



## **HERRENKNECHT DELIVERS SPECIAL TUNNEL BORING MACHINE FOR THE NEW BOSPORUS CROSSING.**

**A large-diameter road tunnel will cross beneath the strait in Istanbul and expand the infrastructure bottleneck between Europe and Asia. The technical planning of the tunnelling operations poses complex challenges. Therefore, the construction consortium ordered a specially adapted tunnel boring machine from Herrenknecht. The 13.6 meter giant, a Mixshield, was completed in early July 2013 in Schwanau and is now on the way to the jobsite in Turkey.**

**Istanbul, Turkey / Schwanau, Germany, August 14th, 2013.** To get from the European to the Asian side of Istanbul, people and goods have to cross the Bosphorus Straits. So far, two road bridges as well as ferries provide the only transport link between the two parts of the city and the two continents. The tense traffic situation for the nearly 14 million residents of the city and for international transit traffic should be improved considerably thanks to the construction of a new road tunnel under the Bosphorus.

"The project is certainly one of the most challenging tunnelling operations currently being addressed in the world," is the assessment of the Herrenknecht project manager Georg Schleer. The route of the "Istanbul Strait Road Tube Crossing Project" runs around 100 meters below sea level at its deepest point. The interior diameter of the tunnel will be twelve meters so that two lanes in each direction can be accommodated. They will extend one above the other on two levels. 3.34 kilometers of the tunnel with a total length of 5.4 kilometers are being created by a Herrenknecht tunnel boring machine that will begin its underground mission from a launch shaft on the Asian side.

Extensive geological and hydrogeological preliminary investigations showed that the tunnel builders must reckon with water pressures of up to 12 bar. The executing Turkish-South Korean construction consortium YMSK, consisting of Yapı Merkezi İnşaat ve Sanayi A.Ş. and SK Engineering & Construction Co. Ltd., ordered a specially developed Herrenknecht TBM type Mixshield with a diameter of 13,660mm for this project. "The machine's engineering presented us with a real challenge," says Georg Schleer, summarizing the starting situation for the engineers from Schwanau. The main task: "Even if the pressure is extremely high up front at the tunnel face, the client must be able to change the cutting tools quickly and safely if necessary." The result was a new type of cutting wheel, where time- and cost-consuming access for maintenance work under pressurized air can be reduced. The complete cutting wheel is accessible from the rear of the machine under atmospheric pressure. From there, all disc cutters and a large part of the cutting knives can be changed safely. In addition, the Mixshield is equipped with a special, newly developed lock system. It allows pressurized air access at well over 5 bar where necessary.

To detect strong material wear early and to tackle necessary maintenance accesses in a targeted manner, wear detectors are integrated into the excavation tools as well as in the steel construction of the cutting wheel. Moreover, the disc cutters are equipped with the DCRM monitoring system (Disc Cutter Rotation Monitoring), which was developed by Herrenknecht. It provides data about the rotational movement and temperature of the disc cutters in real time to the machine operator in the control container. Thus, conclusions can be drawn regarding the condition of the tools and change intervals can be better planned.

In the Herrenknecht factory in Schwanau the Mixshield was named YILDIRIM BAYEZİD. This is the name of a sultan, who drove the expansion of the Ottoman Empire successfully forward at the end of the 14th Century. After its dismantling, transport and assembly at the jobsite, the Herrenknecht Mixshield will start its tunnelling work in Istanbul at the end of 2013. Following the opening of the tunnel, the new quick link between Europe and Asia will initially be operated for 26 years by the Joint Venture "Avrasya Tüneli İşletme İnşaat ve Yatırım A.Ş. (ATAŞ)" and subsequently handed over to the government of Istanbul.

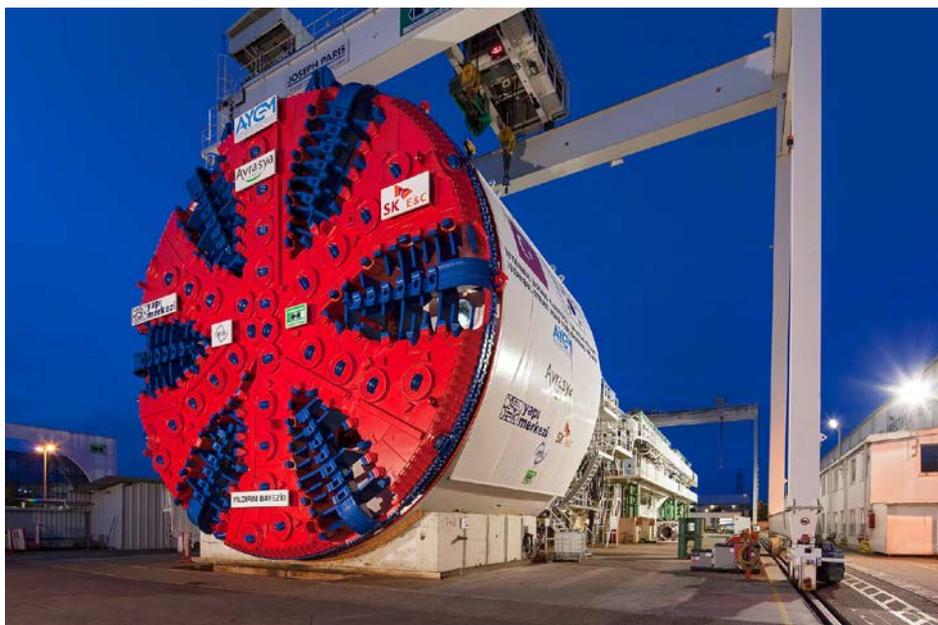
The Bosphorus was crossed with a tunnel boring machine for the first time in the years 2008 - 2009. An Earth Pressure Balance Shield (Ø 6,110mm) from Herrenknecht was used for the construction of a water tunnel. In addition, a total of about 56 kilometers of Istanbul's metro are being built using machines produced in Schwanau.

<b>Istanbul Strait Road Tube Crossing Project</b>		<b>Herrenknecht S-762 Mixshield</b>	
Location	Istanbul, Turkey	Diameter	13,660mm
Application	Road	Cutterhead power	4,900kW
Tunnel length (mechanized tunnelling)	3,340m	Nominal torque	23,290kNm
Geology	Sand with gravel, limestone and clay stone	Client	YMSK (Yapı Merkezi İnşaat ve Sanayi A.Ş., SK Engineering & Construction Co. Ltd.)

Further project information:

<http://www.avrasyatuneli.com/en/>

**Picture:**



The Herrenknecht Mixshield with a diameter of 13.6 meter for the »Istanbul Strait Road Tube Crossing Project« was completed in early July 2013 in Schwanau.

### **Information on Herrenknecht AG**

*As the only company worldwide, Herrenknecht AG delivers tunnel boring machines for all ground conditions and in all diameters – ranging from 0.10 to 19 meters. The product range includes tailor-made machines for transport tunnels, supply and disposal tunnels and additional equipment and service packages. Furthermore, Herrenknecht manufactures drilling rigs for vertical and inclined shafts as well as deep drilling rigs. In the year 2012, the Herrenknecht Group achieved a total operating performance of 1,135 million euros. The Herrenknecht Group employs around 5,000 members of staff worldwide, among them 200 trainees. With 78 subsidiaries and associated companies working in related fields in Germany and abroad, Herrenknecht provides a comprehensive range of services close to the respective project and customer.*