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PRESS RELEASE**

5TH EDITION OF THE ITA TUNNELLING AWARDS THE WINNERS 2019

Since 2015, the international competition "the ITA Tunnelling Awards" seeks and rewards the most ground-breaking innovation and outstanding projects in tunnelling and underground space use. This year the event took place in Miami in conjunction with Cutting Edge Conference of UCA of SME. After editions in Hagerbach (Switzerland), Singapore, Paris (France) and Chuzhou (China), the fifth ITA Tunnelling Awards moved to the United States of America for the 2019 event. The four previous editions of the ITA Tunnelling Awards received 333 entries and 139 nominations, rewarded 41 projects and personalities and gathered almost 1000 attendees.

President of ITA, Prof. Jinxiu Yan stated: *"ITA Tunnelling Awards is a yearly major event of ITA focusing on latest outstanding tunnelling projects, technical project innovation and technical product/equipment innovation, innovative underground space concept as well as safety initiative. For this year, we have received 71 entries worldwide and 34 of them are for the three categories yearly tunnelling projects, which means that many outstanding projects have been recently built worldwide."*

Through 8 categories and 1 Lifetime Achievement Award, the ITA Tunnelling Awards identifies and rewards major disruptive innovations and groundbreaking projects. This edition, the event took place in conjunction with the 8th Cutting Edge Conference.



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THE WINNERS:

- **Major Project of the Year (over €500M)** - Tuen-Mun Chek lap Kok Link - Northern Connection Subsea Tunnel Section - Hong-Kong, China
- **Project of the Year (between €50M and €500M)** - Regional Connector Transit Project - Los Angeles, USA
- **Project of the Year incl. Renovation (up to €50M)** – Modernization of the Vladivostok tunnel of the Far Eastern Railway, Russia
- **Technical Project Innovation of the year** – Toulouse Line A Underground Stations Extension, France
- **Technical Product/Equipment Innovation of the year** - Autonomous TBM, Malaysia
- **Innovative Underground Space Concept of the year** – Underground Green Farming, Switzerland
- **Safety Initiative of the Year** – Air Quality Working Group An industry-first collaboration on silica dust control, Australia
- **Young Tunneller of the year** – Amanda Kerr, USA
- **Lifetime Achievement Award** - Dr. Harvey Parker

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- **Major Project of the Year (over €500M)** - Tuen-Mun Chek Lap Kok Link - Northern Connection Subsea Tunnel Section – Hong-Kong, China

The winner for the Major Project of the Year in the over-€500M category is the Tuen Mun Chek Lap Kok Link, which will provide an alternative access route to the Hong Kong International Airport located on Chek Lap Kok Island, which up to now has only been accessible via the Tsing Ma Bridge.



The works comprise a 4.5-km twin-tube sub-sea tunnel with 57 cross passages as well as a 500m cut and cover section. Construction required two slurry TBMs with an excavation diameter of 14m. The teams had to use innovative solutions to cope with harsh ground conditions and hydrostatic pressure of 5bars at tunnel face (55m below sea level). The first 630m of excavation were also operated by a 17.63m diameter TBM (world's largest TBM), which was then reconfigured as a 14m diameter machine. 41 sub-sea cross passages were also constructed by mini TBM. The first breakthrough was completed on 27 February 2019 and the overall cost of works is estimated at €2.36bn.

Client: Highways Department (the Government of Hong Kong Special Administrative Region)

Contractors: Dragages Hong Kong Ltd & Bouygues Travaux Publics

Engineering firms: AECOM; DBJV; ARUP; ATKINS and Golder

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- **Project of the Year between €50M and €500M - Regional Connector Transit Project**



The Regional Connector Transit Project comprises the design-build of a 1.9-mile underground light rail system with 3 new stations. The contract includes traffic control, permits, support of excavation, tunnelling, concrete works, mechanical, electrical, fire protection, rail, and systems. In order to construct the twin tunnels, a single tunnel boring machine (TBM) was rebuilt from Traylor's University Link Light Rail project in Seattle. It was a Herrenknecht TBM modified to navigate the extremely tight radius curves along the alignment.

