

11TH INTERNATIONAL CONFERENCE ON UNDERGROUND CONSTRUCTION PRAGUE 2010

The 11th International Conference on Underground Construction Prague 2010 was organised by Czech Tunnelling Association (CzTA) ITA-AITES. The conference was held in the modern hotel Clarion in the capital of the Czech Republic from 14th to 16th June 2010. The conference continued in previous Czech tunnelling conferences the Underground Construction Prague 2003 and the World Tunnel Congress WTC 2007 in Prague.



The conference Scientific Council included tunnelling experts from various European countries, the conference was opened by present ITA/AITES president Prof. In-Mo Lee.

Overall 480 participants from 22 countries were registered to the conference and 167 papers from 25 countries were published in the conference proceedings. Four Keynote Lectures were published separately in the TUNEL journal issue 2/2010, they were prepared by Dr. Nick Barton from Norway, Prof. Walter Wittke from Germany, Prof. Jiri Bartak , and Prof. Josef Aldorf from the Czech Republic. Invited lectures were presented by Prof. Robert Galler, Prof. Wulf Schubert, Dr. Harald Wagner (all from Austria), Prof. Alfred Haack, Prof. Markus Thewes (both from Germany), Mr. Jean-Gilles Arnaudet (from France), and Dr. Alun Thomas (from United Kingdom).



Prof. Alfred Haeck was awarded by the honorary medal of the Czech Tunnelling Association (CzTA) for his long term contribution to the Czech tunnelling industry.

The conference program included 4 keynote lectures, 56 presentations in the six technical sections, poster presentations, social evening in the Brevnov monastery and four excursions of the Czech underground structures (two parts of the tunnel Blanka, Prague's utility tunnels and the Underground Educational Facility Josef).

Czech Tunnelling Association would like to express thanks to all speakers and participants and we would like to invite you to the next conference Underground Construction Prague 2013.

TUNNELLER'S AFTERNOONS AND OTHERS SEMINARS

CzTA also organised Tunneller's Afternoons (regular seminars focused on various aspects of tunnelling).

The first Tunneller's Afternoon was focused on preparation and construction of collectors in Prague and Ostrava and was held on 17th February 2010. The second was focused on preparation and realisation of tunnels from client's perspective and it was held on 29th September 2010. The third afternoon was focused on collapses of underground structures and contribution of pilot tunnels, it was held on 24th November 2010.

Two further seminars were also organised by CzTA. The first seminar was focused on use of Steel Fibre Reinforced Concrete (SFRC) for underground structures and it was held on 3rd February 2010. The second seminar was focused on utilisation of geothermal energy, it was held on 21st October 2010. Usually about 100 participants were present on mentioned seminars.

TUNEL MAGAZINE

CzTA regularly publishes the TUNEL magazine, it is published in both Czech and English language. The magazine is distributed to Czech readers and to all tunnelling

associations. Four issues were published in 2010.

OTHER PUBLICATIONS

CzTA also published publication Recommendation for static calculations of mined tunnels using Eurocode in 2010. The further publication Overview of terminology of underground structures is currently in print, it contains explanation of Czech terms and their translation to English and German language.

Tunnelling and Underground Space activities

The **Blanka tunnel complex** is north-western part of the City Circle Road in Prague. It is the largest underground construction project being currently implemented in the Czech Republic.

The total length of new road section is 6.382 km, with the length of tunnels reaching 5.5 km. Construction of all tunnels is done by Metrostav a.s.

The aggregate length of the **Kralovska Obora tunnel** section reaches 3.07km, of that the mined section takes 2.231km, the rest is cut and cover tunnel. The Kralovska Obora mined tunnel consists of two tunnel tubes, i.e. the Northern Tunnel Tube (NTT) and Southern Tunnel Tube (STT). Each of the two tubes has two basic profiles – double-lane and triple-lane ones. In addition, part of the entire Kralovska Obora tunnel complex are mined ventilation structures comprising a ventilation plant cavern with the excavated cross-sectional area of 286m² and a complicated system connecting the ventilation tunnel to the triple-lane tunnels. The NTT excavation from the Troja portal started at the beginning of July 2007, followed by the STT excavation a month later.

