



HERRENKNECHT AG. INNOVATIVE MECHANICAL EXCAVATION TECHNIQUES FOR MINING APPLICATIONS

JACK BROCKWAY CEO AND PRESIDENT OF HTS USA/CANADA

Toronto, PDAC, 4 March 2014



























- Founded in 1977
- Conversion to Herrenknecht AG in 1998
- Today around 4,600 employees worldwide, 2,000 in Schwanau, around 200 young people in training

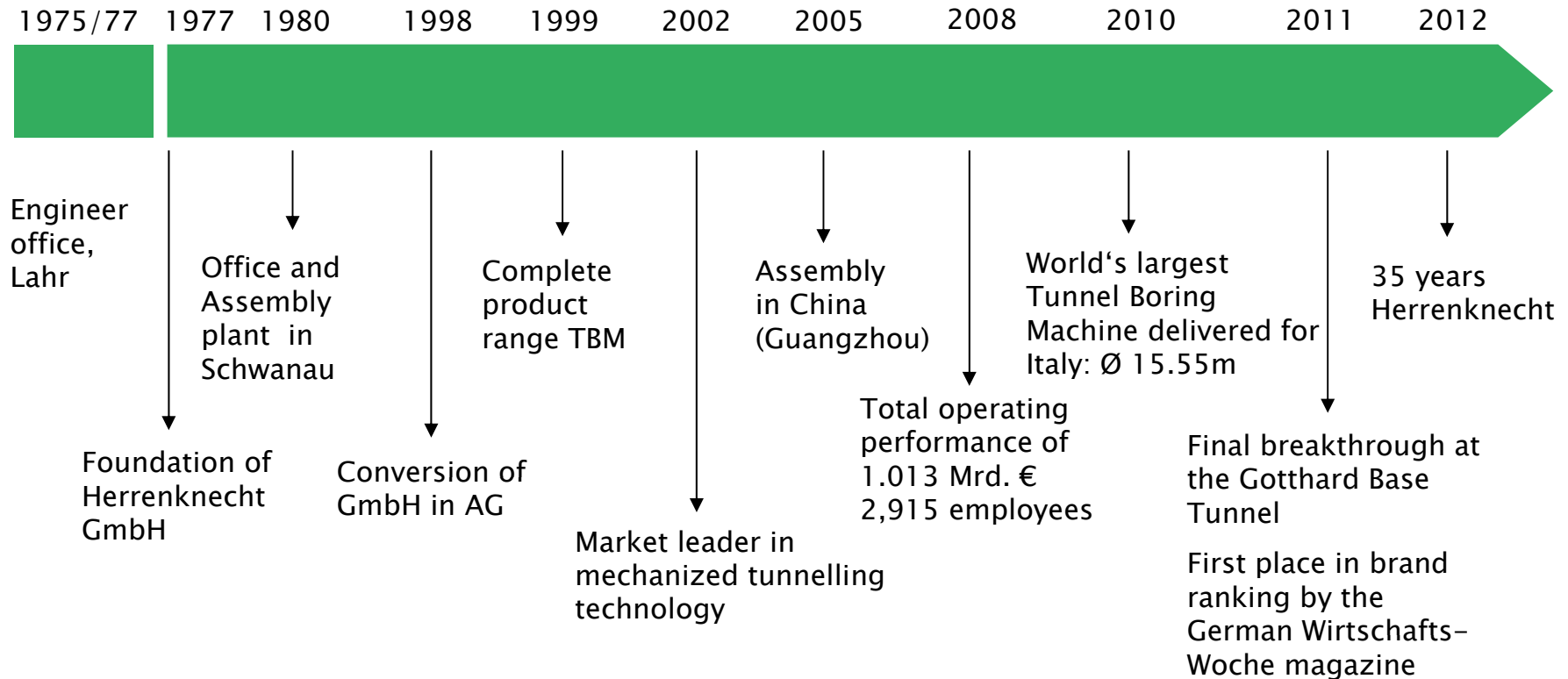
HERRENKNECHT CORE MARKETS.

HERRENKNECHT

Corporate Brand

<p>Core Markets</p>			
<p>Core Brands</p>			
<p>Group Brands</p>	<p>Additional Equipment</p> <p>H+E LOGISTIK  VMT </p> <p>MASCHINEN-UND STAHLBAU DRESDEN  HERRENKNECHT FORMWORK </p> <p>TECHNI-METAL SYSTEMES  EUROFORM </p>	<p>Additional Equipment</p> <p>H+E LOGISTIK  VMT </p> <p>MASCHINEN-UND STAHLBAU DRESDEN  SCHÄFER URBACH </p> <p>TECHNI-METAL SYSTEMES  EUROFORM </p>	<p>Additional Equipment</p> <p>SCHÄFER URBACH </p> <p>BOHRTEC VERTICAL </p>
	<p>Additional Services</p> <p>GLOBAL TUNNELLING EXPERTS </p>	<p>Additional Services</p> <p>GLOBAL TUNNELLING EXPERTS </p>	<p>Additional Services</p> <p>GLOBAL TUNNELLING EXPERTS </p>

MILESTONES OF COMPANY HISTORY.