The project will extend from the Los Angeles Metro Gold Line Little Tokyo/Arts District Station to the 7th Street/Metro Center Station through downtown Los Angeles. 3 new metro stations will be constructed: Central, Broadway and Hope. Hope is estimated to be the deepest station in Los Angeles, 120 ft below ground. The project includes a connection to the existing 7th St. and Flower Station. This project will allow people to ride from Santa Monica to East Los Angeles and Azusa to Long Beach without having to change trains, but also connecting the Exposition and Blue lines directly to Union Station. LA Metro estimates that the Regional Connector will increase ridership across the entire transportation system by 17,000 people per day and save commuters an average of 20 to 30 minutes by reducing the need to transfer to different lines.

Major challenges were encountered during the works and consequently, a few innovations were implemented. Unforeseen obstructions during the TBM drive and SEM construction were unique and extremely challenging. Armed by the support of all teams, the project overcame those difficult challenges by turning a one-month delay into a two-month schedule acceleration.

The overall cost of the project is estimated at \$1.2 billion.

Client: Los Angeles County Metropolitan Transportation Authority (LA Metro)

Contractors: Regional Connector Constructors (J.V. Skanska-Traylor)

Stakeholders: City of LA Bureau of Engineering and Bureau of Street Lighting; ConAd; LADWP; AT&T; LADOT; Caltrans; LA County; LADBS

Engineering firm(s): WSP: Owner's designer, Hatch Mott McDonald: Design-builder's designer, Arcadis and PCC consultants: Owner's PM assistance

- **Project of the Year incl. Renovation (up to €50M) : Modernization of the Vladivostok tunnel of the Far Eastern Railway, Russia**

For the first time in Russia, Mosmetrostroy developed a project and applied the technology of modernization of a railway tunnel, built 82 years ago, where one facility was adapted to specific working conditions and applied various modern world achievements and innovations in the field of transport infrastructure facilities. The applied technical solutions made it possible to obtain a fundamentally new multi-layer lining of the tunnel with high technical and operational characteristics, in which all layers are included in the construction. The task was successfully implemented with a significant reduction in terms (by 1.5 years) and the cost of work (2 times) relative to the initial project, according to which it was planned to carry out reconstruction of the tunnel with a complete tunnel closure for train traffic for the period of work with the construction of the bypass railway section through the city center. With the use of modern technologies during tunnel modernization, a significant social effect was achieved: uninterrupted delivery of goods by rail to the seaport of Vladivostok and from the port, to a heat power-station, as well as for urban needs for the entire duration of work at the facility. The implementation of this project by Mosmetrostroy allowed to increase the throughput capacity of the modernized railway section and reduce operating costs, improve the environmental situation in the tunnel zone due to the organized drainage system.



The positive results achieved make it possible to further disseminate this technology when modernizing numerous other tunnels located on a huge railway network in Russia and abroad, many of which are of considerable age from the moment of construction and also require modernization to meet modern requirements and operating conditions.

- **Technical Project Innovation of the year - Line A Underground Stations Extension, Toulouse, France**



The special feature of this project lies in building three underground station extensions, which required the removal of the tunnel lining, while keeping the subway in operation. One of the operation complexities was the utter necessity to limit any inconvenience for the passengers, while guaranteeing the accessibility and security requirements of an automatic operating metro.

This needed to be done along with minimizing, as much as possible, the disturbance caused by the works on the very urban environment. A steel rib support lined with steel plates was placed around the tunnel during the summer 2017 and removed in summer 2018. This tunnel shell isolated the construction site from the subway in operation. This made the construction of the diaphragm walls, the excavation on both sides of the tunnel and cutting of the lining in the extension are a possible. At no time were the 220,000 passengers of the A Line aware of travelling in the heart of an underground construction site. A success that deserves to be recognized.

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Client : Tisséo Ingénierie

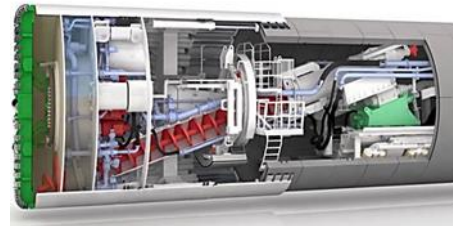
Contractor : EIFFAGE GENIE CIVIL / I.CO.P SPA / BG Ingénieurs Conseils / Forézienne d'entreprises / Fontanié

Engineering Firms : Arcadis/Puig Pujol Associés/Betem

- **Technical Product/Equipment Innovation of the year – Autonomous TBM, Malaysia**

The aim of this project is the development, testing and deployment of AI algorithms for an autonomous system to operate multimode TBM's on a tunnelling megaproject.

