



Press Release

HERRENKNECHT

No run of the mill mission on the Florida coast near Miami

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Schwanau

In February 2016 construction company Bessac completed work on a protection tunnel in extremely difficult geology in South Florida. In just ten months and using a customized machine designed especially for the mission, a "Herrenknecht Combined Shield" (HCS, diameter 3.13 m), 1,613 meters were tunnelled adhering to the highest safety standards. A new sewer line was installed in the finished tunnel – after half a century in use the old pipe was simply worn out.

_____ The ground conditions and project circumstances of the mission at Norris Cut were anything but standard. Not only did the karstified, permeable geology pose the risk of flooding the machine. The complex Fort Thompson Formation to be tunnelled through was also full of sand-filled cavities. The tunnel face was therefore prone to instability.

For this reason the construction of the protection tunnel for a new sewer line between Virginia Key and Fisher Island required a special and highly flexible machine with exceptional safety features. A Herrenknecht Combined Shield offered the necessary adaptability: available in slurry mode as well as in EPB mode depending on the requirements, the HCS machine is optimally prepared for changeable ground conditions.

Additionally, the front area of the machine had to be accessible at all times during the challenge off Miami to allow for tool changes, for instance. For maximum safety a bulkhead with a dive pit was developed especially for the project. Thanks to the bulkhead between the front two machine parts and the overpressure thus enabled, muck and water cannot penetrate into the machine at the tunnel face. Should high water pressures nevertheless lead to flooding, the dive pit allows safe locking into the flooded area.

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In the end the safety reserves were not needed. Neither the sophisticated lock system nor the EPB mode of the HCS machine were used. The ground was highly permeable as expected, however the proper design of the cutterhead and the appropriate disc cutters enabled the customer to perform only one maintenance stop, performed under compressed air after a novative ground treatment from the TBM.

"Dorsey" began the drive near the treatment plant on Virginia Key in April 2015. Right from the very first meter the project was characterized by its special requirements: to save space, with a diameter of twelve meters the launch shaft was rather small. At the beginning there was no room for the HSC machine's back-ups and they were only able to be used one by one after 70 meters of tunnelling. For the first section the TBM was therefore pushed forward in pipe jacking mode using a jacking frame adapter developed by the customer, the rest of the tunnel was then lined with concrete segments.

At a depth of up to 21 meters below sea level, the 3.13 meter diameter "Dorsey" dug its way forward in the months that followed. After 227 working days came the breakthrough on Fisher Island on February 16, 2016 – top performances of up to 24 meters per day and about 300 meters per month confirmed the optimum configuration of the TBM. By the end of the year the new 60" discharge pipeline is due to be installed in the finished protection tunnel and put into operation.

The successful drive on the Norris Cut project has pushed the boundaries of what is possible in Florida's tunnelling industry and contributed to its further development: "The project has set standards for work in Florida's underground and showed solutions for deep sewer lines in the porous Fort Thompson Formation," confirms Bernard Theron, President of Bessac.

With the construction of the Port Miami Tunnel already, machine technology from Herrenknecht had demonstrated that even the most complex ground conditions such as the Fort Thompson Formation can be safely mastered with optimally adapted technology. Despite its huge diameter of nearly 13 meters, in 2013 the EPB Shield S-600 reached its target reliably thanks to an additionally installed slurry circuit. According to internationally renowned accounting and consulting firm KPMG, in 2012 the Miami Port Tunnel was one of the ten most innovative transport projects in the world.

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Photos

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Photo 1

The HCS machine (Herrenknecht Combined Shield) for the Norris Cut Project was produced at the Herrenknecht plant in Schwanau, Germany. With a diameter of 3.13 meters, it reached the target shaft on Fisher Island around 1.6 kilometers away in less than ten months.



Photo 2

The launch shaft on Virginia Key with a diameter of only twelve meters saved space. As a result, however, the HCS machine had to begin the drive in pipe jacking mode using a jacking frame adapter. The back-up section was only assembled after the first 70 meters of tunnelling.



Photo 3

In February 2016 "Dorsey" reached the target shaft on Fisher Island. In late 2016 a new 60" sewer line, installed in the segmentally lined protection tunnel, will replace the old, worn-out line and transport wastewater from Fisher Island to the treatment plant on Virginia Key.

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Herrenknecht AG

Herrenknecht is the only company worldwide to deliver tunnel boring machines for all geologies and in all diameters – ranging from 0.10 to 19 meters. The product range comprises tailor-made machines for traffic, supply and disposal tunnels, technologies for pipeline installation as well as additional equipment and service packages. Herrenknecht also manufactures drilling rigs for vertical and inclined shafts as well as deep drilling rigs.

In 2015 the Herrenknecht Group achieved total revenues of 1.343 billion euros. The Herrenknecht Group employs around 5,000 people worldwide, including around 170 trainees. With 76 domestic and overseas subsidiaries and associated companies working in related fields, Herrenknecht provides comprehensive services close to each project and customer.

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