



## Conventional and mechanized tunnelling in soil and rock

### On-line 3 days training session

#### *Draft Programme*

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The objective of this training session is to present the construction methods and their fields of application in soil and rock tunnelling. The main criteria to select a method will be presented and illustrated through cases studies. The course will highlight the recent improvements leading to an expansion of these fields of application.

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#### **Day 1: 26<sup>th</sup> September - Opening and session 1: 8.45-13:00 CDT time (15:45-20:00 CEST time)**

**08.45 - 09.00 Opening of the training event**

**09:00 -10:45 Chap 1: General overview of the tunnelling methods in soil and rock**

- **P1**: 9.00 - 10.30 : General overview of the different excavation techniques and main criteria for choice
  - Key geotechnical parameters (soil/rock distinction, in-place stress/shear strength ratio, etc.)
  - Key geometric parameters (length, cross-section, etc.)
  - Environmental parameters (neighbouring construction, available surface...)
- 10.30 - 10.45 : Questions & Answers

*10:45-11:15 Coffee Break*

**11:15-13:00 Chap 2: Conventional tunnelling – part 1**

- **P2**: 11.15- 12.00 : Description of the "conventional" method tunnel in soil and rock
  - Tunnel excavation (Drill&blast, BRH, road header...)
  - Support (Bolts, arch steels, shotcrete,...)
  - Selection criteria and illustration through examples
- **P3** : 12.00- 12.45 : Specific techniques in shallow tunnels in soft ground
  - Umbrella vault
  - Face bolts
  - Ground treatments
  - Freezing
  - Selection criteria and illustration with examples
- 12.45- 13.00 : Questions & Answers

**Day 2 : 28 September - Session 2: 9h00-13h00 CDT time (16:00- 20:00 CEST time)**

**09:00 -10:45 Chap 3: Conventional tunnelling – Part 2**

- **P4**: 9.00- 10.30 : Special techniques in deep tunnels in rock
  - Sliding arches,
  - Divided section tunneling,
  - Ground treatments,
  - Treatment of high hydrostatic pressures,
  - Selection criteria and illustration using examples
  - Intersections between galleries, Interfaces with stations
  - Specific excavation / support techniques,
  - Phasing of works,
  - Selection criteria and examples
- 10.30- 10.45 : Questions & Answers

*10:45-11:15 Coffee Break*

**11:15-13:00 Chap 4: Mechanized tunnelling Part 1**

- **P5**: 11.15- 12.45 : Different types of pressurized TBM for tunnelling in soft grounds
  - EPBS
  - Slurry
  - Multi-mode / variable density TBMs,
  - Selection criteria and illustration with examples
- 12.45- 13.00 : Questions & Answers

**Day 3 : 30 September - Session 3: 9h00-13h00 CDT time (16:00- 20:00 CEST time)**

**09:00 -10:45 Chap 5: Mechanized tunnelling – Part 2**

- **P6**: 9.00- 10-30 : Different types of tunnel boring machines for rocks
  - Single shield open tunnel boring machine,
  - Double shield open tunnel boring machine,
  - Hard rocks TBM,
  - Selection criteria and illustration with examples
- 10.30- 10.45 : Questions & Answers

*10:45-11:15 Coffee Break*

**11:15-13:00 Chap 6: Cross-cutting topics**

- **P7**: 11.15- 12.00 : Worksite organization and logistics for the excavated material
- **P8** : 12.00- 12.45 : Health & Safety requirements in both methods
- 12.45- 13.00 : Questions & Answers

**13.00: Conclusion and closure**