

*Salzgitter/Haiger, in February 2023*

## **Hoisting machine and other equipment for the Konrad repository of the Federal Company for Final Waste Disposal in Salzgitter, Germany**

As part of a larger scope of supply, SIEMAG TECBERG has recently installed a 2-rope Koepe hoisting machine in the northern hoisting section of the Konrad 1 mine. Further equipment will be delivered over the next few years.

### **The customer**

The Federal Company for Final Waste Disposal (Bundesgesellschaft für Endlagerung - BGE) is commissioned by the German state with tasks in the field of final disposal of radioactive waste.

The federally owned company was founded for this purpose in July 2016. The new company was created through a merger of the repository divisions of the Federal Office for Radiation Protection (Bundesamts für Strahlenschutz - BfS) and the operating companies Asse-GmbH and German Company for the Construction and Operation of Waste Repositories (Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe - DBE).

Since April 2017, BGE has been the responsible operator of the German Konrad and Morsleben repository projects and the Asse mine. Other tasks include the search for a site for a final repository for highly radioactive waste in particular and the maintenance operation of the Gorleben mine. More than 2,000 BGE employees are currently working on repository tasks at seven sites.

### **THE HISTORICAL BACKGROUND OF THE PROJECT**

In 1990, contracts were awarded to various contractors for the planned modernisation of the Konrad 1 shaft hoisting plant. Due to the abandonment of mining activities at participating companies in the following years, all services of the contract were gradually transferred to SIEMAG (predecessor company of SIEMAG TECBERG).

After the planning approval decision, the Konrad 1 contract was divided into 2 sections; in 2008, the contract adjustment for the southern extraction took place, followed by the contract adjustment for the northern extraction in 2009. From 2009 to 02/2017, the southern extraction was rebuilt and put into operation.

In 2016, the Federal Company for Final Waste Disposal commissioned a study to SIEMAG TECBERG to examine options for converting the northern conveying system from a guide rail system to a rope-guided system. After a positive response to the study, SIEMAG TECBERG was commissioned in February 2017 to convert to a rope-guided system with a 2-rope Koepe winding machine. In 2017, work began on the northern conveying system with the laying down of the ropes.

#### **THE KONRAD REPOSITORY WITH KONRAD 1 SHAFT**

The *Konrad* shaft hoisting plant in Salzgitter, Lower Saxony, is the first repository for low- and intermediate-level radioactive waste in Germany to be licensed under nuclear law. The former iron ore mine is being converted for this purpose under the management of Federal Company for Final Waste Disposal. With the commissioning of the Konrad repository scheduled for 2027, the emplacement of up to 303,000 cubic metres of low- and intermediate-level radioactive waste is to begin in the first half of 2027. In the process, the stored containers are already fixed with suitable concrete and securely sealed during operation. After the end of the operation, all cavities of the mine are backfilled and sealed in a long-term safe manner.

#### **The shaft hoisting plants of Konrad 1 shaft**

Konrad 1 shaft has 2 shaft hoisting systems (south/north). The southern shaft hoisting system has already been newly built and the associated part of the shaft (shaft compartment) completely rehabilitated. The rehabilitation of the northern shaft compartment with the installations for fresh air supply in the mine was started in 2018. This is followed by the construction of the northern shaft hoisting system. While the listed head frame has already been refurbished, the elaborate replacement of the guiding head frame is still to come. The completion of the north hoisting machine building at the beginning of 2020 was an important milestone on the way to commissioning the Konrad repository. The building is needed to house the technology

of the northern hoisting system in shaft 1.

Until the new hoisting system on the north side of the shaft with its final depth of 1,232.5 m is ready for operation, the hoisting system on the south side of the shaft will safeguard man riding and material transport at the Konrad shaft. The people working underground, all the machinery and equipment and the material are currently transported by this hoisting system.

### **THE PROJECT: SIEMAG TECBERG WINDER FOR KONRAD 1 SHAFT**

In order to reduce the construction time for the new northern hoisting system, BGE has opted for a system design guided by 8 guide ropes for the new main man riding system of the northern conveying, which will consist of a 2-rope Koepe hoisting machine. The northern system is operated in single-compartment mode with counterweight. For this purpose, the northern half of the shaft must be rehabilitated, the guide frame in the surface area of the Konrad 1 shaft must be renewed and the steel guide ropes must be anchored at the bottom of the shaft.

