

Ελληνική Επιτροπή Σηράγγων & Υπογείων Έργων (Ε.Ε.Σ.Υ.Ε.)



Member of International Tunnelling &
Underground Space Association (I.T.A.)

www.eesy.gr

ITA Tunnelling Awards 2019

Παγκόσμιες εξελίξεις

Νέες εκδόσεις

Συνέδρια

Τα νέα Διοικητικά

Συμβούλια σε ΕΡΓΟΣΕ

& Αττικό Μετρό

4 Δεκέμβρη

Τεχνική επίσκεψη

Εργοτάξιο Μετρό

Πειραιά

*Προκατασκευασμένα στοιχεία σηράγγων - η χρήση διαμήκων
συνδέσμων (dowels)*

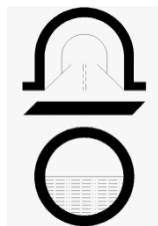
Το Δελτίο Των Σηράγγων

Νοέμβριος 2019

Το δελτίο των Σηράγγων

Ε.Ε.Σ.Υ.Ε. - Μέλος της Ι.Τ.Α.

www.eesyge.gr



Επικοινωνία για το Δελτίο των Σηράγγων: marilia.balasi@gmail.com

Editorial

Καλωσορίσατε στο νέο Δελτίο Σηράγγων. Στο τεύχος αυτό συγκεντρώσαμε όπως πάντα πληροφοριακό υλικό και παραπομπές στις νεότερες εξελίξεις των υπόγειων κατασκευών που πιστεύουμε ότι θα βρείτε αξιοπρόσεκτες. Ιδιαίτερα σας παραπέμπω στα επερχόμενα βραβεία της Διεθνούς Επιτροπής Σηράγγων που συγκεντρώνουν ετησίως το παγκόσμιο ενδιαφέρον του κλάδου, με γιγάντια αλλά και πρωτοποριακά έργα ανά την υφήλιο.

Ευχαριστώ τους συναδέλφους Γιάννη Φίκιρη, Δημήτρη Αλιφραγκή, και Δημήτρη Λίτσα για τη συμβολή τους στην ύλη του περιοδικού. Επίσης θα ήθελα να εκφράσω τις θερμές ευχαριστίες μου στο συνάδελφο Ευριπίδη Ζαμπίρα για το άρθρο που μοιράστηκε μαζί μας στο παρόν τεύχος.

Υπενθυμίζουμε τη διοργάνωση τις αμέσως επόμενες ημέρες (6-8 Νοεμβρίου στο Πολεμικό Μουσείο Αθηνών) του 8^{ου} Πανελληνίου συνεδρίου Γεωτεχνικής Μηχανικής (<https://www.erasmus.gr/microsites/1170>) στο οποίο θα μας δοθεί η ευκαιρία να ακούσουμε τις τελευταίες εξελίξεις στον τομέα αυτό και θα έχουμε τη δυνατότητα να βρεθούμε και να κουβεντιάσουμε με συναδέλφους.

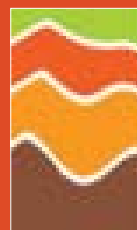
Τέλος, μια πολύ ενδιαφέρουσα και διασκεδαστική έρευνα διεξάγει η σχολή Μηχανολόγων Μηχανικών Ε.Μ.Π. Μπορείτε να λάβετε μέρος ηλεκτρονικά και να τεστάρετε τις γνώσεις σας για την ασφάλεια των σηράγγων και την οδηγική σας συμπεριφορά εντός αυτών. Δείτε περισσότερα στο σύνδεσμο <http://hmrt.simor.mech.ntua.gr/>

Καλή ανάγνωση!

Μαριλία Μπαλάση

8^ο

ΟΡΓΑΝΩΣΗ



ΕΛΛΗΝΙΚΗ
ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

**6-8
ΝΟΕΜΒΡΙΟΥ
2019**

**ΑΘΗΝΑ
ΠΟΛΕΜΙΚΟ
ΜΟΥΣΕΙΟ**

www.8hcge2019.gr

www.hssmge.gr



ΓΡΑΜΜΑΤΕΙΑ ΟΡΓΑΝΩΣΗΣ:
Erasmus Conferences
Tours & Travel S.A.
Κολοφώντος 1 και Ευρυδίκης
τ.κ. 16121 Αθήνα
T 210 7414700, F 210 7257532
W www.erasmus.gr

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Εταίροι – Χορηγοί της ΕΕΣΥΕ

ΕΔΑΦΟΣ ΣΥΜΒΟΥΛΟΙ ΜΗΧΑΝΙΚΟΙ Α.Ε.

Υπερείδου 9, 105 58 Αθήνα, Τηλ: 210-32.22.050, e-mail: admin@edafos.gr, www.edafos.gr



ΣΟΦΙΣΤΙΚΗellas A.E.



ΕΛΛΗΝΙΚΟΙ ΛΕΥΚΟΛΙΘΟΙ

**Απλοί Εταίροι ΕΕΣΥΕ**

**Προβληθείτε εδώ
από την ΕΕΣΥΕ***

* Οι προϋποθέσεις εγγραφής στην ΕΕΣΥΕ, εταιρειών ή οργανισμών του Δημοσίου καθώς και ιδιωτικών εταιρειών προβλέπονται στο άρθρο 3 του καταστατικού της ΕΕΣΥΕ:
<https://www.eesy.gr/902rhothetarhoomicron-3.html>

1. ΤΑ ΝΕΑ & ΟΙ ΕΚΔΗΛΩΣΕΙΣ ΜΑΣ

Η Ελληνική Επιτροπή Σηράγγων και Υπογείων Έργων στα πλαίσια του εορτασμού της Αγίας Βαρβάρας, οργανώνει τεχνική επίσκεψη στον υπό κατασκευή σταθμό Μετρό Πειραιά.

Σας περιμένουμε όλους την Τετάρτη 4 Δεκεμβρίου στο εργοτάξιο του σταθμού Πειραιά στις 13:30.

Περισσότερες πληροφορίες σύντομα στην ιστοσελίδα μας <https://www.eesy.gr/>

Τα νέα μέλη μας

Καλωσορίζουμε στην Επιτροπή Σηράγγων τα νέα μέλη μας:

ΣΜΥΡΛΗΣ ΣΤΑΥΡΟΣ, ΜΗΧΑΝΟΛΟΓΟΣ ΜΗΧΑΝΙΚΟΣ, HILTI

ΣΙΣΚΟΥ ΙΩΑΝΝΑ, ΠΟΛΙΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ, HILTI

ΚΑΡΑΤΟΛΟΥ ΟΛΥΜΠΙΑ, ΜΗΧΑΝΟΛΟΓΟΣ ΜΗΧΑΝΙΚΟΣ, HILTI

ΣΧΙΝΑ ΣΤΑΥΡΟΥΛΑ, ΠΟΛΙΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ

ΠΑΛΑΙΟΛΟΓΟΣ ΔΗΜΗΤΡΙΟΣ, ΠΟΛΙΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ

2. ΤΑ ΝΕΑ ΤΗΣ ΙΤΑ

ITA Tunnelling Awards

Στις 18 Νοεμβρίου 2019, στο Μαϊάμι των ΗΠΑ, θα δοθούν τα ετήσια βραβεία σηράγγων της ΙΤΑ τα οποία διοργανώνονται από το 2019. Οι υποψήφιοι θα παρουσιάσουν το έργο τους και τα επιτεύγματά τους (καινοτομία, λειτουργικότητα, ασφάλεια, βιωσιμότητα). Τα βραβεία θα δοθούν στο πλαίσιο του συνεδρίου Cutting Edge. – Advances in Tunnelling Technology