The NTT counter-heading from the portal in Letna commenced in the second half of 2009, whilst the counter-heading of the STT started in the second half of August 2009. Excavation of ventilation structures commenced in February 2010. The STT top heading breakthrough celebration was held on 16th February 2010; the bench excavation was completed in both the NTT and STT in April and May respectively. The completion of the excavation of the invert of the triple-lane STT was realised in July 2010.

The excavation of the invert of the triple-lane NTT and double-lane NTT tunnels was finished in August and October 2010, respectively. This means that all excavations in the 2.22 km long STT and 2.23 km long NTT have been completed. The construction the Kralovska Obora tunnel section proceeds in line with the updated construction schedule.

The Community Open Day took place on 28th September 2010. Prague citizens had the option of one of three visit routes meticulously prepared by the organisers, which passed through all spaces of the complex of tunnels where the excavation

had been finished. The interest was immense and the final result of about 16,000 mostly satisfied visitors has proved how useful and successful such events are.



The entire length of the **Dejvice tunnel** section is 1.0 km, the whole section is cut and cover tunnel structure, this section runs under the Milady Horakove Street. Majority of tunnelling works on this section was completed from 2008 to 2010.

The **Brusnice tunnel section** is 1.4km long; the length of mined tunnels is 550m, the rest is cut and cover structure. The excavation of the NTT started in October 2009, the excavation of the STT started in January 2010, both tubes have three lanes. The excavation of both tunnel tubes of the Brusnice tunnels continued throughout the first half of the year as expected.

On 5th July 2010 during the work on removing temporary walls of the side-wall drifts required for enlarging the excavation to the whole profile, the overburden stability loss took place in the vicinity of the central top heading face. Subsequently a daylight collapse developed, with a part of the tunnel filled with debris. The course of this event was unexpected, very fast, without preceding warning signals. The collapse did not cause any injury or damage to surface structures. Basic stabilisation measures were implemented during 3 days (concrete filling of the surface crater). Further stabilisation was realised using vertical jet-grouting from surface. All excavations were stopped after the collapse. About 430 m of NTT and 380 m of STT was excavated prior the collapse.

Currently all works on stabilisation of collapse were completed and excavation of both tunnel tubes continues. NTT excavation continues with vertical sequencing (side drifts and central pillar) from the opposite portal Prasny most, STT excavation continues with horizontal sequencing with the split top heading from the Myslbekova Portal. Also works on final lining started in autumn 2010. The excavation of the 114 m long ventilation tunnel was completed by breakthrough into the ventilation shaft in November 2010.

The **extension of the Prague's metro line A** from Dejvicka station to Ruzyne airport is divided by stages into three operating sections V.A, VI.A and VII.A. The first extension, i.e. operating section V.A is currently under construction. The section V.A continues from the existing Dejvicka station and ends with a tunnel for turning rails behind the Motol terminal station. The V.A metro operating section is 6.12 km long and includes bored stations Cervený Vrch, Veleslavin, Petriny and cut and cover station Motol. About 4 km of rail tunnels are designed as single-track and for the first time in the Czech Republic will be bored using TBMs. Twin-track tunnels between stations Petriny and Motol are constructed using NATM. Since the groundbreaking ceremony held in June 2010, the underground works have proceeded in compliance with the contractual schedule. Excavation of the 500 m long access gallery to the Petriny station (realised by Metrostav a.s.) has been completed in 2010. After completing Katerina access gallery excavation, Hochtief a.s. proceeds toward Motol station; it has completed the excavation of over 150m of running tunnels. The first EPB TBM for excavation of running tunnel was commissioned at Herrenknecht factory and has been shifted to Prague. The first TBM excavation is expected to start in April 2011, the second TBM will start its excavation 3 months later.

