



HERRENKNECHT Press Information.

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GALLERIA SPARVO: FIRST TUNNEL TUBE COMPLETED IN RECORD FORMAT.

"With the world's largest TBM, we have become accustomed to setting new records – two of which are its size and advance rate", explained Alfonso Toto, CEO and Managing Director of Toto Costruzioni Generali, during the first breakthrough celebrations while building the Sparvo Tunnel at the end of July. The Herrenknecht Earth Pressure Balance Shield with a world record diameter (15.55 meters) required just under twelve months to build the 2.413-meter tunnel. Each tunnel tube is spacious enough for two lanes, and each has its own hard shoulder. With the TBM Martina equipped for particularly gaseous soil, Herrenknecht has set new standards in tunnel boring machines.

Schwanau, August 10, 2012 During the course of extending the A1 in Italy, a currently busy section between Bologna and Florence is being extended to include a new alternative route. One feature of this route is the Sparvo Tunnel under construction since August 2011 which represents a new record in mechanized tunnelling in terms of size as it has a boring diameter of 15.615 meters and comprises two parallel tubes 2.5 kilometers in length. The alternative route aims to significantly reduce travel time for up to 90,000 vehicles per day. The client Autostrade per l'Italia S.p.A. anticipates the tunnel opening in mid-2013.

The excavation task is regarded as the most demanding part of the overall project, not only on account of its sheer size but also because of the prevailing geological conditions: the geology in the tunnel route comprises mainly clay, claystone, sandstone and limestone. What's more, there is partially an extensive prevalence of firedamp. In order to achieve the requisite safety and speed during construction, the Italian client opted to use mechanized tunnelling technology. To this aim, Toto Costruzioni Generali S.p.A. commissioned Herrenknecht AG with building a tunnel boring machine in 2010. Toto is the leading partner in a joint-venture which also includes Vianini Lavori S.p.A. and Profacta S.p.A. With the aid of the 4,300-tonne and 130-meter Herrenknecht Earth Pressure Balance Shield equipped with 12,000 Kilowatt drive power, Toto has now completed the first tube. Toto reported to the media after the initial breakthrough: "A top advance rate of 22 meters per day has confirmed the superiority of mechanized tunnelling when compared to conventional technology." This process involved the removal of 4,215 cubic meters of soil – a major challenge for site management. Over the next few months, the Martina TBM will be turned around for the second tube which is spaced 20 meters away.

"This machine was intended to set new standards, including with regard to its features for particularly gaseous soil", explains Herrenknecht Project Manager Alexander Ell. Hand in hand with Toto and with the support of the local authorities as well as the Universities of Bologna and Turin, Herrenknecht has developed a complex safety system which includes explosion-protected equipment, a fully-enclosed conveyor belt, a permanent fresh air supply to all areas as well as permanent monitoring of housing tightness and gas concentration. "The concentration of methane at the tunnel face was so high that fresh air had to be transported to the excavation chamber over longer periods of time", reports Ell and

establishes with satisfaction: "So far, our new system has worked just the way we have anticipated."

Herrenknecht AG

Herrenknecht AG is the only company worldwide to deliver tunnel boring machines for all ground conditions and all diameters – ranging from 0.10 to 19 meters. The product range comprises tailor-made machines for traffic, supply and disposal tunnels as well as additional equipment and service packages. Herrenknecht also manufactures boring systems for vertical and inclined shafts as well as deep drilling rigs. The Herrenknecht Group achieved a total operating performance of 1,104 million euros in 2011, supplying 65 tunnel boring machines for traffic tunnels alone in that same year. All in all, Herrenknecht equipment has completed 1,900 kilometers of tunnels in large diameter ranges of over 4.20 meters since its establishment in 1977. The Herrenknecht Group employs around 4,000 people worldwide and trains more than 240 young people. With 77 subsidiaries and associated companies in Germany and abroad, Herrenknecht offers comprehensive services tailored to the respective project and contractor.

Technical data: Herrenknecht EPB Shield S-574 "Martina"

Excavation diameter:	15,615mm
Shield diameter:	15,550mm
Installed power:	12,000kW
Cutterhead power:	315,000kN
Torque:	94,793kNm
Cutting tools:	76 disc cutters, 216 cutting knives, 24 buckets, 1 center cutter
Total weight:	4,500t
Total length:	130m
Segment length:	2m