<https://awards.ita-aites.org/>



MAJOR PROJECT OF THE YEAR (OVER 500M)

- The EPC TBM Follo Line Project (Norway)
- The Seoul Metropolitan High-Speed Railway (Suseo~Pyeongtaek) Construction Project (Yulhyeon Tunnel) (South Korea)
- Tuen-Mun - Chek Lap Kok Link - Northern Connection Subsea Tunnel Section (Hong Kong, China)
- Wuhan Sanyang Road Yangtze River Tunnel Project (China)

PROJECT OF THE YEAR (BETWEEN 50M AND 500M)

- Construction of two parallel tunnels for the Mexico City - Toluca suburban railway (Mexico)
- New Badaling Tunnel and Great Wall Station of Beijing-Zhangjiakou High-speed Railway (China)
- Regional Connector Transit Project (United States of America)
- SCL Immersed tube tunnels (Hong Kong, China)
- The New Ulriken Tunnel (Norway)
- Victory Boogie Woogietunnel (Netherlands)

PROJECT OF THE YEAR INCLUDING RENOVATION (UP TO 50M)

- Finsbury Park Station Step Free Access (United Kingdom)
- Modernization of the Vladivostok tunnel of the Far Eastern Railway (Russian Federation)
- Outram Park Linkway Tunnel (Thomson Line) (Singapore)

TECHNICAL PROJECT INNOVATION OF THE YEAR

- Innovation and Application of New Single-hole Double-line Quasi-rectangular Shield Tunnel Technology System (China)
- Intersecting and Overlapping (Twisted) Tunnel Group Construction Technology for Tianjin Metro Lines 5 and 6 Lot 1 (China)
- Rapid Construction Technology for Large Cross-section Extremely Gassy Tunnel (China)
- Toulouse Line A underground stations extension (France)

TECHNICAL PRODUCT/EQUIPMENT INNOVATION OF THE YEAR

- ARCHITA, an innovative multi-dimensional mobile mapping system (Italy)
- Autonomous TBM (Malaysia)
- AXON (Australia)
- Tunnel Inspection 4.0 – Smart Tunnel Maintenance using Artificial Intelligence (Switzerland)

INNOVATIVE UNDERGROUND SPACE CONCEPT OF THE YEAR

- Building Large Prefabricated Urban Underground Space with Small TBMs for Subsection Undercutting (China)
- SNWA Low Lake Level Pumping Station - Underground (United States of America)
- Underground Green Farming (Switzerland)

SAFETY INITIATIVE OF THE YEAR

- Air Quality Working Group: An industry-first collaboration on silica dust control (Australia)
- An Automatic Geological Forward-prospecting Technique Safeguarding TBM Tunneling (China)
- Robotization of the automatic tubular steel arch installation: a key factor for safety (Italy)

YOUNG TUNNELLER OF THE YEAR

- Amanda Kerr (United States of America)
- Diwakar (Singapore)
- Elliot James Fern (Switzerland)
- Sun Feng (China)
- Yutaka Okuda (Japan)

Working Groups

Παραθέτουμε τη λίστα με τα ενεργά Working Groups της ΙΤΑ, καθώς και πληροφορίες για τη λειτουργία τους.

Όσοι συνάδελφοι ενδιαφέρονται να συμμετάσχουν στις εργασίες των Working Groups παρακαλούνται να επικοινωνήσουν μαζί μας στο eesye.gr@gmail.com.

Working Groups

WG2: Research

WG3: Contractual practices in underground construction

WG5: Health and safety in works

WG6: Maintenance and repair of underground structures

WG9: Seismic effects

WG11: Immersed and floating tunnels

WG12: Sprayed concrete use

WG14: Mechanisation of excavation

WG15: Underground and environment

WG17: Long tunnels at great depth

WG19: Conventional tunnelling

WG20: Urban problems – underground solutions

WG21: Life cycle asset management

WG22: Information Modelling in Tunnelling

WG23 (New): Design and construction of shafts

(<https://about.ita-aites.org/wg-committees/working-groups>)

ORGANISATION AND OPERATION OF THE WORKING GROUPS AND OF THE COMMITTEES

A General provisions

6.1. – Statutes

Working Groups and Committees are part of the Association and represent an important means for carrying out its mission.

6.2. – Objectives

The main objectives of the Working Groups and Committees are:

- to promote understanding of the techniques of underground works (planning, design, construction, operation, use and maintenance) through the exchange of specific knowledge and information;
- to influence decision-makers by providing information on the benefits of underground works and on the needs for further research;
- to formulate specific recommendations to draw the attention of all Member Nations to the importance of underground works and to encourage them to use improved and more economic construction methods;
- to provoke fruitful exchanges, to accelerate the distribution of technical information and to improve coordination between Member Nations by continuous contacts between the specialists in the different countries;
- to facilitate the creation of dedicated teams and groups to perform specific (research) activities through external funding.

6.3. -- Setting up the Groups and Committees

The Working Groups and Committees are initiated by the General Assembly. A Member Nation - Working Group - or Committee - may propose a new working group or a new Committee by written motion to the Executive Council. The proposal should specify the objectives of the Working Group or of Committee, and define a preliminary programme. The Executive Council establishes whether the objectives are in the field of interest of the Association, whether there is duplication with other groups or committees, and whether the programme is feasible. Upon recommendation by the Executive Council, the proposal will be submitted to the next General Assembly for approval

6.4. – Dissolution

After completion of the tasks accepted by a Working Group or a Committee, it may be dissolved by:

- a decision of the majority of the Working Group or Committee members and/or
- a decision of the Executive Council.

In case of a decision by the Working Group or Committee itself, the Secretariat and the Executive Council must be informed.

As a general rule, "ad hoc" Working Groups which are dissolved after achievement of a single task are preferable to permanent Groups.

6.5. -- Long term programme

Due to the time needed for completing a single subject, it is necessary that each Working Group or Committee establishes a programme of its future activities. This programme should be submitted to the Executive Council for approval, to allow a good coordination between the Working Groups and the Committees.

When a Working Group or a Committee is ready to publish the results of its work, they shall send the manuscript to the Secretariat who submits it to the Executive Council. The Executive Council approves the report and decides the form and method of publication.

- If the subject needs many years to come to a final conclusion, it is recommended to publish progress reports, recording the advancements of the studies
- The final report must be written in one of the official languages of the Association (English or French). The Secretariat will initiate:
- the translation into the other official language of the Association (if necessary);
- its publication as an "ITA Report";
- the report will be made available free of charge for the members of the Association either as a hard copy or as an electronic copy;
- the sales of the report can be organised for non-members of the Association.

Publication of reports prepared by Working Groups or Committees shall be made by the Association only. Acknowledgements in each report will be given to the members of the Working Group or of the Committee responsible for its preparation.

Final recommendations of Association should be respected by the Member Nations.

6.7. – Guidance

The Executive Council provides guidance to the works of the Working Groups and Committees. One of the Executive Council members is appointed as "tutor" for each of them. The Working Group or Committee regularly keeps

their tutor informed on the development of the works by sending him copies of:

- all important correspondence;
- questionnaires and drafts for reports;
- minutes of the meetings;
- invitation and agenda for meetings;

and is encouraged to ask for advice where needed.

The Tutor reports to the Executive Council.

B Provisions specific to the Working Groups

6.8. – Animateur

The Executive Council appoints the initial Animateur for each Working Group. Working Groups already in existence should make proposals for the approval of the Executive Council. A nominated Animateur must be professionally active in the area of the Group's interest.

