



Picture 1: Tunnel drilling on Earth gains from Saturn/Titan mission.

Europe

Tunnelling Benefits from Space Engineering to Drill Better Holes

The expertise gained by the European Space Agency (ESA) from working on the joint NASA-ESA-Cassini-Huygens mission to Saturn and its moon Titan is now being applied to underground drilling machines. This is providing tunnelling engineers with an improved ability to virtually 'see' some 40 metres into solid rock and pinpoint obstacles ahead.

With modern high speed tunnelling, sudden geological shifts may damage the cutting head of drilling machines and lead to expensive delays in multi-million euro excavation projects.

Herrenknecht has developed a new method of charting what lies ahead beyond the tunnel face. Back in 1999, Herrenknecht engineers were using seismic processing to estimate what was behind the tunnel face, but they had problems with the transmitters positioned onto the drilling machine's rotary

shear blades, especially because of extreme stress. This is why they asked for help to MST Aerospace, the ESA's Technology Transfer broker in Germany. MST organised a meeting with Astro- und Feinwerktechnik Adlershof GmbH. This firm has developed specialist electro-mechanical hardware for several space mission payloads, most notably ESA's Cosmic Dust Analyser for the Cassini spacecraft currently on its way to Saturn along with Huygens, ESA's Titan lander.

In the process the firm also has acquired extensive experience of testing components for space by simulating extreme conditions, in particular using vibration actuators. In autumn 2001, Herrenknecht awarded Astro- und Feinwerktechnik Adlershof GmbH the contract to develop a transmitter prototype. It was delivered the following year and swiftly judged a success.

These new seismic probing transmitters have been successfully tested on a 9.8 m-diameter TBM shield which excavated the 1,600 m-long Pannerdensch Kanaal twin tunnel near Arnhem, the Netherlands as part of the new 160 km Betuweroute freight rail line. The transmitters are also due to be installed on two further TBMs for excavation of the SMART tunnel in Kuala Lumpur, Malaysia.

Visit www.herrenknecht.com, www.mst-aerospace.de, www.astrofein.com/english/indexf.htm, and <http://sci.esa.int/huygens>

Italy-Tunisia

Tunnel Proposed to Link Sicily with Tunisia

ENEA is studying the feasibility of an ambitious rail tunnel between Sicily and Tunisia. On the Italian side, the subsea tunnel would start in Pizzolato near Mazara del Vallo to exit in Bon on the other shore of the Mediterranean sea. What would be the world longest tunnel with 136 km would cross the Sicily channel at its narrowest point between Sicily and Tunisia. The maximum depth is 230 m. Along this tunnel, four artificial islands are planned for service. ENEA considers a three-tube tunnel with two bores for rail traffic, one for trains and one for shuttle trains carrying cars. The central bore would be a service tunnel. Based on the Channel tunnel as a comparison, estimates by engineers reveal that construction would last seven years, 25 million cubic metres of spoil would be removed, travel time would take 90 minutes and 30 million of freight would be transported between Bon and Pizzolato. Other long-term projects have been proposed around the world such as a 120 km rail / road tunnel to link Japan and Korea, a 50 km link between Finland and Sweden, a 40 km

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rail tunnel across the Gibraltar strait between Spain and Morocco and a 125 km tunnel between China and Taiwan. Visit www.regione.sicilia.it/turismo/trasporti/arcdocumenti/2003/tunnel_SiciliaTunisia.pdf

Spain

One Third of Drivers Believe Driving in Tunnels is Dangerous

A poll by the Spanish motoring association (RACE) shows that about one out of three Spanish drivers believes that driving through a tunnel is more dangerous than on open air roads although statistics show the opposite. RACE has launched a campaign on safe driving in road tunnels. Statistics also reveal that Austria is the country where most accidents in tunnels have been recorded. There are 310 tunnels totalling 163 km on state roads in Spain. Spanish tunnels have been more recently built than in other European countries and thus better equipped on average. Older tunnels like Somosierra and Piedrafita are being upgraded. Visit www.seguridadvial.org

World Digest of Tunnels Under Planning

Germany. The North Rhine-Westphalia authorities have scrapped the 80 km €3.2 billion maglev project planned between Düsseldorf and Dortmund. Instead, a conventional rail service named MetroExpress S-Bahn will be built. The only remaining maglev project in Germany is now the proposed link between the centre of Munich and its airport. Although details of the MetroExpress S-Bahn project will not be published until September, it is hoped to have a large part of the scheme in place in time for the World Cup football championships in 2006. Visit www.tunnelbuilder.com, de/55 and de/56.