A SELDA system (overwind and safety arrestor) is implemented as a safety device at the free height and at the free depth. As a conveyance, the BGE envisages a combination of a skip with a container for the transport of debris (dead rock) as well as two decks for man riding or transport.

The hoisting machine is floor-mounted in the newly constructed northern hoisting machine building. For the installation of the hoisting machine, 36 mounting holes were made in advance in the corresponding foundation in the hoisting machine housing north. They serve to anchor the Koepe winder. The installation of the hoisting machine took place under the management of SIEMAG TECBERG in March/April 2022. In later operation, the hoisting machine will realise a maximum payload of 15 t when conveying material. The skip consists of two decks, whereby the lower deck of the skip must be converted for material conveying.

With man riding only, a total of 32 people can be transported on the two decks per hoisting cycle. The maximum conveying speed for material conveying is 16 m/s, and 12 m/s for man riding. The traction sheave of the new hoisting machine has a diameter of 5 m and is connected to the machine shaft by means of HV screw connections. The machine shaft is supported on two plain bearings, one non-locating and one loca-

ting. The oil supply to the two bearings is placed in the basement of the hoisting machine building. In addition to the circulating oil lubrication, both bearings have a hydrostatic start-up aid, which serves to reduce the bearing wear. The two brake discs of the hoisting machine are bolted to the traction sheave on the front side.

The total of eight pairs of brake generators are mounted on four brake posts that enclose the brake discs from both sides. The braking force is generated by means of disc springs and transmitted to the brake discs. The brake shoes are released hydraulically.

The traction sheave lining is designed as a double groove lining. For machining the traction sheave lining, a turning device is provided underneath the traction sheave in the basement of the hoisting machine building.

