, construction chemicals, and rock support products and expertise for customer processes in underground mining and tunnelling as well as for civil construction industries. Normet employs over 1,800 professionals and operates globally in over 50 locations and 30 countries.

Since 1962, we have expanded our offerings to include a complete portfolio of mining and tunnelling solutions.

Normet's underground equipment is used in hundreds of mines and tunnel worksites around the world. We work closely with our customers to develop equipment and technologies that meet and exceed even their most challenging requirements. Our equipment is used for concrete spraying and transport, explosives charging, scaling, lifting, installation works, and underground logistics.

At Normet, we are Caring, Committed and Courageous. We build long-term relationships with our customers and partners, working together to find optimal solutions that positively impact people and minimize harm to the environment. Our comprehensive range of services and products consistently delivers maximum value, ensuring high performance and a sustainable future.



Underground Mining

Tunnelling

Construction

Products & Services

### Tunnelling



**Sprayed Concrete Solutions for Tunnelling Projects**



**TBM Technology**



**Explosives Charging**



**Water Control**



**Lifting and Installations**



**Rock and Ground Support**



**Scaling**



**Waterproofing**



**Underground Logistics**

## Herrenknecht

With the experience of more than 45 years, Herrenknecht is a technology and market leader in the area of mechanized tunnelling technology. Herrenknecht is the only company world-wide to deliver cutting-edge tunnel boring machines for all ground conditions and in all diameters – ranging from 0.10 to 19 meters. The product range includes tailor-made machines for traffic, supply and disposal tunnels, technologies for pipeline installation as well as drilling equipment for vertical and inclined shafts and deep drilling rigs.

The Herrenknecht Group achieved a total output of 1,394 million euros in 2024. The independent family-run business employs 5,495 people worldwide, including around 200 trainees. With more than 60 subsidiaries and associated companies working in related fields in Germany and abroad, Herrenknecht is able to provide a comprehensive range of services close to the project site and the customer, quickly and in a targeted way. Under the umbrella of the Herrenknecht Group, a team of innovative specialists offers integrated tunnelling solutions with project-specific equipment and service packages upon request: separation plants, belt conveyor systems, navigation systems, rolling stock systems as well as segment moulds and even turnkey segment production plants.

As a reliable project partner, Herrenknecht supports its customers with an extensive range of services from the beginning of the project to breakthrough. From the initial project idea through manufacturing, transport, assembly, tunnelling support and spare parts service to disassembly, Herrenknecht accompanies the process at the customer's side. Even personnel solutions for the temporary supplementing of jobsite crews are provided if required. With competent service specialists, the company regularly supports around 300 jobsites worldwide and offers customized service packages tailored to individual project requirements.

Road, metro, and railway tunnels for efficient traffic network. By the middle of this century, the world's population is expected to reach nine billion, and two thirds of these people will live in large conurbations. To keep people and goods on the move, the way ahead for new efficient infrastructures is leading underground. With state-of-the-art technologies, efficient infrastructures are created exactly where they are needed, even in cramped and complex jobsite conditions. Herrenknecht technology pushes the boundaries of feasibility and creates new tunnelling standards worldwide. Herrenknecht technology extends existing transport networks and creates new connections in urban and rural areas – under mountains or deep beneath water.

Innovative solutions for underground supply and disposal systems. As the world's population grows the need for underground supply tunnels is also increasing; in emerging and developing countries as well as in modern metropolises. That is why around 1,000 Herrenknecht Utility Tunnelling Machines are in operation around the world constructing or laying water and wastewater systems, gas and oil pipelines, as well as conduits for electricity and telecommunications. Here, trenchless tunnelling technology offers a range of advantages compared to conventional construction procedures: transport, business and the environment remain mostly undisturbed when Micromachines, HDD rigs or shaft sinking equipment are being used. Innovations such as Direct Pipe® set new standards in the semi-trenchless installation. The new technology E-Power Pipe® allows the secure and quick installation of underground cable protection pipes with smaller diameters and long advance lengths. Innovative HDD tools simplify pipeline construction operations at key sections. The Herrenknecht product portfolio is completed by a broad range of equipment for mining and exploration.