The Autonomous TBM system is a "plug and play" solution imagined as a custom software installed on an industrial PC module. Teams developed this system as an extent of a previous technological innovation, the Variable Density (VD)



TBM's which are capable of multimode operations, including full slurry and Earth Pressure Balance processes. The sophisticated operation of the multi-mode VD TBM's necessitates re-training even for experienced operators as it involves new operating techniques, providing the initial motivation to develop the « Autonomous TBM » system.

Global tunnelling boom and the burgeoning of tunnelling projects worldwide lead to an ever-increasing demand for TBM operators. The safe delivery of tunnelling projects relies heavily on TBM operators' competency. However, it is difficult to gauge and validate an operator's skills through formal hiring processes. There is also a huge variability in operator competency levels and additional training requires significant resources and time.

Indeed, a TBM has over 400 sensors sampling thousands of data points every minute. A computer is highly suited to process these data points and respond instantaneously with appropriate decisions. In contrast, human operators are limited by their ability to only view each data point individually and sequentially, resulting in slower response times.

The « Autonomous TBM » system has been developed in Malaysia, for the Klang Valley MRT Line 2 project, currently the largest mega-infrastructure project being undertaken by the Malaysian Government. It has already successfully completed 3km of urban tunnelling in complex geologies undercrossing sensitive infrastructure including live rail lines and a 14-lane highway.

- **Innovative Underground Space Concept of the year – Underground Green Farming, Switzerland**



Already in 2015 it was established that globally we lose 12 million hectares of arable land for food production through degradation of the soil annually. To survive, humanity must find new and renewable methods to produce food. We also need to learn from our past and find methods that are sustainable, use renewable resources and contribute to decarbonizing our society.

The Swiss Center for Applied Underground Technologies (SCAUT) has developed and commissioned the first 'Underground Green Farming' prototype for a sustainable food production by using aquaponics. Aquaponic systems combine aquaculture with hydroponics in a symbiotic environment. The project is divided in three parts : fish, vegetables and biofilters. The system works in a cycle: water from the fish ponds is fed to a hydroponic

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system and then recirculated back to the aquaculture system. The use of LED lighting allows for stimulating plant growth through specific targeting of certain light frequencies. The link with Carbon Capture and Storage allows for use of CO₂ turning it from a waste to a feedstock.

A further phase would be to investigate the possibility of using CO₂ from carbon capture and storage schemes for plant growth and thereby conversion of CO₂ to O₂. With SCAUT's underground green farming concept, several harvests per year will be possible. Underground green farming offers the opportunity to produce food locally in urban areas – exactly where the demand is. Consequently, there is no need to ship food all over the world. Underground Spaces offer constant climate conditions – extensive cooling during summer or heating during winter is therefore not required.

- **Safety Initiative of the Year - Air Quality Working Group: an industry-first collaboration on silica dust control - Australia**



Silica dust is one major health issue for Australian tunnelling industry. In Australia, tunnel construction workers have an increased risk of developing occupational disease when compared to the general construction industry such as lung cancer and silicosis.

The Australian Tunnelling Society is a strong proponent of the importance of health and safety in the tunnelling sector. In 2019, tunnel

construction projects planned and under construction in the state of New South Wales (NSW), Australia are valued at up to \$20 billion in total. The stakeholders of ATS took a proactive approach to this health issue through leveraging the strong experience of their membership and have produced a much needed body of knowledge to support an ever-growing industry.

This entry highlights the ambitions of the whole Australian industry for the prevention of health issues. Over the period of 12-months, the ATS facilitated an Air Quality Working Group (AQWG) which focused on sharing information to address the challenges associated with controlling silica dust and producing a much needed body of reference material that previously did not exist in the tunnel construction industry's body of knowledge.

Several conclusions were produced by this initiative: standardised awareness material that could be effectively delivered during toolbox talks and tunnel inductions ; addressing higher-level business processes associated with the tunnel construction life-cycle so that the risk of silica dust exposure could be effectively considered by client organisations during project planning and design ; numerous case studies on engineering controls including those on ventilation scrubber systems, portal misting systems and Roadheader cabin air filtration, in addition to general information on ventilation.

