

Training Course. Shanghai - Saturday 12 – Sunday 13 November 2011  
**Safety Operation in Metro and Road Tunnels**

**Objective:** to provide an introduction to the safe use and operation of metro and road tunnel systems. The seminar will provide a general overview to be followed by more in-depth sessions on operation (management structure and organization for emergency situations), monitoring technology, fire control (detection, passive and active fire fighting and mitigation) and research (recent research about safety in operation). The seminar aims at Clients, Designers, Consultants and Operators.

**Day 1 Session 1: General Overview - ITA & Country representative and F.AMBERG**

09.00 – 09.45: Welcome and Opening: ITA and concerned country representatives

09.45 – 10.30: Introduction to safety management and state of regulations

10.30 – 11.00: Coffee break

**Day 1 Session 2: Specific Aspects of Safety of Metro Systems – N.P. HOJ and H. RUSSELL**

11.00 – 11.45: Interface management & systems for 2nd Avenue subway

11.45 – 12.30: Models for probabilistic safety analysis and deterministic scenario analysis

12.30 – 14.00: Lunch

14.00 – 14.45: Technology and technical measures for metro tunnels, stations and rolling stock

14.45 – 15.30: Structure, management and operation of safety and emergency forces

15.30 – 16.00: Coffee break

16.00 – 16.45: Integration and use of advanced supporting technology (i.e. SCADA systems)

16.45 – 17.30: Contingency plans for metro systems, Permanent education and training of emergency forces and operators

17.30 – 18.00: Questions and Answers (to all sessions)

**Day 2 Session 3: Specific Aspects of Safety of Road Tunnels – N. P. HOJ**

09.00 – 09.45: Integrated safety analysis for road tunnels, human behaviour and self rescue

09.45 – 10.30: Models for probabilistic safety analysis and deterministic scenario analysis

10.30 – 11.00: Coffee break

11.00 – 11.45: Technology and technical measures for road tunnels, integration and use of advanced supporting technology

11.45 – 12.30: Structure, management and operation of safety and emergency forces, contingency plans

12.30 – 14.00: Lunch

**Day 2 Session 4: Fire control in Metro and Road Tunnels – P. REINKE**

14.00 – 14.45: Ventilation systems

14.45 – 15.30: Fire detection systems, passive/active fire fighting, fixed fire fighting systems

15.30 – 16.00: Coffee Break

**Day 2 Session 5: Research and Development – F.AMBERG**

16.00 – 16.45: Results of recent R&D projects, tests and their relevance for safety operation

16.45 – 17.30: R&D topics of the future

**Session 6: Q&A, Closing remarks**

17.30 – 18.00: Questions and Closing Remarks

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**Felix Amberg**, President of the Amberg Group Amberg Engineering Ltd.  
Amberg Measuring Technique Ltd. Hagerbach Test Gallery Ltd. President of the Swiss Tunneling Society  
M. Sc. Civil Engineering, Swiss Federal Institute of Technology, Zurich, Switzerland

**Memberships**

SIA Swiss Society of Engineers and Architects STS Swiss Tunneling Society SGBF Swiss Society for Soil and Rock Mechanics STUVA Research Organisation for Underground Transportation Facilities VöV Public Transportation Federation Litra Information Service for Public Transportation VSS Association of Swiss Road and Traffic Engineers



**Project-related experience**

L-SURF (Design Study for a Large Scale Under-ground Research Facility on Safety and Security). Coordination of an EU-research project. Additional participants are SP Fire, STUVA, TNO, NBL and INERIS. Goals are: Feasibility study Scientific and Technical Research Business-planning

2000 to date Tunnel TESLA (TeV Energy Superconducting Linear Accelerator), DESY (German Electron Synchrotron), Germany. Project management, pre-liminary design and technical approval. Project director.

1990 to date Gotthard Base Tunnel, AlpTransit Gotthard AG, Switzerland. Preliminary, detail design and project management for 14 km and 15 km sections of twin, 9 m diameter rail tunnel, 800 m – 8 m diameter shaft, construction scheduling and cost estimations, construction specifications, tender documents.

1997 – 1998 Gotthard Base Tunnel, Section Piora, AlpTransit Gotthard Ltd., Switzerland. Leader of the “Piora Formation” Task Force. Geotechnical and constructional analysis as well as risk examinations for determination of the required equipment to penetrate the Piora Formation, incl. tender documents for extensive stabilisation works.

1981 to date Underground Military Structures, Switzerland. Detailed design for underground installations including construction scheduling and cost estimations, specifications, construction supervision and quality assurance.

**Project-related experience**

1999 – 2000 Guadarrama Tunnel, High speed rail-way line Madrid-Segovia, GIF Spanish Railway, Spain. Project consulting, comparing offers and determination of optimal project.