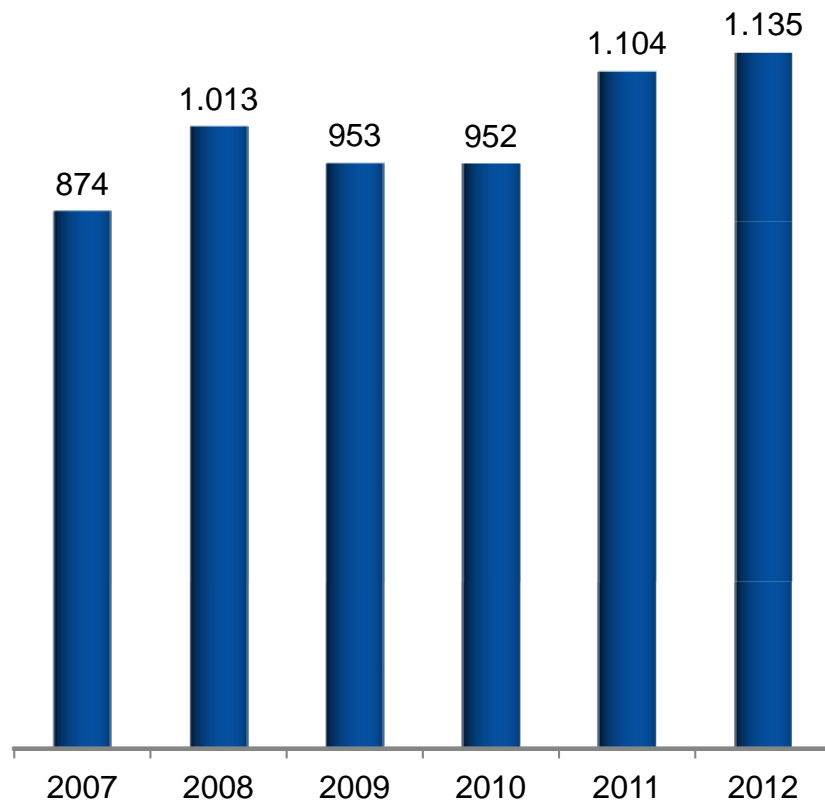


HERRENKNECHT WORLDWIDE ON ALL CONTINENTS.

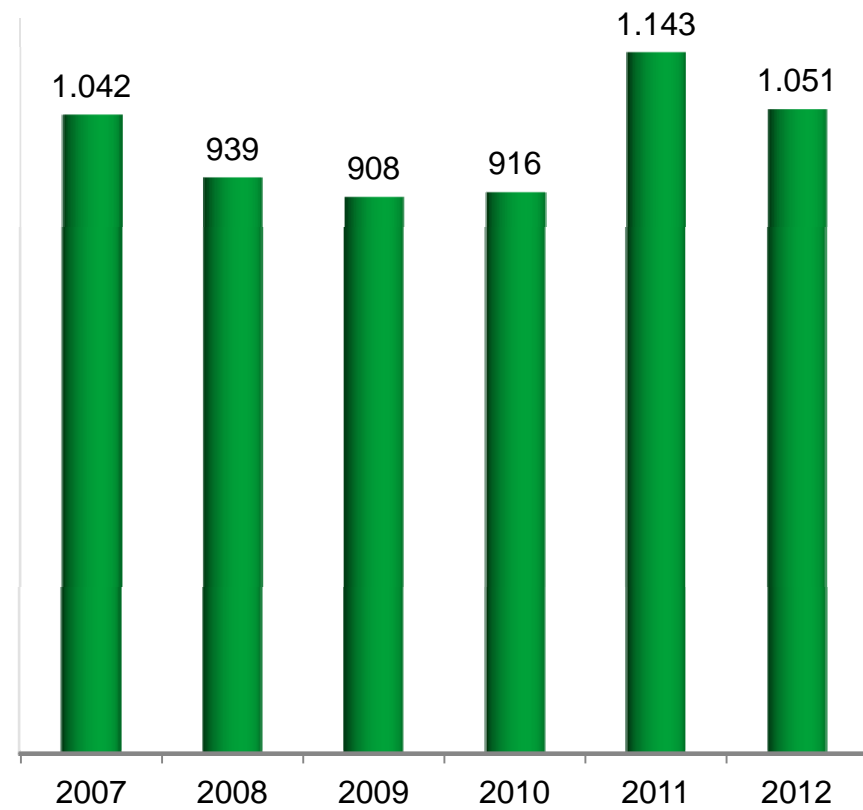


HERRENKNECHT GROUP. COMPANY FIGURES.