Italy. The Valcamonica mountain community has commissioned a feasibility study and preliminary project to Architects Mario Lieta and Gregorio Sterli for the Mortirolo rail tunnel that will connect the Valcamonica and Valtellina valleys. There would be two sections, one from Edolo to Lovero of nearly 9 km, and one from Lovero to Tirano (4 km). The tunnel will lie in a vast area between the Alpine crossings of Gotthard and Brenner to serve 1 million people in Valcamonica, Valtellina and Val di Sole. The tunnel will not be completed, however, before 2013.

Malta. A 8 km rail tunnel at sea level between Malta Freeport and Grand Harbour has been mooted in order to speed up the handling of cargo between the two ports. This is one of the three projects submitted by the Maltese government to the EU high-level group that is revising the Trans-European Transport Network (TEN-T). Read E-News Weekly 28/2003.

Spain. The road directorate at the Catalan government has approved the preliminary design and the environmental impact study for the 5.7 km Sant Joan de les Abadesses bypass in Girona province on road C-26. The scheme has a budget of €30.09 million. The new carriageway will be 10 m-wide with two 3.5 m-wide lanes and two 1.5 m-wide emergency lanes. A 219 m-long tunnel will be built in Puig Penjat.

Spain. Tenders are imminent for engineering studies for the third ring road in La Coruña from Lonzas to A Zapateira and from A Zapateira to the A-6 motorway in Culleredo with also a nearly 6 km branch to connect with the airport. The A Zapateira-Culleredo section will necessitate four cut-and-cover tunnels for a total length of 800 m.

Spain. Calls for tenders will be published soon further to government approval for the first high speed rail sections between Barcelona and Girona. On the 7.51 km San Celoni-Riells section, a 365 m bored tunnel and a 209 cut-and-cover tunnel will be constructed. This section will cost €47.8 million and will take 22 months to build. The 9 km Riells-Massanes section requires a 175 m cut-and-cover tunnel. Its cost will be €46 million and time frame for construction is two years.

Switzerland. Swissmetro has applied for a new concession for the Geneva-Lausanne link. The first

attempt to get a concession in 1999 was rejected by the federal council for financial reasons. The project would cost CHF3.5 billion according to the federal Polytechnic School of Lausanne (EPFL). The confederation would contribute up to CHF1.2 billion through long-term loans. The cantons would finance the remainder. This is the first official move to revive the project since December 2002 when Swissmetro decided to reduce drastically its capital. Nevertheless, research has progressed since then. A 1:10 scale test is to begin soon at EPFL and the HISTAR (High Speed Train Aerodynamic Rig) programme, mainly financed by the commission for technology and innovation, aims at studying aerodynamics phenomena produced when high speed trains circulate in narrow tunnels. These experiments will last two years and will be crucial for the construction of a test site at the 1:1 scale. Visit www.swissmetro.com and <http://imhefwww.epfl.ch/lmn/animation/swissmetro/main.html>

United Kingdom. A radical scheme to build a 1.6 km tunnel under Pickering, North Yorkshire could go ahead to protect residents from more flooding. One idea put forward would see a £3.8 million 2 m-wide flood diversion tunnel constructed under the north of the town. A £6.2 million scheme to re-grade the water channel and deepen it has also been suggested.

World Digest of Bids

Belgium. Negotiated procedure, deadline 11th August, 2003 for construction of a 158 m cut-and-cover railway tunnel on the Schaerbeek-Namur line. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=119012-2003>, OJ S 132, or contact SNCB, Liège, fax +32 42412280. E-mail michel.simon@dse15.b-rail.be

Romania. Tender notice, deadline 15th October, 2003 for construction by tunnelling of the Rosiori main sewer, length around 200 m and 3.15 m in diameter plus associated works. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=116140-2003>, OJ S 130, or contact Ministry of public finance, Bucharest, fax +40 212106456 or 212108348. Read E-News Weekly 18/2003.

Spain. Open call for bids, deadline 2nd August, 2003 for work control and construction supervision of the second carriageway of section Llera-Grado (8.75 km) between Oviedo and Salas, including the Peñaflor tunnel (811 m). Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=118903-2003>, OJ S 132, or contact Ministry of development, Madrid, fax +34 915978537. Read E-News Weekly 50/2002.

