



# Shield tunnelling in soft soils

Over the last decade worldwide the number of shield tunnelling projects has grown extensively and knowledge has leaped along with it. Understanding of critical mechanisms has increased and so has computing capability. This has resulted in more advanced design methods. Today shield tunnels are built in areas with difficult soil conditions while restrictions exist to minimize settlements.

## Aim of the course

This three-day course raises the awareness of the key risks involved in a wide range of shield tunnelling aspects. As shield tunnelling is one of the most integrated construction methods in the civil engineering practice, it is vital to have a good understanding of all disciplines involved. This course provides good insight in the best practice design methods for the different issues in shield tunnelling. The steppingstone is a risk driven design method to come to grips with tunnelling projects.

Topics are:

- soil investigation;
- risk management;
- tunnel safety and installantions;
- lining, backfill grouting, face stability;
- tunnel boring machines;
- ground freezing, soil improvement;
- ground movements, observational method, monitoring;
- vibration hindrance;
- re-use of excavated soil and logistics.

## Excursion

The fourth day of the course is an optional day for an excursion to the Amsterdam Metro line extension project.



### Course leaders

- Day 1: Prof. Markus Thewes, head of the Institute for Tunnelling, Pipeline Technology and Construction Management at Bochum's Ruhr-University. He was the construction manager of the Westerscheldetunnel (NL).
- Day 2: Prof. Robert Mair, professor of geotechnical engineering and head of civil and environmental engineering at Cambridge University. Throughout his career he has advised on numerous civil engineering projects worldwide, specializing in underground construction.
- Day 3: Prof. Johan Bosch, who holds the chair of underground space technology at Delft University of Technology. He is adviser of the project agency North/South metroline in Amsterdam.
- Overall: Hans Brinkman (Deltares), who has over 15 years of experience in research and consultancy on shield tunnelling projects and is a senior lecturer in geo-engineering at UNESCO-IHE.

### Procedure

The course consists of presentations, lectures, discussion sessions and workshops, all in English.

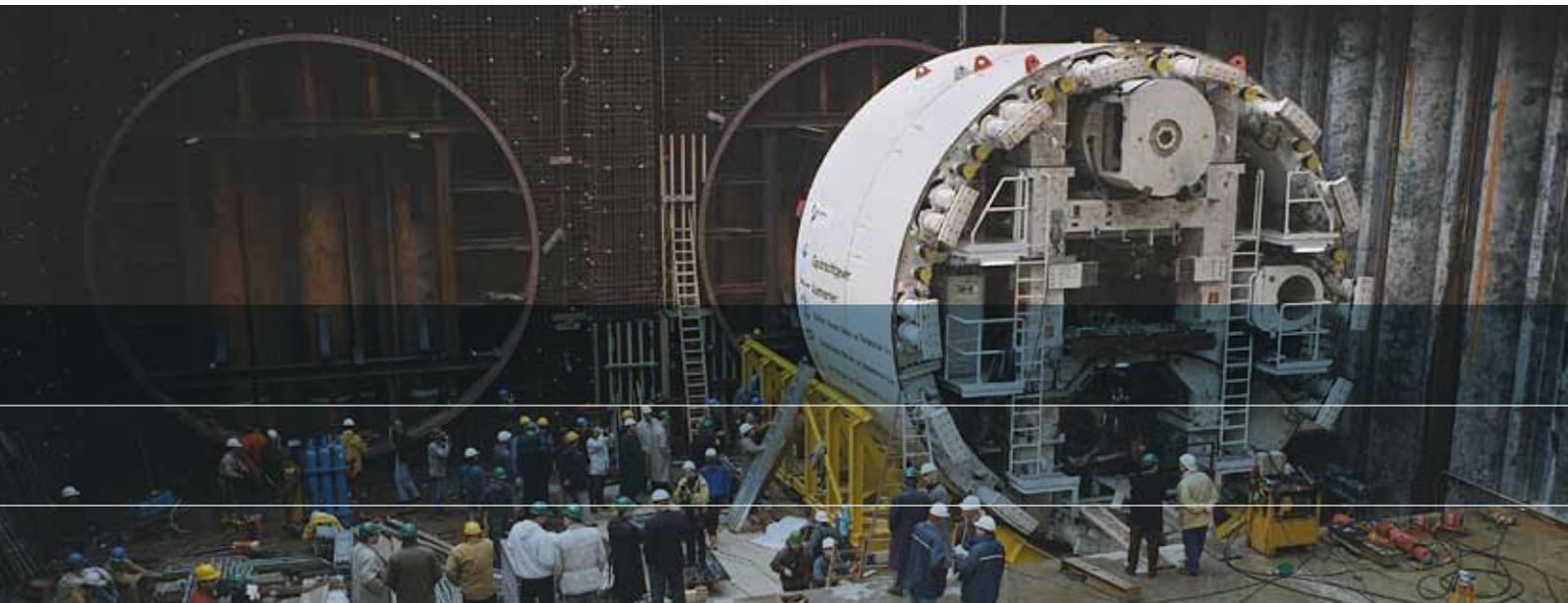
### Certificate

We provide a certificate of participation after completion of the course.

### Enrolment, fee and registration

The registration fee is € 1,450.-- for three days and € 325.-- for the optional fourth day with excursion, excluding VAT.

In order to register for this course, please use the electronic registration form on our website [www.deltaresacademy.com](http://www.deltaresacademy.com).



### Course date

27 - 29 March 2012  
(optional excursion day on 30 March)

### Location

Deltares, Stieltjesweg 2, 2628 CK Delft  
The Netherlands

# Deltares

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### Accommodation

Please check our website [www.deltaresacademy.com](http://www.deltaresacademy.com) for the special hotel arrangements.

### Transportation

From Schiphol Airport frequent train services operate to and from Delft (total travelling time approximately 45 minutes). Our website [www.deltaresacademy.com](http://www.deltaresacademy.com) provides more details on how to get to Deltares.

### More information

For more information, the course schedule, the list of instructors or any other question, please visit our website [www.deltaresacademy.com](http://www.deltaresacademy.com) or contact the course coordinator, Marion Arkesteijn (T +31 (0)88 335 7500 or e-mail [sales@deltaresacademy.com](mailto:sales@deltaresacademy.com)).

Deltares Academy is the training facility of Deltares.