Total output in Mio. Euro

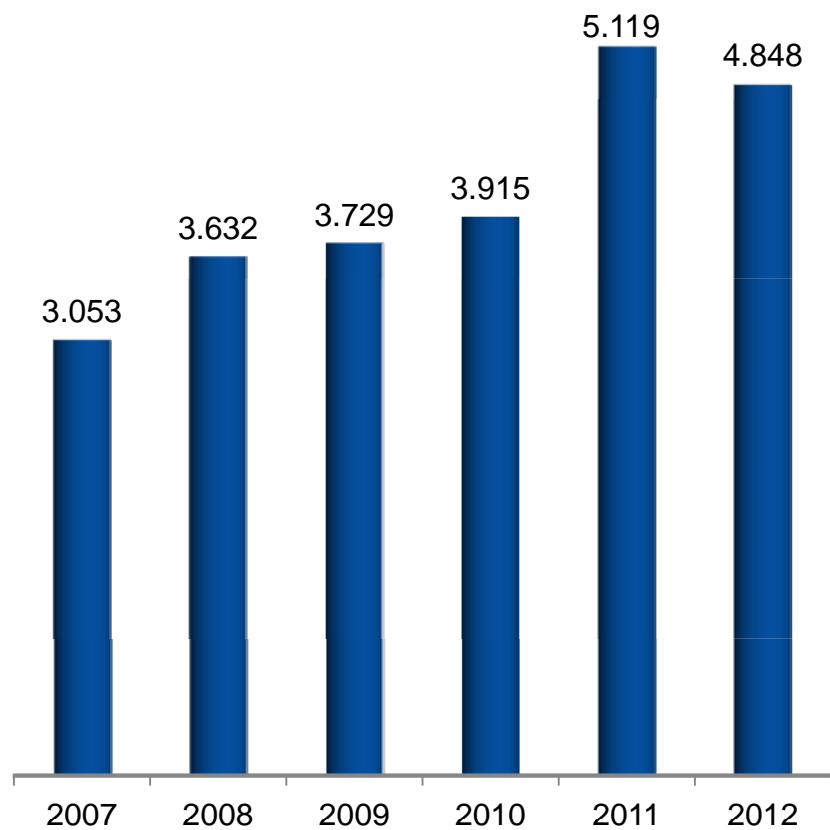


Order inflow in Mio. Euro

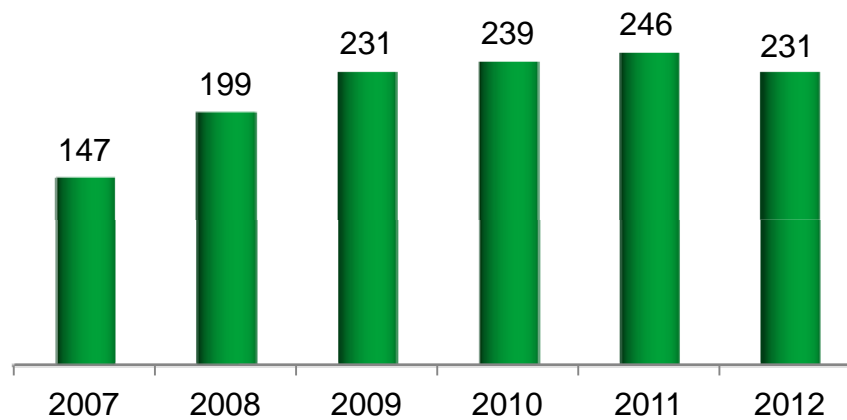


HERRENKNECHT GROUP. COMPANY FIGURES.

Employees at the end of the year*



Trainees at the end of the year



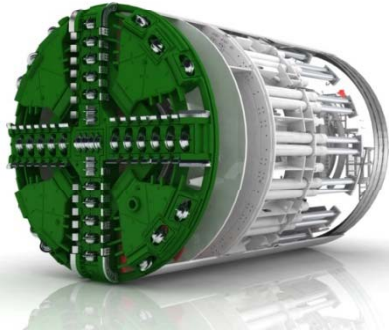
* Without trainees, incl. agency worker

INFRASTRUCTURE - GLOBAL TRENDS.

