Bergen training session "**Excavation and support in soft ground conditions"**

Developed programme

Friday 9th June 2016

	Topic	*Presenter*	
0830-0900	Registration and morning Coffee	Morning moderator : R. Galler	
0900-0915	Welcome	T. Celestino E. Grov	 ITA President
0915-0930	Introduction to the course, and ITA initiative for training	S. Log R. Galler	
0930-1000	Defining soft/challenging ground – Geological aspects - *What is a soft ground (Geologist/Geomech point of view)* - *Classification of soft grounds* - *Main characteristics and behavior typologies* - *Interaction with water*	B. Nilsen	NTNU
1000-1030	History of soft ground tunneling	Martin Knights	
1030-1115	Principles of conventional tunnelling in soft ground - *Definition and fundamentals of conventional tunneling (excavation methods, sequences, ground control, primary support, face stability requirements, waterproofing,..)* - *Ground response and monitoring* - *Scope of application and limits of the methods*	N. Munfah (WG 19 animator)	
1115-1200	Principles of mechanized tunnelling in soft ground - *Definition and fundamentals of mechanized tunnelling (face stability, support, lining,..)* - *Main machine types and specificities – scope of application* - *Segmental lining design principles, waterproofing*	Tim Babendererde	

1200-1300	Conventional excavation : auxiliary methods – *- Main auxiliary methods for excavation and support (High pressure grouting, pipe umbrella, jet grouting,..)* *- Presentation of each auxiliary methods (theory, practice issues and examples)*	E. Grov
	The freezing method ; concepts and case studies ; fields of application and limits	A. Berggren
1300-1400	LUNCH	
		Afternoon Moderator : S. Log
1400-1500	Mechanized excavation : specific aspects	
	1400- 1430 : EPB vs Slurry TBM *- Description of both methods and specificities* *- Scope of application and limits of each one* *- Specific requirements (logistics, worksite,..)* *- Case histories* *- Future developments*	Tim Babendererde
	1430 – 1500 :Hard rock TBMs in soft ground and dual mode *- Main challenges in the transition from rock to soft ground* *- Cutterhead, cutting tools, conveyor,..* *- Specific issues of the dual mode* *- Case histories*	Brad Grothen (for Robbins)
1500 -1545	Choice of the excavation method: mechanized or conventional ?	R. Galler
1545-1730	Selected case studies on the presented topics above	
	- *Sao Paulo – Conventional-*	P. Grasso
	- *Hallandsas - Mechanized*	F Renault (from Vinci)
	- *Seattle Alaskan Way*	N. Munfah
	- *Zilina tunnel*	K. Rossler
1800-	- Social gathering	

Saturday 10th June 2016

	Topic	*Presenter*
0830-0900	Morning Coffee	Morning Moderator: M. Deffayet
0900-0915	Welcome and recap from yesterday	S. Log
0915-1000	Future relevant projects in Soft/challenging Tunneling in Norway *- Main coming challenges in soft ground projects in Norway* *- Perspectives*	Amund Bruland NTNU
1000-1045	Urban Soft Ground Tunnelling – Challenges and lessons learned *- Specificities of urban tunnelling* *- Environmental issues* *- Settlement control* *- Examples of complex urban tunnels*	E. Chiriotti (WG2 leader)
1045-1130	Geotechnical investigations in soft ground - New developments *- Importance of investigation* *- investigation methods in soft ground – principles and methods* *- Specific issues and investigation methods in urban areas*	P. Grasso
1130-1215	Main parameters for design in conventional tunnelling *- Outline of design process* *- Design according to ground behaviour (geological and geotechnical profile, structural analysis and dimensioning)* *- Design according to the site environment* *- Design according to functionalities requirements (tunnel shape, layout,..)* *- Adapting design during construction : importance of monitoring*	F. Amberg
1215 - 1300	Settlement control using soil conditioning in EPB tunnelling *- Settlement control from the machine* *- Soil conditioning in mechanized tunnelling*	D. Peila

1300-1400	LUNCH	
		Afternoon moderator: E. Grov
1400-1530	Recent technological developments (20 min each max)	
	- bolting and support installation – new development for the machine control and quick support installation	Normet
	- grouting and soil reinforcement – How to manage and reinforce very poor quality grounds	Mapei
	- shotcrete for immediate support – new developments for resistant and ecofriendly concrete	Sika
	- waterproofing in soft ground under the watertable – the methods and their performances	BASF
	- the contribution of fibres for efficient lining – Elements from the WG2 and ITATECH reports on fibres use	ITAtech
1530-1700-	Exchanges - Panel discussion with experts	
	- 1 : The technological limits in the current methods? Lengths, pressures etc	P. Grasso
	- 2 : How to make the tunnel construction more eco-friendly ?	R. Galler
	- 3 :Can we manage all kind of risks ? the limits of the design and calculation methods	D. Peila
	+ Other questions on the 2 days courses	E. Grov
1700-1730	Recap of the two days, conclusions and Farewell	Sindre / Eivind
1800-	Social gathering	