Since its publication 4 months ago, the published body of knowledge has been accessed over 1,630 times, demonstrating the level of interest and importance of this work.

- **Young Tunneller of the Year – Amanda Kerr, USA**

“The Tunneling Industry provides many opportunities for quick thinking and creativity in a technical environment; I look forward to more engineering challenges and to further mentor young engineers to succeed in a demanding industry.”



Amanda received a Bachelor of Science in Engineering in Civil Engineering with a Minor in Spanish Literature, as well as a Master of Science in Engineering in Construction Engineering. Throughout her Undergraduate studies, she held leadership positions in her university's Chi Epsilon, ASCE, and NASTT student chapters performing STEM outreach activities, particularly focused on Underground Infrastructure, with surrounding elementary schools and youth programs. As a winner of the NASTT Michael E. Argent Scholarship, bringing more talent, diversity, and focus to the trenchless industry is of utmost importance to her. She began her construction career with heavy civil work with the Southwest Branch of Granite Construction, on the Tucson International Airport project in Arizona (US) where she gained firsthand knowledge of the success possible by the proper implementation of alternative delivery methods. She then went on to work as a heading engineer on the Northgate Link Extension with Michels-Jaydee-Coluccio. Following this position, she worked as a Lead Field Engineer for the joint-venture of Michels-Jaydee on the Blacklick Creek Sanitary Interceptor Sewer (BCSIS) tunnel project. She was involved in the TBM Design and Hardware selection, led a team of engineers managing the construction of eleven shafts, served as lead project scheduler, and managed the BCSIS Environmental program. After two years, she became Lead Project Engineer, where she oversaw major structural design modifications that significantly reduced construction costs and saved the project over 180 calendar days, as well as successfully negotiated project change orders with the client, preventing any outstanding claims. Amanda currently works as a Lead Project Engineer for the large diameter tunnelling division of the Michels Corporation.

- **Lifetime Achievement Award – Dr. Harvey Parker**



With over 45 years of experience in the tunneling industry in the US and around the world, Dr. Parker has made significant contributions to signature tunnelling projects through leadership and expertise. He has been involved with many iconic projects. He is a University of Illinois Urbana-Champaign alumni where he received his Ph.D. in Civil Engineering with Minor in Geology. He also holds a M.S. in Civil Engineering from Harvard University and B.S. in Civil Engineering from Auburn Polytech. He has held adjunct or visiting teaching positions at University of Illinois and Columbia University and is the author or co-author of over 60 publications; often on planning, risk management, and geotechnical investigations. Specific examples include the Alaskan Way Viaduct replacement project in Seattle Washington, the largest bored tunnel in the world at the time, the metro system in Los Angeles, and the inception of the metro system in Washington DC. His knowledge has been captured and available to students and the practicing community through chapters in the most recognized textbooks in the industry.

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PREVIOUS EDITION : WINNERS 2018

Major Project of the Year (over €500M): The Immersed Tunnel of Hong Kong-Zhuhai-Macao Bridge

Tunnelling project of the year (50-500m€): The Queershan Tunnel on National Road 317

Project of the year up to €50m: Zarbalizadeh Shallow Tunnel Construction underneath the Operating Railways

Technical Project Innovation of the Year: A Mechanized Method with Large Section Horseshoe Shape EPB-TBM First Applied in Loess Mountain Tunnel

Technical Product/Equipment Innovation of the Year: Multifunctional Energy-Storage and Luminescent Material for Sustainable and Energy-saving Lighting

Safety Initiative of the Year: ROBY 850 - Semi-Automatic Drilling Robot

Innovative Underground Space Concept of the Year: Norwegian Rock Blasting Museum

The Lifetime Achievement Award: Prof Evert Hoek

Young Tunneller of the Year: Giuseppe Gaspari

About the International Tunnelling and Underground Space Association:

The International Tunnelling and Underground Space Association (ITA) is a non -profit and non-governmental international organization, which aims at promoting the use of underground space as a solution to sustainable development. Founded in 1974 and operating out of Lausanne, Switzerland, ITA currently has 78 Member Nations, 300 affiliated members, 17 Prime Sponsors and 60 supporters.