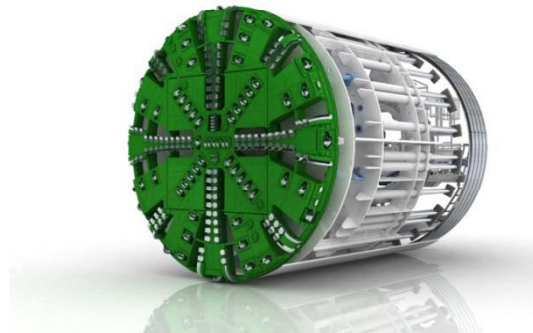
- Population growth and urbanization
- Lack of resources
- Industrialization and automation
- Increased demand for mobility for people and goods
- Need for new supply and disposal systems
- Large infrastructure projects, with parallel sub-projects



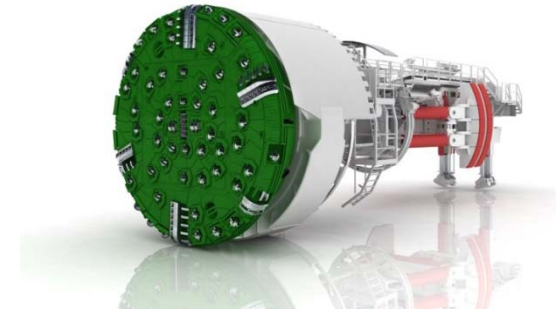
HERRENKNECHT PRODUCT PORTFOLIO. OVERVIEW OF CORE PRODUCTS TUNNELLING.



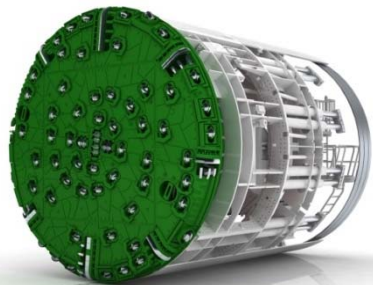
■ EPB Shield



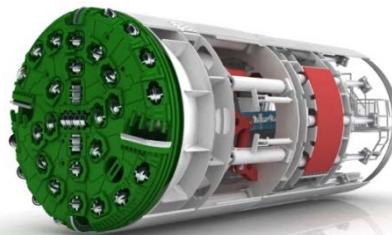
■ Mixshield



■ Gripper TBM



■ Single Shield TBM



■ Double Shield TBM

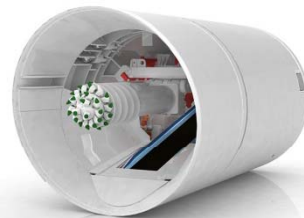
■ Multi-mode TBM

Flexible machine technology for highly variable ground. The machine mode can be changed depending on the ground conditions.

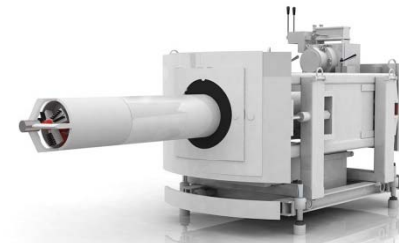
HERRENKNECHT PRODUCT PORTFOLIO. OVERVIEW OF CORE PRODUCTS TUNNELLING.



