Water and wastewater tunnels make modern hygiene and sanitation standards possible.

Dr. Gerhard Lang, Herrenknecht AG

Jakarta, March 2019
HERRENKNECHT GROUP

5,000 employees worldwide

2,000 employees in Schwanau

About 180 young people in training

76 subsidiaries and affiliated companies

Projects in 85 countries worldwide

More than 3,700 successfully executed reference projects
Herrenknecht Group.
Fields of application for Herrenknecht machine technologies.
Herrenknecht Tunnelling Solutions.
Full-Range-Tunnelling for an optimized construction site process.

- Segment production
- Peripheral Equipment
- Separation Plant
- Data management
- Belt conveyor system
- Multi-service vehicles
- Technical staff
- Navigation & Monitoring
Tuen Mun – Chek Lap Kok Link.
The world’s largest tunnel boring machine.

- Mixshield, Ø17.63m (57.9ft)
- 2x 4.2km (2.6 mi.) Road Tunnel
The World Record TBM.
Hongkong: Tuen Mun - Chek Lap Kok Link (TM-CLKL).

- Mixshield S-880: Ø 17,63 m (57.9ft)
- Road tunnel for connection of the Hong Kong-Zhuhai-Macao Bridge
- Two additional UT-machines build 44 cross passages
HERRENKNECHT GROUP | UTILITY TUNNELLING.

Utility Tunnels & Shafts

Pipeline

Energy

< 4,8m

AVN & AVND

EPB Shield

Gripper TBM

Single Shield

Double Shield

Partial-face Excavation Machine

Auger Boring Machine

HDD Rig

Direct Pipe®

Pipe Express®

VSM

Herrenknecht. Pioneering Underground Technologies
Herrenknecht Utility Tunnelling.
For all kinds of Tunnelling and Pipeline systems.
Trenchless Installation Methods.
Especially beneficial in urban environments.
STANDARD PIPEJACKING OPERATION.
Pipe Jacking for Utility Tunnels.
Inner-city Jobsite Layout for AVN 600.
Remote controlled Pipe Jacking operation. Operation Container – Control Panel – Main Screen.
Direct pipe® - machine: excavation process
Slurry microtunnelling – AVN D Mode System.
Trends in Pipe Jacking.

- Higher hydrostatic pressures (river crossings / outfalls)
- Larger tunnel profiles
- More heterogeneous ground conditions
- Lower overburdens (inner-city)
- Longer tunnel drives
Makkah Haram Sewer Line.
Remote jobsite assistance.
Tunnel length: 4,479m (3 drives)
- 24/7 Remote Supervision
- Troubleshooting via Remote SPS access
- Centralisation of expertise
VSM Mechanized Shaft Sinking
TUNNELS AND SHAFTS
Mechanized Shaft Sinking for different applications
Vertical Shaft Sinking Machine VSM.
Reference Projects – Railway Girona, Spain.

- 4 Railway shafts
- Depth 20m (66ft) ID 5.2m (17ft)
- min. jobsite dimensions
- jobsite in narrow street
- 12m (39.4ft) between houses

- Shafts to be excavated under most narrow conditions
- Settlements risk highly considered due to close buildings
- No noise accepted
Herrenknecht in Indonesia.

Joint research project.

Water resources management of an underground river in a karst area, Yogyakarta Special Province, Indonesia.

Development and construction of a vertical shaft drilling machine - VSM 2500.
Landfalls and Sea Outfalls
Sea Outfalls, Intakes and Landfalls.
Application fields.

- **Outfalls** › › › › Sewage | Stormwater | Brine
- **Water Intakes** ‹ ‹ ‹ ‹ Desalination | Cooling
- **Pipeline Landfalls** ‹ ‹ ‹ ‹ Oil & Gas | Cables
Sea Outfalls, Intakes and Landfalls.
Trenchless installation methods.
Direct pipe® setup on the launch side.
Pipeline Landfall with Horizontal Directional Drilling. For Pipeline Projects.

- Tangguh LNG Expansion Project, Pipeline landfall
- H-123; HK400M, HK500PT Pipe Thruster
- Location: Bintuni Bay, Papua Barat, Indonesia
- Pipeline Ø: 24”
- Pipeline length: $3 \times 2,065\text{m}$
Hydropower solutions
Tunnel works in HEPP constructions.
Possible applications.
Double shield principle - Animation.
Double Shield TBM for Multipurpose Project. Segment Lining Tunnels.

- Uma Oya Multipurpose Development Project
- M-1684M + M-1685M, Double Shield TBM 3600, OD 4240
- Location: Uva, Sri Lanka
- Use of tunnel: Headrace + Tailrace Tunnel
- Tunnel length: 3.6 km + 15.1km
- Geology: rock
PIONEERING UNDERGROUND TOGETHER

THE FUTURE LIES UNDERGROUND.

Herrenknecht. Pioneering Underground Technologies