Each Working Group should appoint a Vice-Animateur. The Vice-Animateur substitutes for the Animateur in case of absence. Animateur and Vice Animateur shall not belong to the same Member Nation.

The term of office of the Animateur and of the Vice Animateur is 3 years. After this an election shall be organised inside the Working Group to choose the Animateur and/or Vice Animateur. An Animateur/Vice Animateur may be elected for a maximum of 3 consecutive terms i.e. 9 years. In the event that after 9 years, there is no candidate for the Animateur/Vice Animateur position there should be a vote to determine if the Working Group should continue. This will require ratification by ExCo. In the event of the Working Group continuing then the current Animateur/Vice Animateur may be reelected for a fourth term

The most effective support can be attained when the work is financially sponsored, e.g. by the Government of the Member Nation to which the Animateur belongs. The Member Nation to which the Animateur belongs is responsible for the Working Group and must be willing and able to support him. The Working Group has to inform the Executive Council when it intends to nominate another Animateur or to transmit the responsibility to another Member Nation

The Animateur takes the chair in Working group meetings (§ 6.10) and he is responsible for the progress of the work in the Working Group. He informs his tutor (see § 6.7) in the Executive Council and reports to the General Assembly

6.9. -- Working Group members

Member Nations interested in the work of a specific Working Group should nominate an official representative. He (or she) is – in cooperation with his (her) national body – responsible for the contributions of his country to the Working Group. He should be able to take an active part in the subject being addressed by the Working Group and should participate in the meetings of the Group. Where unable so to do, the Member Nation appoints a deputy who must be briefed on the objectives and progress of the work in the group by the permanent representative before the meeting. In general a change of the delegate to the Working Group should be avoided, as this delays the work of the Group, much of which essentially occurs between meetings.

Affiliate Members of the Association are entitled to be member of the Working Groups, and individuals from the country where the Working Group meeting takes place are entitled to participate in the meeting

6.10 – Meetings

As a general rule, Working Groups meet at the same time and place as the General Assembly. Intermediate meetings or conference calls may be agreed on by the Working Group members. In due course Working Group meetings may alternatively be associated with appropriate seminars.

The costs of the participation in the Working Group meetings are carried by each Member Nation or representative respectively.

Minutes of the meetings have to be prepared and sent to each member of the group and to the Secretariat for publication, at the latest one month after the annual meeting, or after any intermediate meeting.

6.11 -- Activities between meetings

The Animateur has to assure that the work is continued in the time between the meetings, e.g. by:

- exchange of letters, e-mails, records and documentation
- delegating special tasks to be undertaken by the Working Group members
- sending questionnaires to the Member Nations,
- assessing returned completed questionnaires,
- drafting of publications,
- making preparations for the next meeting.

For these works, the Animateur may use the services of the ITA Secretariat.

6.12 -- Preparation of a meeting

The careful preparation of a Working Group meeting is essential for its success. Usually the Animateur or the Secretariat should distribute the invitation to the Working Group members four weeks (in no case later than two weeks) before a meeting. The invitation should include:

- place, date and timetable,
- agenda
- written material on those points of the agenda for which (after discussion) a decision has to be taken by the Working Group (e.g. draft of a planned publication or evaluation of a questionnaire).

The invitation and the agenda to the Working Group meetings are also distributed to those Member Nations of the Association which are not permanently represented in the Working Group, so that they will be able to participate in the meeting, if the subjects are of interest to them.

6.13 -- Method of working

The work of each Working Group should aim at recommendations and/or other reports, and publications. Therefore, all material which is available on the subject from the different countries should be evaluated. In some cases, it may be necessary to prepare questionnaires. These should be sent to the Working Group members as well as to all Member Nations and to other nations involved in the subject. Questionnaires should only be distributed by the Animateur or the Secretariat or – exceptionally – by a member who is authorized by the Working Group. Target programmes should be prepared for each stage of the work, to be reviewed and updated at each meeting.

6.14 -- Corresponding working groups in Member Nations

The most efficient support of a Working Group can be reached, if each represented Member Nation establishes a national group on the corresponding theme. All those countries, which are especially interested in a subject, are therefore encouraged to support their representative to a Working group by a corresponding national group. In certain instances, the work of the Working Group may need to be preceded by adequate work on a national scale.

3. ΕΝΔΙΑΦΕΡΟΥΣΕΣ ΕΞΕΛΙΞΕΙΣ

«Ανοίγει ο δρόμος» για τη Γραμμή 4

(Πηγές: [Ypodomes.com](https://ypodomes.com), Η Καθημερινή)

<https://ypodomes.com/prasino-fos-gia-ti-grammi-4-aporrifthikan-oi-prosfyges-sto-ste/>

<https://www.kathimerini.gr/1048273/article/epikairota/ellada/prasino-fws-apo-to-ste-gia-th-grammh-4-toy-metro>

Σύμφωνα με πληροφορίες, απορρίφθηκαν από το ΣτΕ οι προσφυγές εναντίον του διαγωνισμού της Μυτιληναίας και της Τέρνα για τη Γραμμή 4 του μετρό Αθήνας, τμήμα Α, Άλσος Βεΐκου – Γουδή, ανοίγοντας έτσι το δρόμο για την ολοκλήρωση του διαγωνισμού. Στη διεκδίκηση παραμένουν οι κοινοπραξίες ΑΒΑΞ ΑΕ- GHELLA SpA -ALSTOM TRANSPORT S.A. και ΑΚΤΩΡ ΑΤΕ – ANSALDO STP S.p.A – HITACHI RAIL ITALY SPA.

Θυμίζουμε ότι το πρώτο τμήμα της γραμμής 4 που δημοπρατείται θα ξεκινά από το Άλσος Βεΐκου στο Γαλάτσι και θα καταλήγει στο Γουδή, αποτελούμενο από 15 σταθμούς: Άλσος Βεΐκου, Γαλάτσι, Ελικώνος, Κυψέλη, Δικαστήρια, Αλεξάνδρας, Εξάρχεια, Ακαδημία (σύνδεση με γραμμή 2 Στ. Πανεπιστήμιο), Κολωνάκι, Ευαγγελισμός (σύνδεση με γραμμή 3), Καισαριανή, Πανεπιστημιούπολη, Ιλίσια, Ζωγράφου και Γουδή.

Τα νέα της ΕΡΓΟΣΕ

(Πηγή: Δελτίο Τύπου ΕΡΓΟΣΕ 18/10/2019)

<https://www.ergose.gr/paroysiasi-toy-d-ntos-symvoyloy-tis-ergose-k-chr-dioneli-sta-plaisia-toy-tritoy-synedrioy-ypodomon-metaforon-2/>

Καθήκοντα ανέλαβε η νέα διοίκηση της ΕΡΓΟΣΕ Α.Ε.

Το νέο Διοικητικό Συμβούλιο της Εταιρείας διαμορφώνεται ως εξής:

Πρόεδρος Δ.Σ.: Χρόνης Ακριτίδης, Αγρονόμος Τοπογράφος Μηχανικός – Συγκοινωνιολόγος

Διευθύνων Σύμβουλος: Χρήστος Βίνης, Πολιτικός Μηχανικός και Μηχανικός Περιβάλλοντος.

Μέλος: Αθανάσιος Τάτσης, Νομικός.

Μέλος: Ιωάννης Κανελλόπουλος, Αγρονόμος Τοπογράφος Μηχανικός.

Μέλος: Ιωάννης Ρουκάς, Οικονομολόγος.