■ AVN Machine



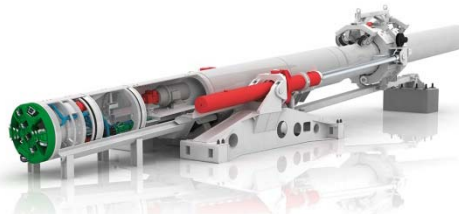
■ Partial-face
Excavation Machine



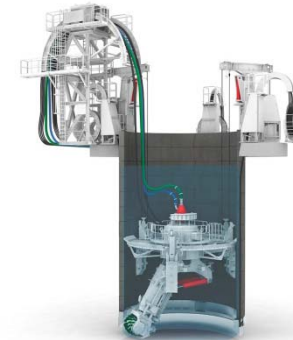
■ Auger Boring
Machine



■ HDD Rig



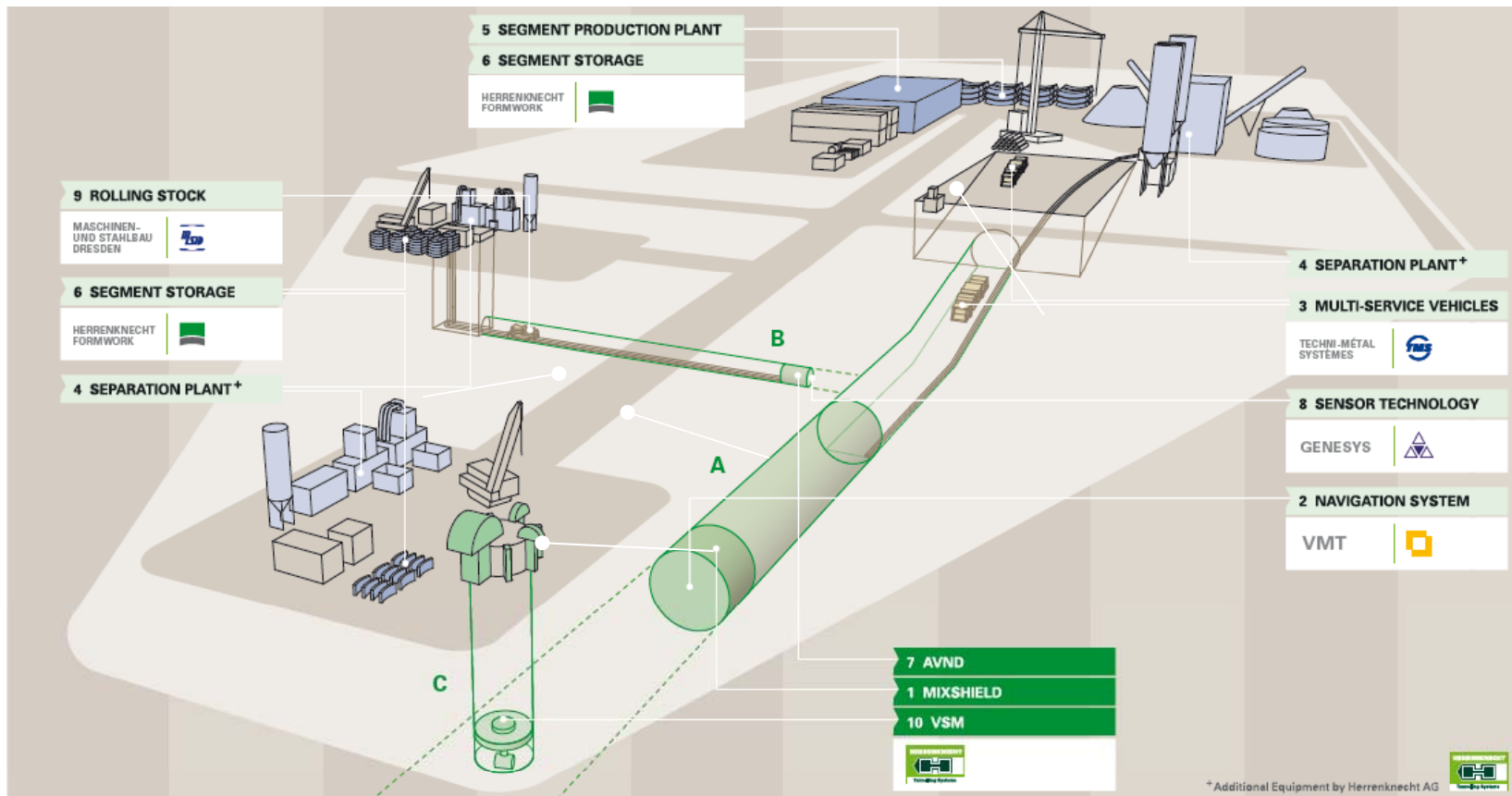
■ Direct Pipe®



■ Vertical Shaft Sinking
Machine

HERRENKNECHT PRODUCT PORTFOLIO. ADDITIONAL EQUIPMENT.