Spain. Open call for bids, deadline 2nd August, 2003 for work control and construction supervision of the second carriageway of section Trubia-Llera (4.1 km) between Oviedo and Salas, including the Priañes tunnel (614 m) and a 77 m cut-and-cover tunnel. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=118902-2003>, OJ S 132, or contact Ministry of development, Madrid, fax +34 915978537. Read E-News Weekly 22/2003.

Spain. Open call for bids, deadline 4th September, 2003 for work control and construction supervision for section Padrón-Osebe (4.1 km) of the high speed railway in La Coruña province in Galicia. This section includes a 865 m tunnel under Mount Areal. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=127294-2003>, OJ S 140, or contact Ministry of development, Madrid, fax +34 915979342 or 8470. E-mail vrapascual@mcom.es or cpublic@mcom.es. Read E-News Weekly 25/2003.

World Digest of Contract Awards

Bulgaria-Greece. Bulgarian minister for land planning and regional development presided the launch ceremony for the construction of a 447 m-long tunnel between Gotze Deltchev, Bulgaria and Drama,

Greece. The construction firm is Greek contractor Prodeftiki. The €4 million tunnel will be completed at summer-2004. Read E-News Weekly 17/2002.

World Digest of Ongoing Tunnelling



Picture 2: Work start at the Eichelberg tunnel.

Germany. Construction of the 1,110 m-long Eichelberg tunnel, the last tunnel on A71 motorway in Thuringia commenced on 22nd July. This twin tunnel, located south of Suhl on a 13 km section between Meiningen south and Bavaria's border, will cost €47 million to build. Drill/blast excavation is used by the contractors, Walter Bau and Walter+Heilit Verkehrswegebau. Other tunnels have been completed in Behringen, south of Arnstadt (465 m); Alte Burg, south of Geschwenda (866 m); Rennsteig (7,916 m), opened on 5th July; Hochwald, north of Zella Mehlis (1,056 m); and Berg Bock near Suhl (2,740 m). There is also another tunnel south of Suhl in Waldau (480 m). Visit www.a71.de and www.tunnelbuilder.com, de/13.

Russia. The Severo-Muisky tunnel in the Russian republic of Buryatia, in southern Siberia, will open for rail traffic in November. The tunnel will allow trains to go straight along the Baikal-Amur railroad (known by the Russian acronym BAM) instead of bypassing it. Trains have to cover 67 km of difficult terrain between avalanche-prone mountains and hills at minimum speed. The 15,343 m-long Severo-Muisky tunnel will be one of the world's longest rail tunnels running through geologically hazardous areas. Its depth will reach up to one km at some points.

Sweden. Exploratory work at Hallandsås has been held up on 22nd July prior to the work resumption of the rail tunnel. Some 6 cubic metres of a cement and clay grout have leaked into a crack during core drilling. The pH of the neighbouring river has risen dramatically making it more acid and killing hundreds of fish and crawfish. The municipality of Båstad has lodged a complaint against Banverket, Skanska and Vinci. To date, one third of the 8.6 km tunnel has been excavated. Visit www.tunnelbuilder.com, se/26.

World Digest of Tunnel Renovation & Maintenance

France. Open call for bids, deadline 10th September, 2003 for rehabilitation of a sewer in Perray park in Sainte-Geneviève-des-Bois. Length 1,574 m, 1.2 m in diameter. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=116586-2003>, OJ S 130, or contact Syndicat Mixte de la Vallée de l'Orge Aval, Viry-Châtillon, fax +33 169450921. E-mail sivoa@sivoa.fr

France. Negotiated procedure, deadline 1st September, 2003 for rehabilitation of the Voltaire Malaquais Conti tunnel on line C of the RER suburban rail network. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=119015-2003>, OJ S 132, or contact SNCF, Paris, fax +33 140480192. E-mail annabelle.cavelier@sncf.fr. Read E-News Weekly 29/2003, 12/2003, 47/2002 & 43/2002.

France. Open call for bids, deadline 3rd September, 2003 for assistance during supervision of rehabilitation works of 8.2 km of sewer mains, variable sections 1.05 m x 2 m to 2.6 m x 2.8 m, in the Marcadet-Poissonniers area in the 18th district. Visit <http://ted.publications.eu.int/udl?request=Seek-Deliver&language=en&docid=125195-2003>, OJ S 138, or contact City of Paris, fax +33 142768710. Read E-News Weekly 13/2003.