The purpose of the **Outer Prague Ring Road (SOKP)** is to link all motorways and expressways running in radial direction to the Czech capital city of Prague which should significantly relieve the overloaded road network in the city. The route has to cross valley common for the Vltava and Berounka Rivers, near confluence of the rivers and climb/descent from/to higher elevated terrace planes of Prague. Due to steep slopes of the valley, road tunnels are designed on both sides of the valley (Lot 513 Lahovice - Vestec and Lot 514 Lahovice - Slivenec).



The **Komorany tunnel** (Lot 513) is 1.9 km long, its construction was done by Skanska a.s., the **Lochkov tunnel** (Lot 514) is 1.6 km long, its construction was done by Skanska a.s. Both tunnels have one double-lane tube for the descending direction and three-lane tube for the ascending direction, tubes are connected with cross-passages, excavation was done using NATM. The both tunnels were opened to

traffic on 20 September 2010.

Kralovopolske (Dobrovskeho) tunnels are part of construction project “Road I/42 Brno, Large City Circle Road Brno, Dobrovskeho B”, which will become an important component of the extensive complex of construction parts of the Large City Circle Road Brno (VMO Brno). The construction of the tunnels has been under way since 2006, the excavation of mined tunnels started at the beginning of 2008. There are two tunnel tubes with the lengths of 1.25 km; the mined parts of both tubes are approximately 1.0 km long. The conventional excavation of both tunnel tubes has been finished in the beginning of 2010. The first tunnel tube was built by OHL ŽS, the second by Subterra a.s. The breakthrough celebration took place on 25th March 2010. The surface settlement above both tunnel tubes corresponded with the design assumptions. Works on the final lining are almost completed.

The **D8 highway section 0805 between Lovosice and Rehlovice** is part of the highway route Prague – Ústí nad Labem – the border with Germany and it is currently under construction. The total length of the construction lot 0805 is 16.4 km. It comprises 3 grade-separated intersections, 2 motorway tunnels, 18 motorway bridges and 9 flyovers, relocations of roads, cart-roads and local roads. Both motorway tunnels are unidirectional, with two lanes, of the T 9.5 category. The two tunnel tubes of the Prackovice tunnel are 270m (LTT) and 260m (RTT) long. The LTT and RTT of the Radejcin tunnel are 600m and 620m long respectively. The tunnels were excavated using NATM by Metrostav a.s. The excavation of **Prackovice tunnel** was completed in 2009, the excavation of the **Radejcin tunnel** was completed in August 2010.

The construction of **tunnels on Votice – Benesov section of the railway line Prague – Ceske Budejovice** is ongoing. It contains five tunnels, all of them are double-track tunnels constructed by NATM, construction of 4 mined tunnels is done by Subterra a.s., construction of cut and cover Votice tunnel is done by Hochtief a.s. The excavation of the **Zahradnický tunnel** (1.03 km) and the **Olbramovice tunnel** (480 m) has been completed in 2010 and works on final lining already started. The excavation of the Tomický I tunnel (324 m) and the **Tomický II tunnel** (390 m) is currently ongoing. Also the construction of the longest cut-and-cover tunnel in the Czech Republic, the 590m long **Votice tunnel**, continues by excavating the construction trench concurrently with laying side drains, installing self-supporting reinforcement and casting of the lining using water seepage resistant concrete.

All works on the **Jablunkov tunnel** (612 m railway double-track NATM tunnel) were stopped in November 2009 and they have not started yet.

The **Osek tunnel** is situated on railway line Prague – Pilsen on the section Beroun – Zbiroh. The tunnel is 324m long, it is cut-and-cover double-lane tunnel. The work on the tunnel was started by Hochtief a.s in September 2009, the casting of the final lining started in May 2010, the tunnel was completed in November 2010.