Full-Range-Tunnelling for optimized jobsite processes



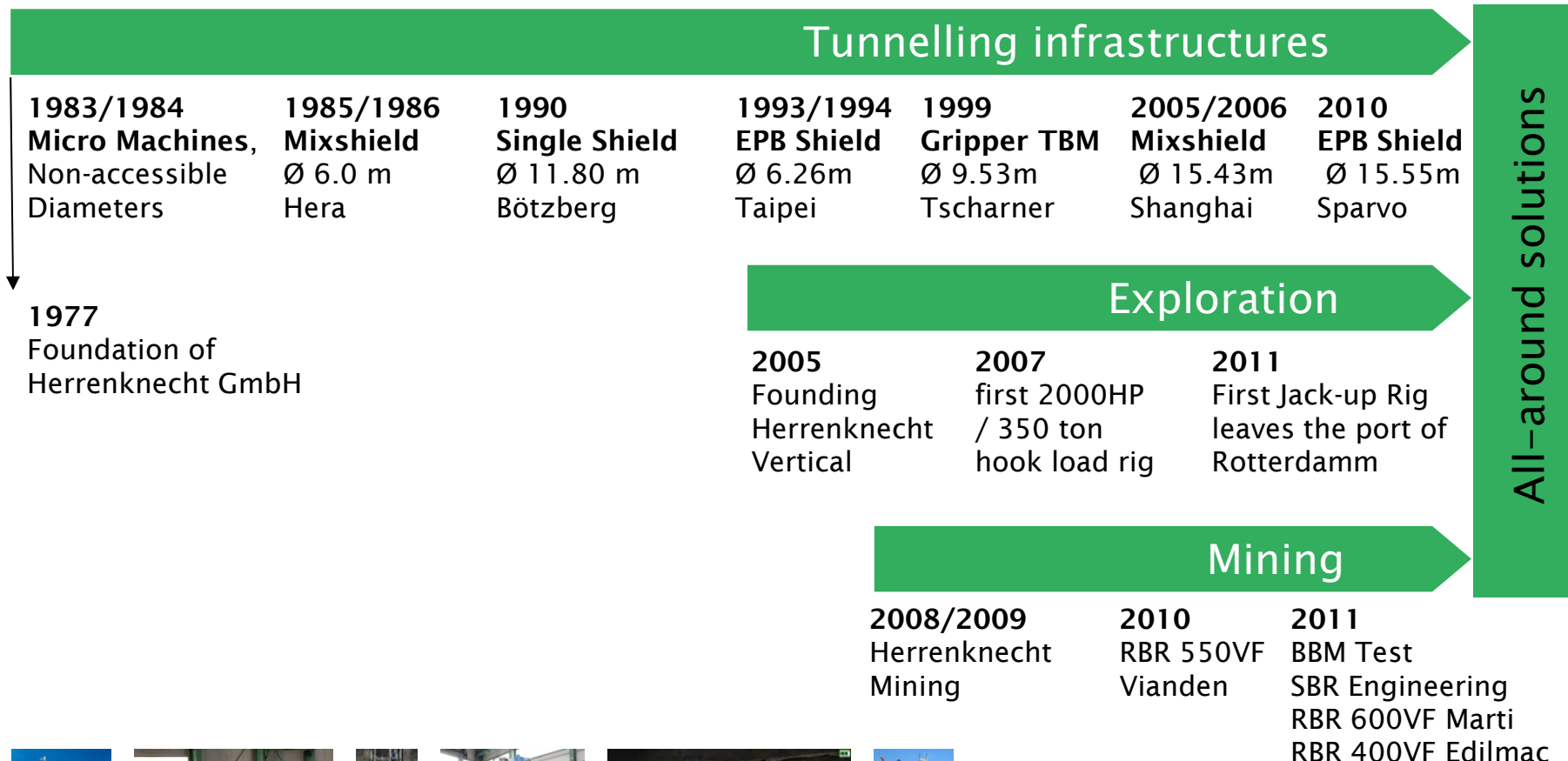
HERRENKNECHT PRODUCT PORTFOLIO. SERVICES.

- Installation services
- Personnel
- Spare and wear parts
- Excavation tools
- Refurbishment
- Rental equipment & used machines





MILESTONES OF PRODUCT DEVELOPMENT.



