

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.



SPECIAL APPLICATION RIGS

TI-250 TEST RIG IN OPERATOR'S R&D CENTER

Built to Herrenknecht Vertical's demanding standards for a discerning customer: TI-250 Test rig



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**AUTOMATED
RIG TECHNOLOGY**



TI-250 Test rig

for special testing applications

Herrenknecht Vertical designed this unique experimental drilling and equipment testing facility based on a design brief from Shell International Exploration and Production. The TI-250 Test rig skids forwards and backwards to access three test wells, and the entire structure is able to jack itself up by 2 meters (6.6 feet) to allow any combination of wellhead spools to be used. The cylinder hoisting system and top drive are hydraulically driven and are specially designed to

push as well as pull. Customer specification of millimeter increments under full load is achieved using Herrenknecht Vertical's accurate cylinder hoisting system instead of conventional draw works. Operating within Shell's R&D center laboratories in Rijswijk, The Netherlands, the TI-250 Test rig is powered entirely by a central electro-hydraulic power unit (HPU) to meet stringent sound and environmental impact requirements.

Testing the future of drilling

The rig is used to test new drilling technologies and work processes for exploring oil and gas deposits. The globally unique offsite test setup relieves real field operations where tests of new technology, procedures or material would usually be realized. The stationary installation of the Herrenknecht Vertical TI-250 Test rig with three test wells beneath allowed Shell's drilling experts to gain valuable knowledge. Under constant and repeatable conditions, the rig produced results that otherwise may have been impossible or that would have to be generated during costly interruptions of field operations.

Herrenknecht Vertical holds a close R&D partnership with Shell, designing and implementing further features into the test rig and developing new rig equipment for Shell's field operations.

One example is the specialized single joint elevator for an offshore rig operating for Shell in the North Sea. The specialized hoisting equipment was designed by Herrenknecht Vertical for handling tubings with very sensitive threads, not withstanding its own full weight. The hydraulically operated, automated single joint elevator compensates the tubular weight during make-up of the connection. It can be integrated into the PLC control system of Herrenknecht Vertical rigs to be operated from the driller's cabin. Before being put into operation offshore at the TI-250 Cantilever rig of Herrenknecht Vertical, the equipment has been thoroughly tested in Rijswijk together with the operator Shell and the drilling contractor Swift Drilling.



"THIS RIG WILL HELP US TO REDUCE DRILLING COST BY UP TO 50 PERCENT."

Joe Leone, VP R&D,
Exploration & Production, Shell



Technical specifications

HOOK LOAD

- › Max. hook load: 250 mt (275 sht) below saver sub

MAST*

- › Type: twin profile
- › Height: 30 m (98.5 ft)

SUBSTRUCTURE*

- › Type: customized substructure for vertical and lateral movement, adapted to 3-well off-site test setup
- › Lateral skidding: 3 m (9.8 ft)
- › Height adjustment: 2 m (6.5 ft)

Upon request, the TI-250 Test rig can also be designed with slingshot or box-on-box substructure.

HOISTING SYSTEM*

- › Type: cylinder system
- › Hoisting power: 750 kW (1,000 hp)
- › Stroke: 16 m (52.5 ft)
- › Brake: hydraulic lowering brake valves

Ultra sensitive operation due to multi-valve hydraulic control.

Upon request, the hoisting power can be upgraded for maximum travelling speed.

TOP DRIVE*

- › Type: HV TD H 385-400
- › Max. static load: 350 mt (385 sht)
- › Max. push load: 160 mt (175 sht)
- › Max. rotary speed: 190 rpm
- › Max. continuous rotary torque: 21,200 Nm (15,600 ft-lbs)
- › Rated power: 300 kW (400 hp)

ROTARY TABLE*

- › Table opening: 953 mm (37 1/2")
- › Max. static load: 450 mt (500 sht)
- › Max. dynamic load: 350 mt (385 sht)
- › Drive: hydraulic

RIG POWER SUPPLY*

- › Hydraulic power unit: 2x 400 kW (2x 535 hp) drives all components including hoisting system, top drive, rotary table and pipe handling system

The rig is operated with power from the grid via a transformer unit.

Upon request, the rig can also be run with power from generators or generator supported grid power.

DRILLERS'S CABIN*

- › Controls: joystick, trackball and touch screen with camera control

PIPE HANDLING SYSTEM*

- › Pipe range: 73 mm - 620 mm (2 7/8" - 24 1/2")
- › Max. load: 4.5 mt (5 sht)
- › Max. tripping speed: 350 m/h (1,145 ft/h)
- › Drive: hydraulic

The complete pipe handling system is designed to handle drill pipe range 3 in super singles, drill collars and casing. The controls are semi-automated and the system is operated by the pipe handling operator or the driller.

An integrated anti-collision system ensures a safe pipe handling process during all operations.

AUXILIARY CRANE

- › Type: PK 10000 M
- › Lifting moment: 93,500 Nm (70,000 ft-lb)
- › Max. lifting capacity: 5.7 mt (6.3 sht)
- › Slewing angle: 400 degrees
- › Drive: hydraulic
- › Control: from a wireless remote control panel

OPTIONAL EQUIPMENT

- › Iron roughneck/manual rotary tongs
- › Power slips/slip lifter/manual slips
- › Elevators
- › Medium voltage switchgear unit/generators
- › Mud tank system/mud pump units
- › BOP/BOP closing unit

* Components manufactured by Herrenknecht Vertical



TI-250 Test rig in manufacturer's yard