Μέλος: Χρήστος Παλής, Πολιτικός Μηχανικός.

Τα νέα της Αττικό Μετρό

(Πηγή: Υπηρεσία Τύπου και Εταιρικής Επικοινωνίας Α.Μ.)

https://www.ametro.gr/?page_id=6727

Το νέο Διοικητικό Συμβούλιο της Αττικό Μετρό:

Πρόεδρος Δ.Σ.: Νικόλαος Ταχιός

Αντιπρόεδρος Δ.Σ. και Δ/νων Σύμβουλος: Νικόλαος Κουρέτας

Μέλος: Παύλος Σαραντόπουλος

Μέλος: Νικόλαος Καλογήρου

Μέλος: Ιωάννης Μαρτάτος

Μέλος: Νικόλαος Κερερές

Μέλος: Δημήτριος Γρίβας

Για τα νέα ανά τον κόσμο μας ενημερώνει ο Δημήτρης Λίτσας.

First Hinkley Point C TBM Begins Boring

By Tris Thomas

(Πηγή: *Tunnelling Journal – Tunnel business magazine*)

<https://tunnellingjournal.com/first-hinkley-point-c-tbm-begins-boring/>



(Image: *Tunnelling Journal*)

Tunnelling work has started at the UK's Hinkley Point C Power Station following the launch of TBM, Mary. Mary will install the 38,000 concrete segments required to support the three 7m diameter underground marine tunnels at up to 33m below the seabed of the Bristol Channel. The tunnels consist of two x 3.5km long Intake Tunnels, and one x 1.8km long Outfall Tunnel. Once complete, the tunnels will form a critical part of Hinkley Point C's cooling system and will have the capacity to transfer 120,000 litres of water per second.

In a first for the UK and made at Balfour Beatty's innovative manufacturing facility in Avonmouth, pre-fabricated nuclear-grade concrete segments will be constructed to ensure that each of the three Herrenknecht TBMs being used to bore the tunnels is able to deliver significant efficiency savings whilst excavating over 11 tonnes of rock per minute.

Alistair Geddes, said: "This is a significant milestone, critical to the successful delivery of the first new nuclear power station in the UK for over 20 years. Having installed the first permanent segment ahead of schedule, this milestone is testament to Balfour Beatty's expertise and to the collaborative approach required to deliver a project of this scale and complexity."

Rob Jordan, Hinkley Point C Construction Director said; "The start of tunnelling at Hinkley Point C represents a hidden but vitally important milestone in the construction of the UK's first new nuclear power station in a generation. The achievement underlines the continued progress being made to ensure that Hinkley Point C will be ready to supply the UK with the reliable low carbon electricity that it needs to combat climate change." The new power station will supply safe, secure low carbon electricity to around 6 million homes.

UK-based Balfour Beatty is contracted to three major packages of works at Hinkley Point C. It was appointed to deliver the electrical works package in a joint venture in 2015, the tunnelling and marine package in 2017 and most recently the 400kV overhead line project on behalf of National Grid in 2019.

For more info about Hinkley Point C:

https://en.wikipedia.org/wiki/Hinkley_Point_C_nuclear_power_station

Kolkata TBM failure causes extensive damage

By Shani Wallis

(Πηγή: TunnelTalk)

<https://www.tunneltalk.com/India-04Sep2019-EPBM-inrush-of-water-causes-surface-collapses-on-Kolkata-Metro-drive.php>

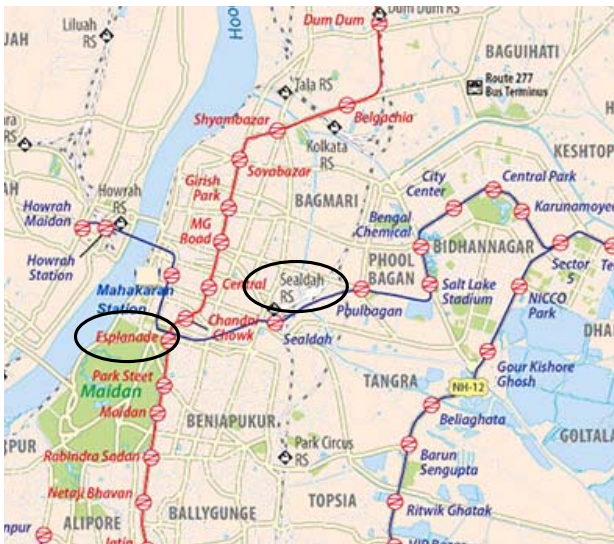
Tailseal failure on the EPBM operating on a running tunnel drive for the Kolkata Metro is reported to be the cause of an uncontrollable inrush of water and material that led to major damage and collapse of buildings. Having started in the evening of Saturday 2 September, the inrush took until end of Sunday 3 September to control, with residents evacuated from dangerously damaged and collapsing homes and businesses in the central Bowbazar area.



Uncontrollable ground-loss settlement caused wide spread damage and collapse of old buildings (Image: TunnelTalk)

The incident occurred 1.6km into the lead heading of the 2.45km running tunnel drives for the new East-West Metro line, which will run from Esplanade to Sealdah Stations (see map). According to senior executives of the Kolkata Metro Rail Corporation (KMRC), the machine had just taken a tight radius turn into an alignment under Ganguly Street, placing severe pressure on the three-row wire brush tailseal. The turn occurred as the machine entered a reportedly unexpected geological deposit of highly water-charged sand. The inrush of water and sand through the damaged tailseal – described as a ferocious flow – quickly became uncontrollable, flooding the tunnel and the TBM, and causing collapse damage on the surface.

The Esplanade to Sealdah drives are part of the eastern 4.5km section of the new metro line that runs between Esplanade to the transition ramp of an elevated guideway to Salt Lake Sector V and are being advanced by the ITD/ITD Cementation Ltd JV. The JV is using two refurbished EPBMs that ITD procured from Herrenknecht some 10 years ago for work on the Delhi Metro. The lead machine launched from the Esplanade Station box in February 2019. The twin machine launched about a month later and is currently about 300m behind the troubled TBM.



Incident occurred on the drive between Esplanade Station, at the Central railway station, and Sealdah Station on the new East-West metro line for Kolkata (Image: TunnelTalk)

Both TBMs are at an indefinite standstill awaiting work to stabilise the area of collapse, assess the condition of damaged buildings, and secure the tunnel drive. More than 450m³ of concrete was injected from the surface and from within the tunnel to stop the inflow of sand and water and continued for the following days to fill the ground-loss void.

A senior management spokesman for KMRC told TunnelTalk in a telephone interview today (Thursday, 5 September 2019) that “not all is yet stable but the settlement increase has stopped.” In addition to the volume concrete pumped into the collapsed area, “a bulkhead of poly-fibre reinforced shotcrete was installed at the end of the 75m TBM to prevent water flowing back into the working shaft. Another bulkhead of cast concrete is now being installed about 5m behind the first.” The spokesman confirmed that, “the 6.35m diameter TBM is completely flooded” and that “it is not known the state of the 5.8m i.d. segmental lining ahead of the shotcrete bulkhead.”

Managing Director of KMRC, Manas Sarkar, explained to local media that, “in normal situations [when encountering poor ground conditions] we inject a mixture of concrete and certain chemicals to plug the holes. But this time, no matter how much we pushed the mixture in, it was getting washed out. After we failed to bring the situation under control, we began evacuating the homes.” Officials told local media reporters that the aquifer of sand and water could not be identified during pre-excavation ground surveys beneath the streets of one of the oldest and most dense urban areas of the city.