HERRENKNECHT MINING | Development

MI-001
RBR600VF



MI-003
SBR



MI-005
RBR600VF



MI-007
RBR900VF



MI-009
Jumbo



MI-011
BBM1100



MI-014
BBM1500



MI-016
RBR600VF



2010

2011

2012

2013



MI-002
BBM1100



MI-004
SBR



MI-006
BBM1500



MI-008
RBR400VF



MI-010
BBM1100

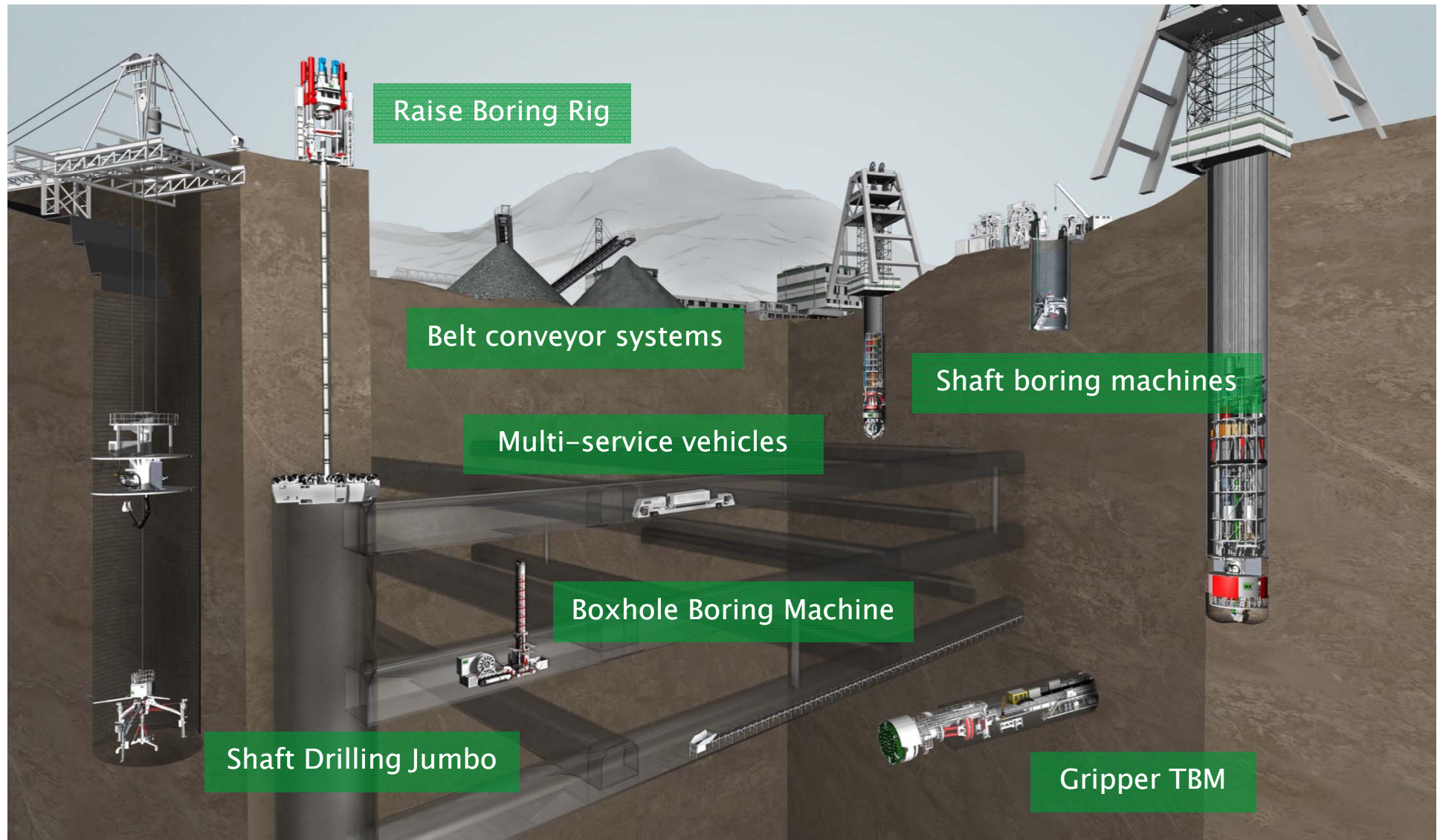


MI-012
RBR600VF



MI-015
RBR400VF

NEW BUSINESS SEGMENT – MINING. PRODUCT PORTFOLIO.



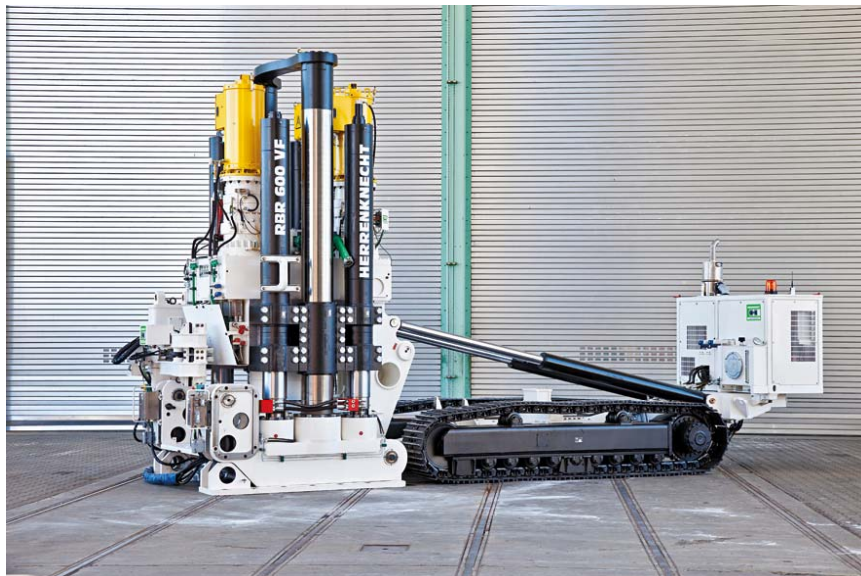
BOXHOLE BORING MACHINE BBM.

