

# Herrenknecht Vertical

## Automated Rig Technology

The exploration of new energy deposits is one of the global challenges for future energy supply. Whether the development of onshore and offshore oil and gas or deep geothermal energy is economically reasonable also depends on the drilling equipment used. Herrenknecht Vertical, a subsidiary of Herrenknecht AG, the market leader in mechanized tunnelling systems, designs and manufactures customized high-quality rigs for drilling, workover and decommissioning, meeting the needs of our customers and their projects. The hydraulic rig concepts for drilling to 8,000 meters incorporate comprehensive, safety-based automation, setting new standards of safety, efficiency and environmental protection. **Automated Rig Technology. Engineered and built for your performance.**



**Headquarters in Germany, active worldwide.** With more than 40 years of engineering and manufacturing experience, around 5,000 employees and 76 locations within the Herrenknecht Group, we support our customers globally.

TI-350 SLINGSHOT

# PAD DRILLING FOR SHALE GAS IN CHINA



**Efficient shale gas development in China with innovative hydraulic drilling rig from Germany**



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**AUTOMATED  
RIG TECHNOLOGY**



# TI-350 Slingshot

## for efficient shale gas development

The exploration and production of natural gas trapped in shale is considered very challenging technically. A number of wells at depths of several thousand meters are required, preferably in “multi-well pads”. China is the country with the world’s largest shale gas resources and the Sichuan region is one of the major local areas. To get on with the development of shale gas, China’s biggest oil and gas company,

China National Petroleum Corporation CNPC, ordered a TI-350 Slingshot rig from the German manufacturer Herrenknecht Vertical. This was a key innovation for the country’s drilling industry and an important step towards performance improvement, notes the CNPC subsidiary, rig operator Chuanqing Drilling Engineering Company/ Chuandong Drilling Company. The hydraulic rig is the first of its kind in the Asian market.

### SHALE GAS IN CHINA

› Location:	Sichuan province, China
› Well depths:	5,200 m - 5,700 m (17,000 ft - 18,700 ft)
› Well diameter:	660.4 mm - 215.9 mm (26" - 8½")
› No. of wells per pad:	6
› Geology:	mudstone, sandstone, limestone, dolomite, shale

### TI-350 SLINGSHOT

› Max. hook load:	350 mt (375 sht)
› Max. push load:	160 mt (175 sht)
› Hoisting power:	1,600 kW (2,200 hp)
› Top drive power:	800 kW (1,000 hp)
› Max. tripping speed:	600 m/h (1,970 ft/h) <sup>1</sup>
› Max. drilling depth:	6,000 m (19,700 ft) <sup>2</sup>
› Mud pumps:	2 units per 1,200 kW (1,600 hp)
› Generators:	3 units per 1,504 kVA

<sup>1</sup>depends on training level and experience of the crew

<sup>2</sup>depends on inclination and string weight as well as formation and casing design

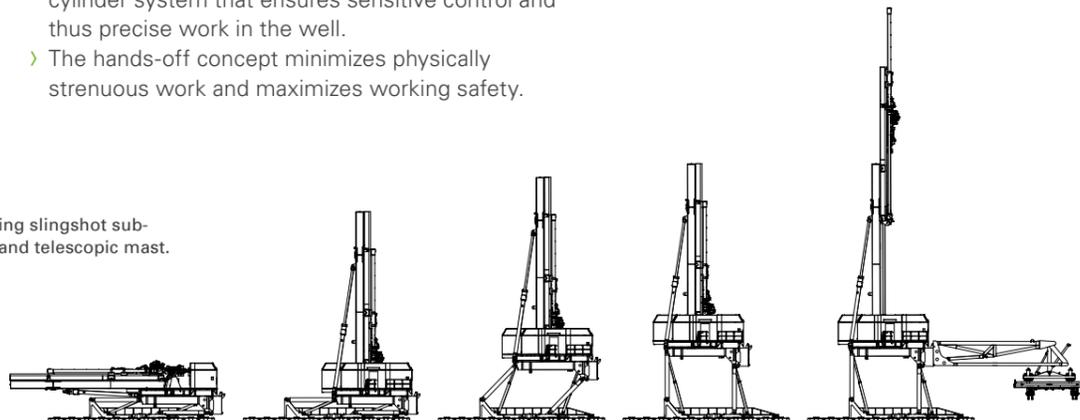
The TI-350 Slingshot has been built by Herrenknecht Vertical in cooperation with the Chinese customer. After successful factory acceptance in Germany, the integration of the rig with customer’s components, such as the mud farm, took place in China. In parallel to the final commissioning, a customized three-stage training program for the drilling and service crew has been started and continued on site, enabling the crew to utilize the benefits of the new technology: Substantial time and cost savings through the rig’s hydraulically assisted processes with particularly increased safety.

- › Drill string and casing is handled by the pipe handler between the horizontal pipe rack system and the top drive. Hoisting is done by a hydraulic cylinder system that ensures sensitive control and thus precise work in the well.
- › The hands-off concept minimizes physically strenuous work and maximizes working safety.

The rig is controlled from the driller’s cabin with no personnel in hazardous areas and can be manned by only four staff members per shift.

- › The automated horizontal racking system allows a high flexibility in tubular handling and reduces load in the mast, enabling operations also during heavy winds.
- › A comprehensive noise protection concept, using silent hydraulic components and noise protection encapsulation for mud pumps and gensets, makes the rig suitable for drilling in urban areas.
- › The rig’s slingshot substructure and telescopic mast are erected by hydraulic cylinders – no heavy load cranes are required.

Self-erecting slingshot substructure and telescopic mast.



Automated pipe handling and racking system controlled from the driller’s cabin.



## Optional features for pad drilling

### XY stepping system and telescopic catwalk.

Bundling several wells on one location into so-called “multi-well pads” reduces the number of locations and rig moves – and hence the environmental impact. To this end, the TI-350 Slingshot is equipped with a XY stepping system to skid the rig in two directions: forwards/backwards and lateral. Both, rig and hydraulic power unit, are equipped with four hydraulic ‘feet’ each, by which the equipment is lifted and skidded synchronously. The pipe rack and backyard components remain in place during this pad drilling. The telescopic catwalk transfers the tubulars to the hand-over position of the pipe handler and extension lines bridge the distance between rig and backyard.



Overview site layout with multi-well pad.