The Esplanade to Sealdah drives are the last section of the East-West Metro Line 2 to be completed. The running tunnels from the elevated section transition ramp, through the Phoolbagan underground station and on to Sealdah Station were completed earlier by the ITD/ITD Cementation JV using the same EPBMs.

Specialists called in by KMRC to assist control and recovery of the incident include supervisors who worked with the Afcons-Transtunnelstroy JV to successfully complete 3km of twin running tunnels for the western contract of the East-West Metro Line, including the 520m drives under Hooghly River. The Afcons-Transtunnelstroy JV used two new Herrenknecht EPBMs to connect three underground stations from Howrah Maidan Station in the west to Esplanade Stations in the east. The twin under river drives, at up to 15m below the river bed and 30m beneath the water surface, started in April 2017 and the last ring of the second drive was erected 66 days later in June 2017. The Afcons-Transtunnelstroy JV is now progressing construction and fit out of the underground stations at Howrah Maidan, Howrah, and Mahakaran.

TBMs designed for excavations on the moon

(Πηγή: TunnelTalk- TunnelTECH)

<https://www.tunneltalk.com/TunnelTECH-Jun2019-Designing-TBMs-for-creating-infrastructure-on-the-moon.php>

Current and future goals for human activities on the moon as a staging post for travelling further into space, engineers are preparing to design TBMs capable of excavating underground environments and infrastructure to create those safe and sustainable lunar habitations. A team of engineers from the Colorado School of Mines, TBM manufacturer Herrenknecht, and construction company McNally of Canada, are considering the challenges of developing a lunar TBM (LTBM) designed for the lunar environment and for boring through lunar material.

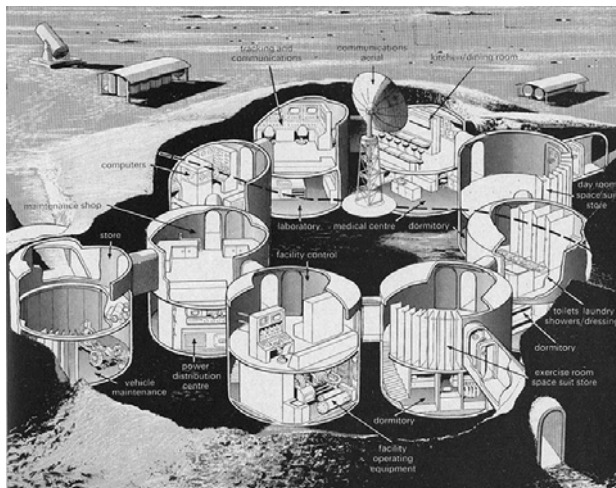
Reaching for deep space is no longer a scientific fantasy, but rather a possibility for commercial applications and perhaps a necessity as resources on earth become stretched. With the advent of reusable rockets, establishment of bases on the moon has attracted renewed attention.

Establishing bases on the moon underground seems to be a logical choice as they would protect future lunar inhabitants and equipment from the harsh environment at the surface, including the vacuum environment, impact by meteorites, radiation, extreme temperatures, storms, and other unknown conditions integral to long-term activities on the moon.

Developing rilles (ancient lava flows that formed into hollow structures as the outer layers of lava cooled), and lava tubes could create underground spaces to house bases the size of large cities with tunneled interconnections. Lava tubes could also provide

skylights to the surface, with special filters to mimic the natural light on the earth.

As well as the potential for developing rilles and lava tubes, limited exploration has shown that water ice, carbon dioxide, and several other volatiles are present in and near the permanently shadowed craters of the lunar north and south poles. Tunneling presents expanded opportunities to access and extract these resources. LTBM's could also be adapted for the frozen regolith (the layer of material covering the solid rock such as soil or dust) in the permanently shadowed craters at the lunar poles, which may be an attractive option for access to lunar ice resources. Other TBM adjustments would be needed to overcome vacuum and lack of breathable atmosphere, surface temperature variations, impacts by micrometeorites, and high levels of radiation. (...)



Large underground lunar base designs from National Geographic (Image: TunnelTalk- TunnelTECH)

Lunar geotechnical considerations

The geology on the moon is expected to be a 10cm layer of regolith, highly compacted within the first 10-20cm, with boulders and fractured rock, deeper intact bedrock, basaltic in the Mare regions and anorthositic in the Highlands. Frozen regolith at the polar regions would combine fine grained to coarse grained rock including boulders of anorthosite mixed with icy volatiles, creating a permafrost region with variable mechanical strength. Until further investigations, face

conditions on the moon will be mixed with more challenging conditions for cutting through the frozen regolith at the polar regions and through boulders and bedrock, requiring high cutting forces that cannot be supported by the weight of the surface equipment, if cut and cover method were to be used.

The following are some of the challenges that one can imagine as part of using TBMs for development of underground bases or mining operations on the moon.

Weight Limits: A 2m to 3m diameter TBM can weigh more than 100 ton, including the backup systems and trailing gear. This is based on using low-cost steel for the support structures with gearboxes, cutterheads, cutting tools and disc cutters. Alternatives are needed for LTBM's to reduce weight specifically for transporting the components on rockets to the moon. The primary support structure could be manufactured from lunar resources such as cast basalt or compressed sintered regolith reinforced with metallic members or basaltic tensile fibers. Using carbon fiber composite parts and lighter composites or alloys for various parts of the machine is also a possibility. Switching materials will have implications on repairs and maintenance such as welding of the parts and that should be considered in the design.

Temperature: Material behaves differently at low temperatures, with most metals being brittle at temperatures below 50°C. (...)

Power and energy consumption: TBMs are power-hungry with 2m to 3m diameter TBMs requiring 500-700 kWe of input power. Variable frequency drive systems are typically used on TBMs with feed cables carrying 5-25kV power to the machine where it is transformed to 480V, 660V, or 1000V for the drive units. To achieve low energy consumption per excavated volume, high forces, and thus high power, are necessary. Low force excavation methods like thermal spalling or microwave excavation require larger amounts of energy than the most efficient mechanical methods. In an environment where power and weight levels have to be kept low but energy must be conserved, a dilemma is faced and lunar TBMs may require excavation techniques that are not economical on earth. (...)

Abrasivity: The regolith and bedrock of basalt encountered on the moon are known to be abrasive due to the mineralogy of the material being from harder silicates.(...)

Vacuum: Lack of atmosphere and working in a vacuum pose significant challenges. Putting a system in place where pressure can be built up inside the tunnel will be easier with operations entirely in hard rock. (...) Problems with vacuum operations include the lack of convective heat transfer. This could result in excessive heating of the cutting tools and components of the TBM drive system and other thermal management

issues. Another issue is extreme high and low temperatures at the surface and limited possibility for heat exchange to maintain an ambient and acceptable temperature. Thermal conditions would stabilize once the TBM is deeper beneath the surface. Needs for human intervention maintenance of LTBM would require the wearing of space suits which will limit the ability of workers to do their job. This limitation will place special emphasis on the clever use of automated systems and robotics to the greatest extent possible.

Lack of flushing/cooling material: Lack of atmosphere and fluids on the moon surface means lack of flushing material for probing ahead of the machine or installing roof bolts. (...)

Ground stability and support: For lunar tunneling, support tools could be made from Kevlar or carbon fiber with light polymer or resin based cements sprayed on the tunnel surface. Special segments could be cast from light materials such as 3D printed rock powder to form air-tight rings in the same way soft-ground machines easily keep 7-8 bar of water pressure at bay.