- Fast and safe construction of slot holes with small diameters
- Drilling diameters of up to 1.5 meters
- Maximum drilling length of 60 meters
- In the Cadia East Gold Mine in Australia more than 40 slot holes were successfully drilled

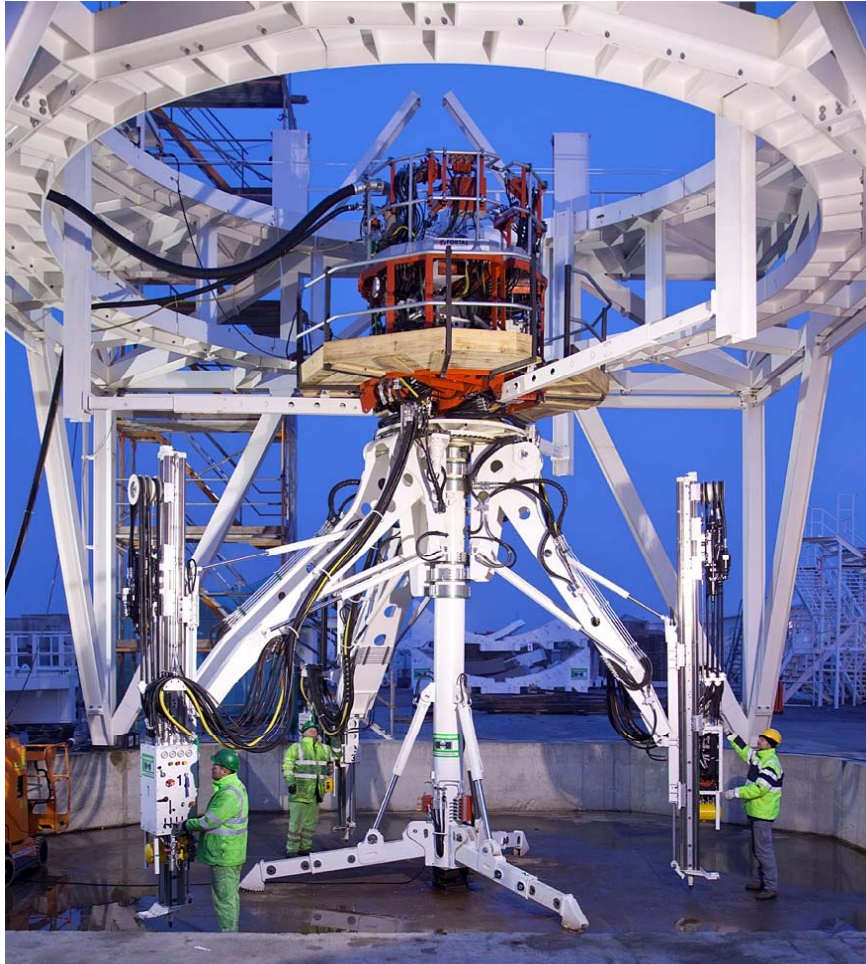


RAISE BORING RIG RBR.

- Construction of shafts in rock down to 2,000 meters in depth
- High flexibility even under space constraints
- Pilot drill vertically or at a downward angle of up to 45 degrees
- Rig pulls the reamer on the drill string upwards
- Power plant Nant de Drance: 2 x 424m deep vertical penstocks



SHAFT DRILLING JUMBO SDJ.



- Conventional shaft construction in hard rock
- Shaft diameters of up to 12 meters
- With booms the borehole is drilled and blasted afterwards
- Drilling cycle is carried out manually or automatically and with all booms at the same time
- First project at pumped storage power plant Nant de Drance (Ø 8m)

SBR – PROJECT, TASK AND CHALLENGES.

Project

- Potash Mine, Saskatchewan, Canada
- Shaft depth ~ 1000 m

Task

- Development of a shaft sinking method for deep blind shafts in soft and frozen ground

Challenges

- Enhanced safety in shaft sinking
- Changing geology
- Variable diameters
- 700 m of frozen ground
- Excavation of cut-outs
- Weight restrictions
- Muck removal from bench



TECHNICAL DATA OF THE SBR. SHAFT BORING ROADHEADER.

HERRENKNECHT
SHAFT BORING ROADHEADER SBR

Incorporating Rio Tinto
Mine of the Future™ Technology

- SBR is suspended by headframe (ropes)
- Geology: medium-hard rock (up to 120 MPa)
- Possible shaft diameters: 8 – 11,4 m
- Machine weight: 320 t
- Depth: up to 1000 m
- Conveying system in SBR: Pneumatic Mucking System
- Instantaneous cutting rate: 3–6 m/d
- Machine height: 45 m
- Shaft wall support: shotcrete and rock bolting unit



SHAFT BORING MACHINE SBM.

- Shaft depth: 2,000 m
(as per requirement)
- Diameter: 10 - 12m
- Total Weight: approx. 2,800t
- Geology: Hard rock
- Stabilization through Gripper system
- Stabilization shield in the lower part
- Cutterhead with disc cutters
- Worn disc cutters can be readily replaced
in a safe and secure working area
- Material is transported by a vertical belt
conveyor





THINK POSITIVE.

TOGETHER WE ARE BUILDING THE FUTURE.