## Shanghai Bofa Spatial Information Technology Co., Ltd.

Shanghai Bofa Spatial Information Technology Co., Ltd. is a leader in high-precision measurement, monitoring, and digital modeling for tunnels and rail transit infrastructure. It delivers solutions for tunnel deformation monitoring, structural defect detection, clearance surveys, and BIM/digital twin modelling—supporting the full-lifecycle management of underground projects.

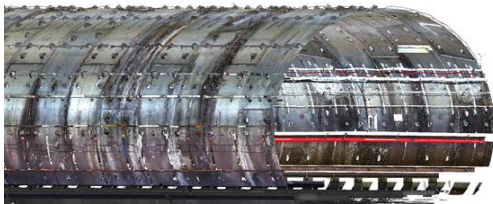
Driven by independent innovation, Bofa developed the Tunnel Laser Scanning system (hereinafter referred to as TLSD trolley system). The seamless integration of laser scanners, high-definition linear array cameras, and Inertial Measurement Units (IMUs) is a key advantage of this system, while its proprietary TLSD software acts as the technical backbone. The system enables full-section tunnel measurement with image resolution up to 0.2 mm/pixel, travel speed of 7.2 km/h, and profile intervals as narrow as 1 cm—providing robust technical support for intelligent inspection and evaluation of tunnels and tracks.

Currently, its products and technologies are widely deployed in China’s metro systems, municipal tunnels, and railways, with over 5,000 km of real-world tunnel inspection experience. Backed by a professional R&D team and extensive engineering experience, Bofa advances the digital transformation of underground infrastructure, delivering reliable, efficient, and smart monitoring solutions. Guided by the values of innovation, precision, and service, it continues to strengthen its capabilities to support the safe operation and sustainable development of tunnel and rail transit projects.



上海勃发空间信息技术有限公司  
Shanghai Bofa Spatial Information Technology Co.,Ltd

<https://intro.bofaspatial.cn>  
Mr. Xu Zhengwen: (+86)13818312971  
xuzhengwen@bofaspatial.cn



# TLSD

Reliable Measurement, Monitoring,  
and Modelling of Tunnels



### ■ Instruction

Equipped with laser scanner, line scan cameras, IMU, and track inspection equipment, the trolley acquires multi-dimensional data to support tunnel and track inspection.

### ■ Core Hardware

Trolley HD Line Scan Camera

Laser Scanner IMU Other Sensors

### ■ Applications

Tunnel Deformation Tunnel Defect

Clearance Equipment Survey BIM Modeling

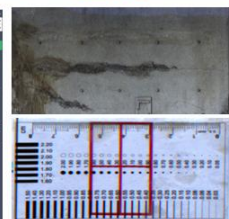
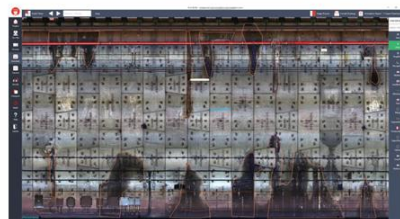
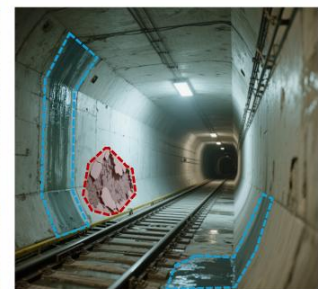