1987 – 1999 Zugwald and Vereina Rail Tunnels, Rhaetian Railway, Switzerland. Project management and detailed design including cost estimates and tender documents for single track 19.5 km and 2.2 km, 7.6 m diameter (TBM) tunnels including 3 rail bridges, large earth works and 2 km of road works.

1993 – 1996 Beira-Alta Railway Line, REFER EP, Lisbon, Portugal. Project management and tunnel refurbishment design work for 12 single track rail tunnels with a total length of 3'300 m.

Responsible for all projects of the Amberg Group since 1994

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**Dr Peter Reinke**, HBI Haerter Consulting engineers

**Background information:** 15 years as engineer for tunnel ventilation, safety, aerodynamics, climate and mechanical equipment at HBI Haerter Ltd for high-speed rail or metro tunnel systems in the world



Major project involvements include Alpine base tunnels (e.g. Gotthard, Brenner, Loetschberg, Ceneri) and other high-speed rail tunnels (HSL Zuid, Guadarrama, Transandino)

Major projects include several metro projects (e.g. Athens Line 2 and 3, Singapore Down-town-Line Stage 2/3, Barcelona Line 9, Karaj Line 2, Panama Line 1)

Design and analysis experience in excess of 35 rail, metro and road tunnel projects

Major involvement in development of concepts, technical specifications, numerical simulation tools, measurements and tests

Member of ITA-COSUF activity group 2 “Regulations and best practice”

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**Henry A. Russell Jr. P.E.** , Principal Professional Associate of PB Americas Inc.

Henry A. Russell Jr. P.E. is a Senior Vice President and Principal Professional Associate of PB Americas Inc. formerly Parsons Brinckerhoff Quade & Douglas Inc. Mr. Russell is the International Program Leader for the rehabilitation of underground structures and is the Chair of the International Tunneling Association's Working Group 6 Repair and Maintenance of Underground Structures.



As the Animateur for ITA Working Group 6 , he was the editor of Structural Fire protection for road Tunnels 2003, and Structural Fire Protection For Metro tunnels 2010.

He is a member of the MOLES, TRB, Chairman of AUCA/SME Committee on Tunnel Rehabilitation and has over 42 years of experience in the inspection, and rehabilitation of underground structures, including over 80 tunnels in the U.S. and overseas.

Mr. Russell has had numerous projects that have won national awards for excellences among them are; The ICRI Outstanding Transportation Project in 1993 and 2005, and the American Shotcrete Association's underground project of the year in 2005, 2007.

Mr. Russell has authored over 40 professional papers on the design and rehabilitation of underground structures, including the rehabilitation chapter, of the Tunnel Engineering Handbook, 1998 and the Tunnel rehabilitation chapter in FHWA-AASHTO Training Manual. 2009. Mr. Russell has over 40 publications on repair and maintenance of underground structures.



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**Niels Peter Høj**, HOJ Consulting GmbH



Niels Peter Høj has a broad experience and special knowledge of design for safety, risk analysis, risk management, structural engineering, structural reliability and decision support.

Analysis of concrete structures, and particularly tunnels, subjected to fire is part of N. P. Høj's expertise.

The special expertise on safety and risk analyses applied as an integrated part of the decision support has been applied in practice to support decision within design and operation of major infrastructure projects and as part of feasibility studies. Risk analyses have been carried out for a large number of tunnels, bridges and roads.

Mr. Høj has contributed with his experience and developed new methods for risk analyses of tunnels and for safety design by participation in research projects.

The research projects count among other EU-sponsored projects like FIT, DARTS, UPTUN, projects for the Nordic research cooperation NordFoU, national research projects and projects for OECD, PIARC etc. Presently a “best-practise” for risk analyses of road tunnel – based on Mr. Høj's know-how is being developed and introduced in several European countries.

In recent year Mr. Høj has been involved in a large number of practical risk analyses in a number of countries in Europe and worldwide.

N. P. Høj is member of a number of international expert groups and committees related to risk analyses and fire safety, among others he is Steering Board member of ITA COSUF “ITA Committee on Operational safety of Underground Facilities”. He is chairman of fib's Group of “Fire Design of Concrete Structure” and member of Joint Committee of Structural safety, Risk Analyses, IABSE's working commission on Structural Performance, Safety and Analysis. He is delegated to activities in ISO, COST.

In 1999 Niels Peter Høj received the IABSE Prize in recognition of his “outstanding efforts with introduction and application of modern probabilistic ways of thinking in professional practical engineering activities, in particular related to methods for risk analysis, structural reliability and decision making”

Niels Peter Høj is owner of HOJ Consulting, which a small company specialized in risk analysis, integrated design, tunnels systems and fire design.

Before founding his own company N. P. Høj has been active as specialist and project manager in large international consulting companies and in research.