Maintaining air pressure in the opening: Atmospheric pressures would need to be maintained inside the tunnel heading to allow the crew to work in normal conditions. A similar example on earth is TBM operations under high groundwater pressure where shielded machines work under air tight support installed within the tail shield. Lunar tunnels are not expected to be deeper than 100m so the rock would contain the stresses.

Material transportation: A set of airlocks could allow the transition of materials in and out of the tunnel between vacuum and atmospheric pressure. Muck transfer could be as a fluidized particle flow by a gas supply on the LTBM.

Utilities: Most important of support utilities require by TBMs is an electricity supply. Compressed air lines are the second priority, which would also maintain atmospheric pressure in the tunnel. Installation of water lines for cooling and dust suppression appears less important for lunar tunnelling. (...)

Νέοι Χορηγοί ΕΕΣΥΕ

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Η ιστορία της Mapei στην Ελλάδα:

2001: Η Mapei Ελλάς ιδρύεται στην Ελλάδα με στόχο την ανάπτυξη στην τοπική αγορά και τη βελτίωση των υπηρεσιών της. Η πρώτη έδρα της εταιρείας ήταν στην οδό Παπαδιαμαντοπούλου από όπου ξεκίνησε την εμπορική της δραστηριότητα.

Το 2010 αποτέλεσε σταθμό στην πορεία της Mapei Ελλάς με τη λειτουργία του πρώτου εργοστασίου παραγωγής στη Ριτσώνα. Η έδρα της εταιρείας μεταφέρθηκε στη Ριτσώνα όπου συνέχισε τη δυναμική της ανάπτυξη, φροντίζοντας για την εμπορική διάθεση των προϊόντων στην τοπική αγορά και στο εξωτερικό, αλλά και για την παροχή ολοκληρωμένων και υψηλής ποιότητας υπηρεσιών προς τους πελάτες της εταιρείας μέσα από δραστηριότητες πωλήσεων, προώθησης και προβολής, διαρκούς ενημέρωσης και τεχνικής υποστήριξης.

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Η ΑΚΤΩΡ είναι ο κατασκευαστικός βραχίονας του Ομίλου ΕΛΛΑΚΤΩΡ και η μεγαλύτερη θυγατρική του. Κατέχει ηγετική θέση και διεθνή παρουσία στον τομέα των Υποδομών, παρέχοντας μεγάλο εύρος διαφοροποιημένων υπηρεσιών υψηλού επιπέδου στην Κατασκευή Έργων Υποδομής, Κτηριακών και Βιομηχανικών Εγκαταστάσεων, Φωτοβολταϊκών Πάρκων, καθώς και στη

Διαχείριση Λατομείων, Τεχνικών Εγκαταστάσεων και στη Διαχείριση Έργου. Συνδυάζοντας 70 έτη εμπειρίας με τις πλέον σύγχρονες τεχνολογίες, η ΑΚΤΩΡ δίνει ζωή σε έργα που συμβάλλουν στην ανάπτυξη και βελτιώνουν την ποιότητα της ζωής ανθρώπων σε όλο τον κόσμο.

Μεταξύ των emblematic έργων υποδομής της ΑΚΤΩΡ στην Ελλάδα και το εξωτερικό περιλαμβάνονται η Γραμμή 2 του Μετρό της Αθήνας, η Χρυσή Γραμμή του Μετρό στο Κατάρ, το Μουσείο της Ακρόπολης, ο Αγωγός Φυσικού Αερίου TAP, η Γέφυρα Ρίου-Αντιρρίου, το Κέντρο Επεξεργασίας Λυμάτων Αθήνας στην Ψυττάλεια, ο Αυτοκινητόδρομος Demir Karija – Smoknica στη Βόρεια Μακεδονία, καθώς και τα υπό εξέλιξη έργα του Μετρό Θεσσαλονίκης, της ανάπλασης του Φαληρικού Όρμου κ.ά.

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ΕΠΙΣΤΗΜΟΝΙΚΗ
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ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Χαιρετισμός

Τα τελευταία 30 χρόνια η ανάπτυξη της γεωτεχνικής μηχανικής στην Ελλάδα υπήρξε αλματώδης, χάρη στην ανεπανάληπτη ανάπτυξη και κατασκευή έργων υποδομής. Αν και με την πολύχρονη οικονομική κρίση η δραστηριότητα του μηχανικού στην Ελλάδα, δυστυχώς, μειώθηκε δραματικά, πιστεύουμε ότι η σημαντική δράση Ελλήνων γεωτεχνικών εκτός χώρας ή σε διεθνή έργα, αλλά και η συνεχιζόμενη, με μικρή μόνον μείωση, ερευνητική δραστηριότητα στα Πανεπιστήμια μας (χάρη κυρίως σε ευρωπαϊκή χρηματοδότηση), έχουν διατηρήσει το επίπεδο της ελληνικής γεωτεχνικής υψηλό. Αυτό ελπίζουμε ότι θα επιβεβαιωθεί στο 8ο Συνέδριό μας τον ερχόμενο Νοέμβριο.

Εκ μέρους της ΕΕΕΕΓΜ σας καλώ λοιπόν να το διαπιστώσουμε ίδιοι όμασιν! Στο 8ο Πανελλήνιο Συνέδριο Γεωτεχνικής Μηχανικής, στην Αθήνα, 6 – 8 Νοεμβρίου 2019.

Γιώργος Γκαζέτας

Πρόεδρος της ΕΕΕΕΓΜ

<https://www.erasmus.gr/microsites/1170>

5. Η ΧΡΗΣΗ ΔΙΑΜΗΚΩΝ ΣΥΝΔΕΣΜΩΝ (DOWELS) ΜΕΤΑΞΥ ΑΡΜΩΝ ΔΑΚΤΥΛΙΩΝ ΕΠΕΝΔΥΣΗΣ ΠΡΟΚΑΤΑΣΚΕΥΑΣΜΕΝΩΝ ΣΤΟΙΧΕΙΩΝ ΣΗΡΑΓΓΩΝ

Γράφουν οι:

Ευριπίδης Ζαμπίρας, Πολιτικός Μηχανικός,
Τμήμα Μηχανικής Διάνοιξης Σηράγγων,
ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε.

Νικόλαος Σπυρόπουλος, Μηχανικός
εργοταξίου TBM, ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε.

Μία από τις πρόσφατες εξελίξεις των τελευταίων χρόνων στην κατασκευή και ανέγερση δακτυλίων επένδυσης σηράγγων από προκατασκευασμένα στοιχεία, είναι η όλο και συχνότερη εφαρμογή διαμηκών συνδέσμων (dowels) στους αρμούς μεταξύ δακτυλίων τμηματικής επένδυσης, έναντι της συμβατικής εφαρμογής κοχλιών.

Η συμβατική χρήση κοχλιών στους αρμούς μεταξύ των δακτυλίων είναι μια από τις κύριες αιτίες πρόκλησης διαμηκών ρωγμών στην επένδυση, μετά την περίσφιξή τους και την προώθηση του TBM. Ειδικότερα σε χαράξεις με κλειστές ακτίνες και σε περιπτώσεις λανθασμένης ευθυγράμμισης και δημιουργίας προεξοχών / μετατοπίσεων αρμών των προκατασκευασμένων στοιχείων, η εμφάνιση τέτοιων ρωγμών στην περιοχή των κοχλιών αυξάνεται.