Image resolution 0.2mm/pixel, speed 7.2km/h, tunnel diameter 5.4m

## DeepTek

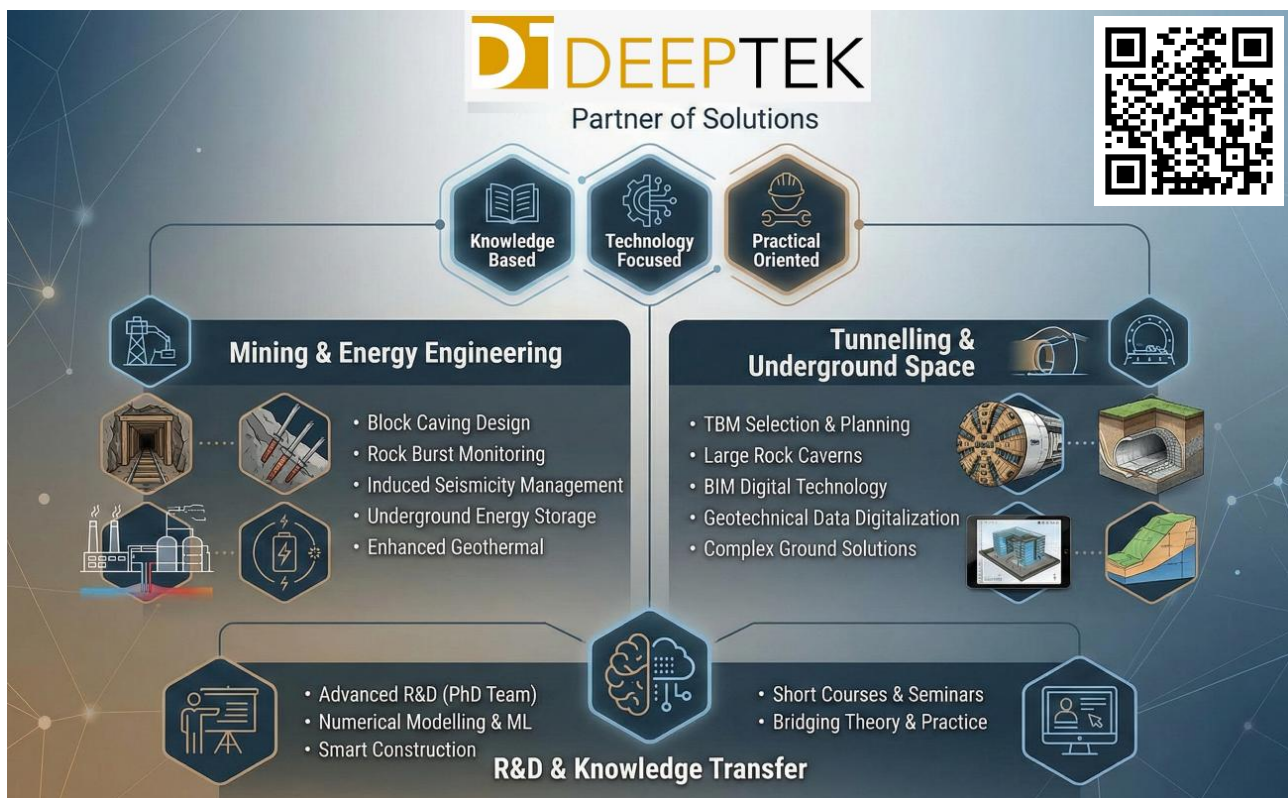
DeepTek is an engineering and technology company rooted in Monash University. Beyond our academic origins, we serve as your dedicated Partner of Solutions. We have reimagined the connection between academic research and engineering application. Our core philosophy is built on being Knowledge Based, Technology Focused, and Practical Oriented. We work alongside our clients to solve some of the world's most complex challenges in mining, energy, and underground engineering.

