



**Training Course WTC 2011, Helsinki**  
**Friday 20 – Saturday 21 May 2011**  
**Venue: Finlandia Hall and below Construction Site**  
**Final Programme - April 10<sup>th</sup> , 2011**

**Conventional Rock Tunnelling and sprayed concrete technology**

**Objectives of the Course**

- Holistic approach for use of wet sprayed concrete for rock support and permanent lining in rapid conventional tunnelling and underground construction (course will only deal with wet sprayed concrete and rock support, because this is the dominant method and trend worldwide for use of sprayed concrete)
- Concentrate on the basic practical aspects of the whole sprayed concrete process chain in daily production and issues which are important for young engineers to understand and to have control over in their daily work on site or in design companies.
- The course is built up around Scandinavian practice of use of sprayed concrete (Scandinavia is probably one of the areas in the world where sprayed concrete is most extensively just in the past and nowadays and also has a tradition as temporary and final support)
- The course will also include methods/techniques and trends in drilling, blasting, injection and waterproofing - all important parameters for successful use and final quality of sprayed concrete as rock support and final lining
- The course will also deal with the important topic of qualification, training and certification of sprayed concrete supervisors and operators.
- Speakers will come from the industry with long practical experience and good reputation
- An objective is also to try to show / demonstrate in practice on the second day what was explained in theory the day before and get the young engineers a feeling for important parameters to be checked and controlled in the sprayed concrete process. This along the Slogan: 'Seeing is believing' and probably the best way to understand the process

## Day 1: Friday, 20. May 2011

08.00 - 08.15 Welcome and Opening – Objectives of the Course

A.ASSIS and K.KORHONEN

### Session 1: Rock Tunnelling Excavation, Support and design

08.15 - 09.00 General aspects of Rock Tunnelling

J.ZHAO

09.00 - 09.45 Excavation Methods: Drilling

G.NORD

09.45 – 10.30 Excavation Methods: Blasting:

Ms M.TEIKARI

10.30 - 11.00 *Coffee Break*

11.00 – 11.45 Types of Rock Support: Examples of relevant case histories

F.AMBERG

11.45 - 12.30 Design of Rock Support

F.TONON

12.30 - 14.00 *Lunch*

### Session 2: Sprayed Concrete technology

14.00 – 14.45 Sprayed concrete application: general concepts and methods

T.CELESTINO

14.45 – 15.30 Health and Safety in sprayed concrete application

D.LAMONT

15.30 – 16.00 *Coffee break*

16.00 – 16.45 Best practice and future potential

R.DIMMOCK

16.45 – 17.30 High quality wet sprayed concrete technology

E.DAL NEGRO

17.30 – 18.00 Questions and Answers

## Day 2: Saturday, 21. May 2011

### Session 3: Reinforcements

08.15 – 09.00 Sprayed concrete reinforcement: Mesh – Steel/polymer fibers

M.VANDEWALLE

09.00 – 09.45 Equipments for sprayed concrete

J.LEHTO

09.45 – 10.30 Testing - Quality control - Nozzelmen certification

G.BRACHER

10.30 – 11.00 *Coffee Break*

### Session 4: Special aspects

11.00 – 11.45 Design and construction of waterproof tunnels employing pre-grouting for water ingress reduction and tunnels linings with sprayed concrete and sprayed membranes

K.G.HOLTER and R.BRIDGE

11.45 – 12.30 Shotcrete as permanent lining

E.GROV

### Session 5: Practical demonstration

14.00 – 18.00 at Finlandia Hall underground parking cavern worksite, Contractor LEMMINKAINEN

**Important Nota: limited to 100 attendants due to space limitation on the jobsite**

Demo-Group 1: EFNARC best spraying practices – organised by NORMET

O-B. KLEVEN

Demo-Group 2: Sprayed concrete quality control – organised by VSH Hagerbach Test Gallery

R. WEISS

Demo-Group 3: Sprayable membranes – organised by MEYCO-BASF

K. G. HOLTER

Demo-Group 4: Fibre reinforced sprayed concrete – organised by MAPEI

E. DAL NEGRO

**The attendants will have the possibility to attend all demonstrations**