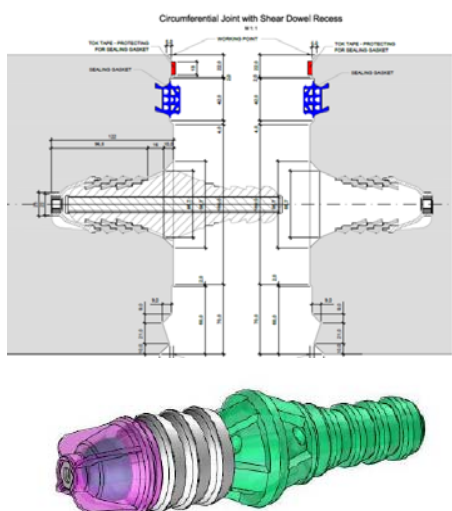


Παραδείγματα ρωγμών κατά μήκος της σήραγγας στις περιοχές των κοχλιών σύνδεσης των αρμών δακτυλίων (μετρό Ντόχα, Πράσινη Γραμμή).

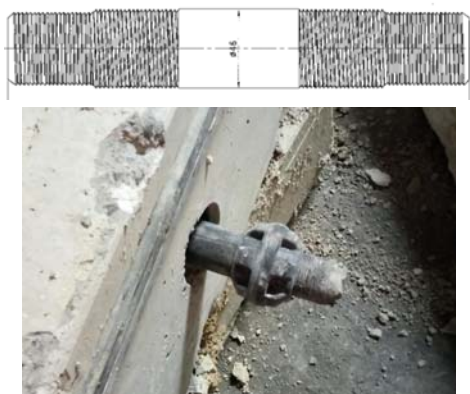
Εναλλακτικά, η χρήση διαμηκών συνδέσμων μεταξύ των δακτυλίων βελτιώνει σημαντικά την ευθυγράμμιση των μετωπικών αρμών εξαλείφοντας τον κίνδυνο δημιουργίας προεξοχών (lipping / stepping) εκτός των επιτρεπομένων ορίων αποφεύγοντας έτσι την δημιουργία ρωγμών από την πίεση των εμβόλων, ενώ εξασφαλίζεται και η επιθυμητή ευθυγράμμιση του στεγανωτικού παρεμβύσματος. Οι διαμήκης σύνδεσμοι χρησιμοποιούνται είτε ως απλοί, για γεωμετρικό έλεγχο και ευθυγράμμιση των δακτυλίων της επένδυσης κατά την ανέγερση σε συνδυασμό με κοχλίες, είτε ως κύριοι σύνδεσμοι αντικαθιστώντας τους κοχλίες (σχεδιάζονται έναντι διάτμησης, εξόλκευσης και κάμψης). Πέραν των ανωτέρω, η εφαρμογή διαμηκών συνδέσμων αντί κοχλιών, επιτρέπει ταχύτερη ανέγερση του δακτυλίου, απλοποιεί τον οπλισμό των προκατασκευασμένων στοιχείων (λόγω έλλειψης κοχλιών), αποφεύγονται δευτερογενείς φορτίσεις από την περίσφιξη των κοχλιών και βελτιώνεται συνολικά η ανθεκτικότητα (durability) των προκατασκευασμένων στοιχείων αφού μειώνεται ο κίνδυνος εισροής υδάτων από πιθανές ρωγμές.

Η εμπειρία από τα έργα μετρό της Πράσινης Γραμμής στην Ντόχα και της επέκτασης της γραμμής 3 προς Πειραιά, έδειξε τα εμφανή πλεονεκτήματα της εφαρμογής διαμηκών συνδέσμων μεταξύ των δακτυλίων. Συγκεκριμένα, στην Πράσινη Γραμμή του μετρό της Ντόχα ο βασικός σχεδιασμός της επένδυσης της σήραγγας ήταν με πλήρη εφαρμογή κοχλιών σε όλους τους αρμούς, αλλά κατά την διάρκεια κατασκευής του έργου διαπιστώθηκαν πολλά προβλήματα με πρόκληση ρωγμών στους αρμούς μεταξύ των δακτυλίων και στις περιοχές των υποδοχών των κοχλιών, κ-ρίως στις κλειστές καμπύλες της χάραξης (βλ. φωτογραφίες).

Κατόπιν αυτού, αποφασίστηκε η κατάργηση των κοχλιών στους αρμούς μεταξύ των δακτυλίων και η εφαρμογή διατμητικών συνδέσμων (shear / friction dowels) στις περιοχές της χάραξης με κλειστές καμπύλες (βλ. σχετικό σχήμα). Με την εφαρμογή των εν λόγω συνδέσμων, κατ' αρχήν εξαλείφθηκαν τα προβλήματα ευθυγράμμισης της γεωμετρίας των προκατασκευασμένων κατά την ανέγερση και οι εμφανιζόμενες ρωγμές μειώθηκαν στο ελάχιστο. Στην σήραγγα επέκτασης του μετρό προς Πειραιά, ο σχεδιασμός της επένδυσης ήταν εξ αρχής με την εφαρμογή μόνο διαμηκών συνδέσμων στους αρμούς μεταξύ των δακτυλίων (χωρίς κοχλίες), το οποίο εί-χε σαν αποτέλεσμα να μην παρουσιάζονται επιμήκειες ρωγμές και η επένδυση να κατασκευαστεί εν γένει εντός των απαιτούμενων ανοχών χωρίς δημιουργία προεξοχών (stepping / lipping).



Διαμήκης σύνδεσμος (shear / friction dowel) σύνδεσης δακτυλίων, σήραγγων Πράσινης Γραμμής μετρό της Ντόχα (εσωτ. διάμετρος σήραγγων 6,17m).



Διαμήκης σύνδεσμος (τύπου biblock) σύνδεσης δακτυλίων, σήραγγας επέκτασης μετρό προς Πειραιά.



Επένδυση προκατασκευασμένων στοιχείων με διαμήκης συνδέσμους μεταξύ των δακτυλίων (επέκταση μετρό προς Πειραιά, εσωτ. διάμετρος σήραγγας 8,48m).

Σε κάθε περίπτωση, η πρόκληση ρωγμών και βλαβών στα προκατασκευασμένα στοιχεία εντός της σήραγγας, εξαρτάται και από άλλους παράγοντες όπως ο γενικότερος ποιοτικός έλεγχος κατά την ανέγερση του δακτυλίου από τους χειριστές βάρδιας, η ορθή γεωμετρία των πελμάτων έδρασης των εμβόλων σε σχέση με το πάχος της επένδυσης, λίπανση των παρεμβυσμάτων των προκατασκευασμένων στοιχείων κλπ.

Τα τελευταία χρόνια έχει εξελιχθεί ένα ευρύ φάσμα κατηγοριών συνδέσμων, κάτι το οποίο δίνει την δυνατότητα για συχνότερη και ευρύτερη εφαρμογή σε επενδύσεις σήραγγων από προκατασκευασμένα στοιχεία, δεδομένων των πλεονεκτημάτων που παρουσιάζουν.