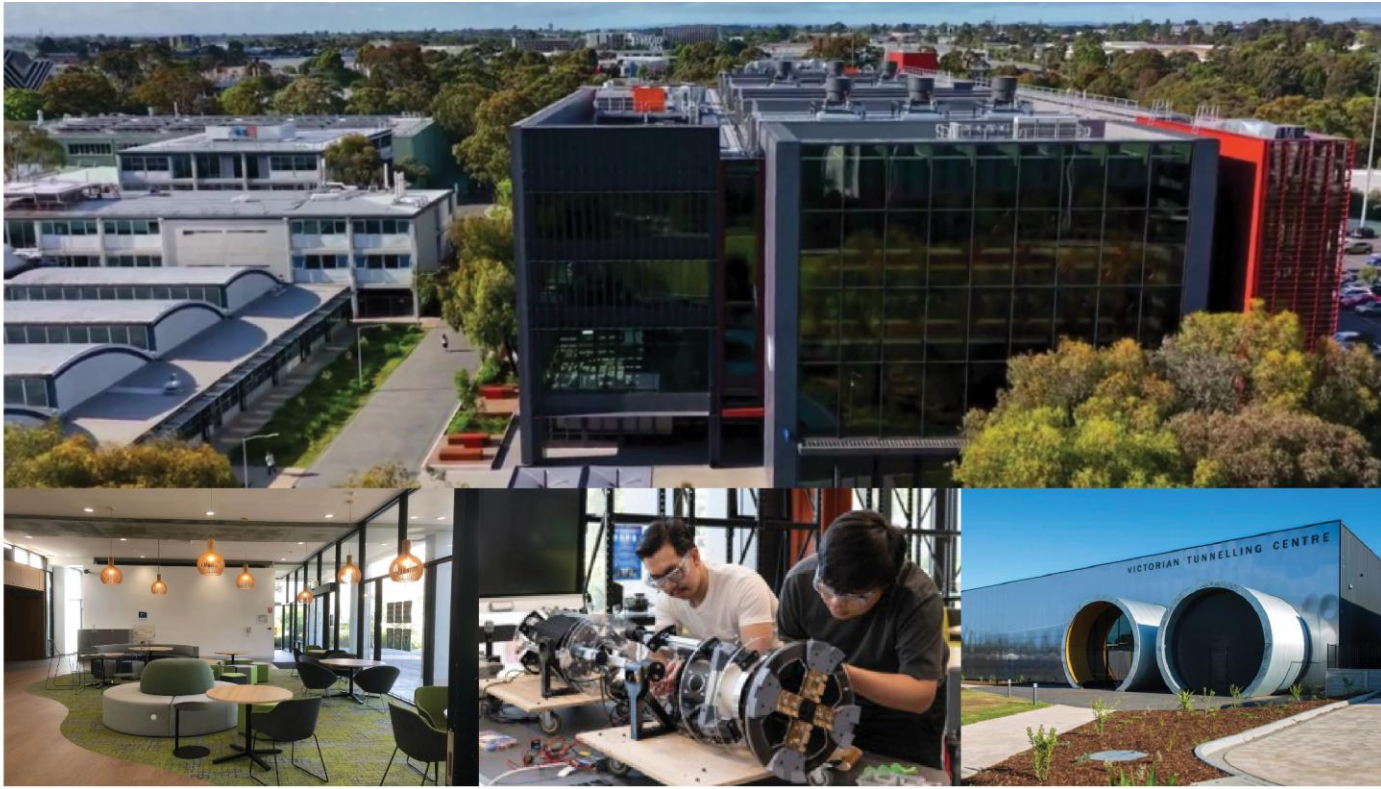
Our strength comes from a deep pool of knowledge driven by a highly trained R&D team with numerous PhDs. We go beyond traditional consulting by collaborating closely with government agencies and industry partners on specialized contract research and development. We utilize advanced tools like numerical modelling, machine learning, and smart construction to translate high-level theory into tangible, on-site solutions.

DeepTek brings deep technical expertise to the Mining and Energy Engineering sector. We provide specialized consulting for projects located in difficult and complex grounds, including block and mass caving design, rock burst monitoring, and induced seismicity management. We also engineer the future of energy by designing underground energy storage systems and enhanced geothermal energy developments.

Our Tunnelling and Underground Space team supports the delivery of state-of-the-art infrastructure. We add value across the project lifecycle through services ranging from planning and TBM selection for mixed-face conditions to the design of large rock caverns and BIM digital technology application. Our capabilities in geotechnical data digitalization, slope stability analysis, and managing complex formations ensure creative and effective engineering outcomes.

DeepTek believes in the power of knowledge transfer. We bridge the gap between theory and practice through short courses, seminars, and online resources. These initiatives empower practical engineers in the mining and rock engineering sectors. Based in the innovation hub of Monash, Victoria, we remain dedicated to technological innovation.

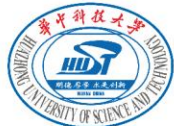




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