Περαιτέρω ανάλυση του εν λόγω θέματος μπορεί να βρεθεί στα παρακάτω άρθρα:

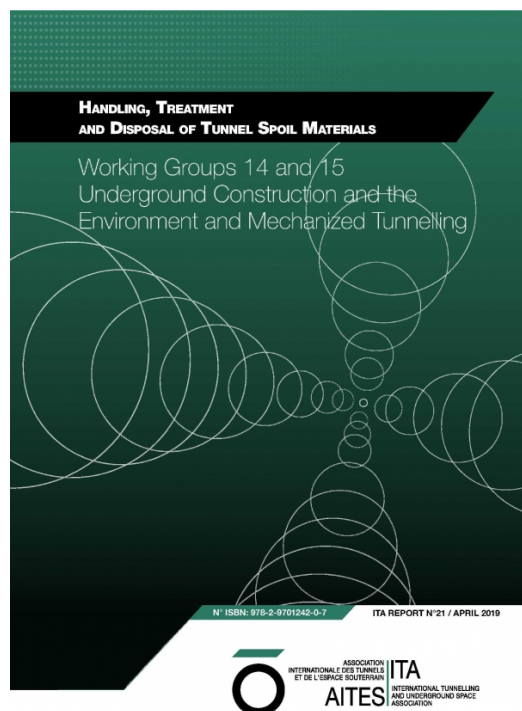
- 1) International Practices for Connecting One Pass Pre-cast Segmental Tunnel Linings Christophe Delus, Bru-no Jeanroy, David R. Klug
- 2) Driving development: PRE-CASTLINERS, NORTH AMERICAN TUNNELLING JOURNAL JUNE / JULY 2013
- 3) Recommendations for the design, production and installation of segmental rings DAUB 10/2013

6. ΝΕΕΣ ΕΚΔΟΣΕΙΣ/ ΚΥΚΛΟΦΟΡΙΕΣ

Οι εκδόσεις της ITA διατίθενται σε ηλεκτρονική μορφή στην επίσημη ιστοσελίδα της: <https://about.ita-aites.org/publications/search-for-a-publication>

Handling, treatment and disposal of tunnel spoil materials

ITA Working groups 14 & 15



“...For collection of relevant information on tunnel muck handling, treatment and disposal, a questionnaire was distributed to the member nations. Altogether information from 59 different projects were received, covering USA, Europe, Asia and Australia.

Also, research programs like the DRAGON Project (Reference 1, a joint cooperation between Austria, France, Germany, Switzerland and UK) and the “Re-Muck” program in Italy (Reference 2) on utilization of excavated materials from tunnels, presents innovative methods for ecocompatible and sustainable recycling of tunnel muck. Both programs give immediate evaluation of the rock quality at the excavation face for finding most suitable treatment techniques and strategies for TBM excavation.

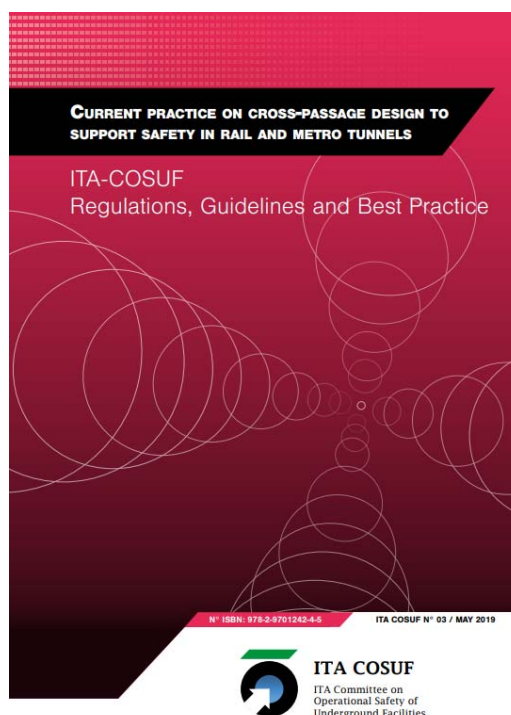
In addition, cases from Taiwan (aggregates, earthworks, shore protection and land reclamation) and Australia (Northside Storage Tunnel Project),

England (Crossrail Project), Switzerland (Farettes Hydropower Project and the Gotthard Base Tunnel), and Italy (mechanized tunnelling with EPB TBMs) have been selected as examples on opportunities and challenges related to tunnel muck....”

Current practice on cross-passage design to support safety in rail and metro tunnels

ITA-COSUF

Regulations, Guidelines and Best Practice



“...Different layouts of cross-passages for rail and metro tunnels are implemented to support the predefined protection goals within the overall safety concept and to meet the other functional requirements. This document aims at supporting the design of appropriate safety aspects of cross-passages in rail and metro tunnels by providing an overview of safety relevant aspects and common practice. Designers should consider them and analyse to which extent the given layouts and requirements apply to their project of interest...”

BIM and Advanced Computer-Based Tools for the Design and Construction of Underground Structures and Tunnels

By Panayotis Kontothanasis, Vicky Krommyda and Nikolaos Roussos

Published: July 27th 2019

<https://www.intechopen.com/online-first/bim-and-advanced-computer-based-tools-for-the-design-and-construction-of-underground-structures-and->

Open access chapter of book in publication progress. From the Edited Volume:

Tunnel Engineering [Working Title]

Edited by Michael Sakellariou

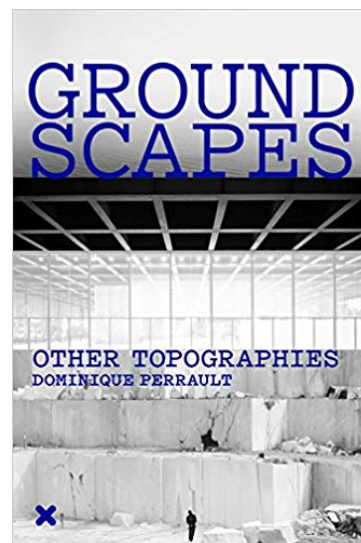
Abstract

Technology and digitalization are continuously producing changes in sectors and fields of human activities. Infrastructure industry needs this support in various and extensive ways, since it affects involved parties and society overall. Even though many individual branches have been transformed, design and construction show some kind of reluctance on encouraging and implementing comprehensive digitalization. A major reason is the significantly high complexity of infrastructure projects and the extended chains of work procedures and activities that are produced. All those are applying through the whole time scale of buildings' existence. Considering that safety and durability remain always the ultimate goal, every new method and concept shall be exhaustively tested, in order to prove its value and efficiency.

The current chapter aims to define and prove technology contribution all along the infrastructure sector, concentrating in tunnels and underground structures. Since evolution is proceeding in accelerated rates, future perspectives are also analyzed to provide broader visions and set indicative standpoints for potential and incentives.

Groundscapes - Other Topographies

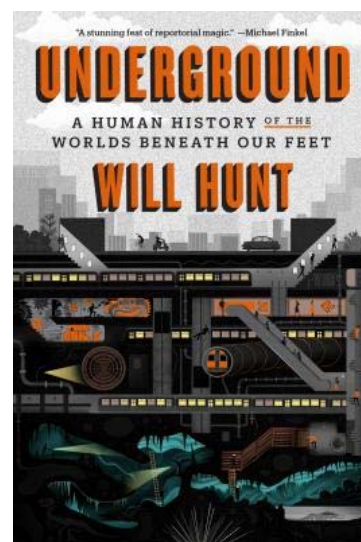
Dominique Perrault, Hors collection



In this book, the architect Dominique Perrault presents his thoughts on the architecture of the "Groundscape". An idea, a concept, the architect has been exploring and experimenting with for many years in his projects and through his fictions. It is a work on shaping reality, through subterranean architecture, where is not a question of living but of marking and carving out places for urban life in the earth, this epidermis open to the sky.

Underground: A Human History of the Worlds Beneath Our Feet

Will Hunt, 2019, Spiegel & Grau



"[A] winningly obsessive history of our relationship with underground places" (The Guardian), from sacred caves and derelict subway stations to nuclear bunkers and ancient underground cities—an exploration of the history, science, architecture, and mythology of the worlds beneath our feet."



Το Διοικητικό Συμβούλιο της Ε.Ε.Σ.Υ.Ε.

2017-2020

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