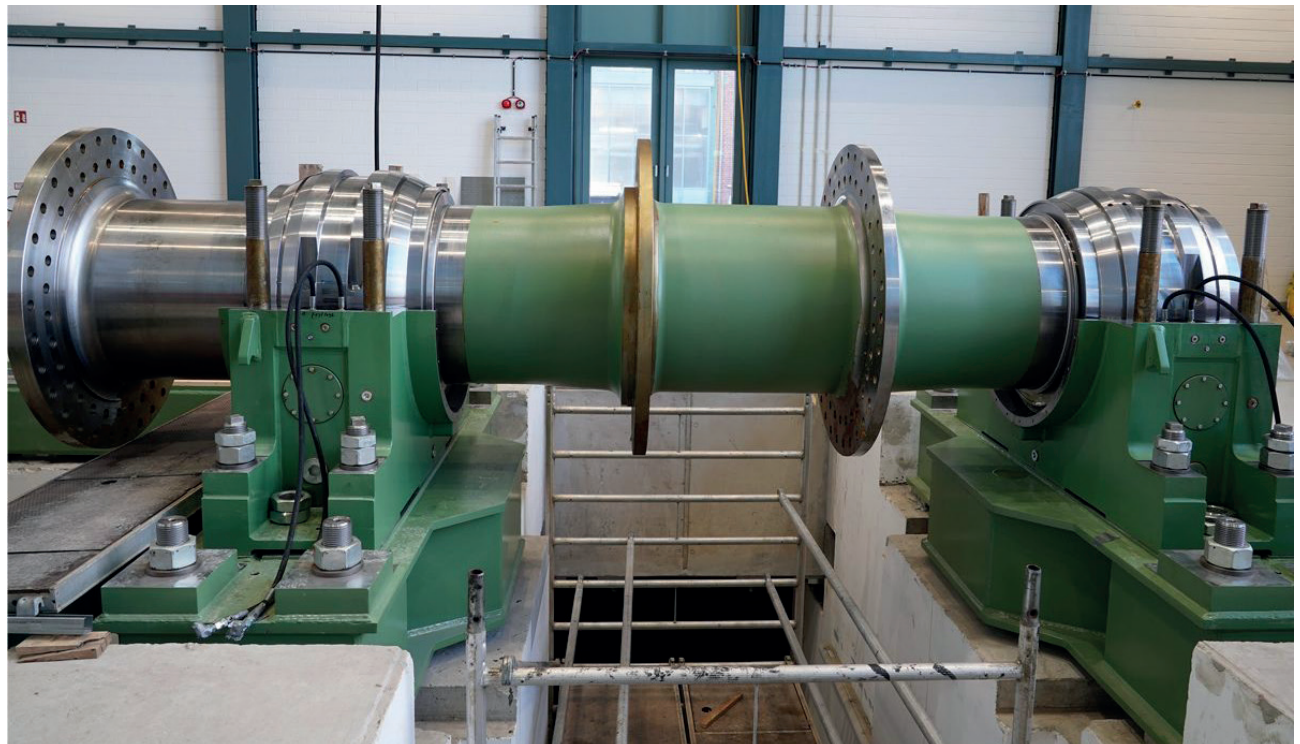


Fig. 1 Copyright 2022 BGE: Installation of the drive shaft of the new 2-rope Koepe hoisting machine in the hoisting machine building of Konrad North Shaft 1. Image used with the kind permission of The Federal Company for Final Waste Disposal.



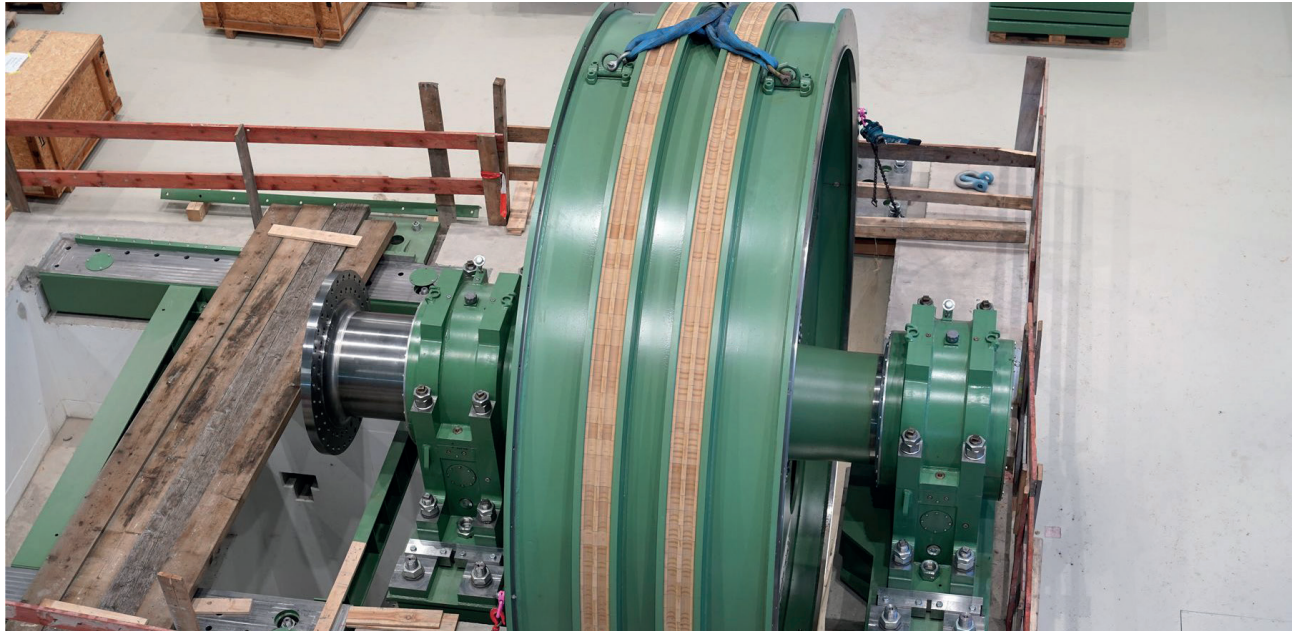


Fig 2 Copyright 2022 BGE: 2-rope Koepe hoisting machine with traction sheaves in the new hoisting machine building of Konrad North Shaft 1. Image used with the kind permission of The Federal Company for Final Waste Disposal.

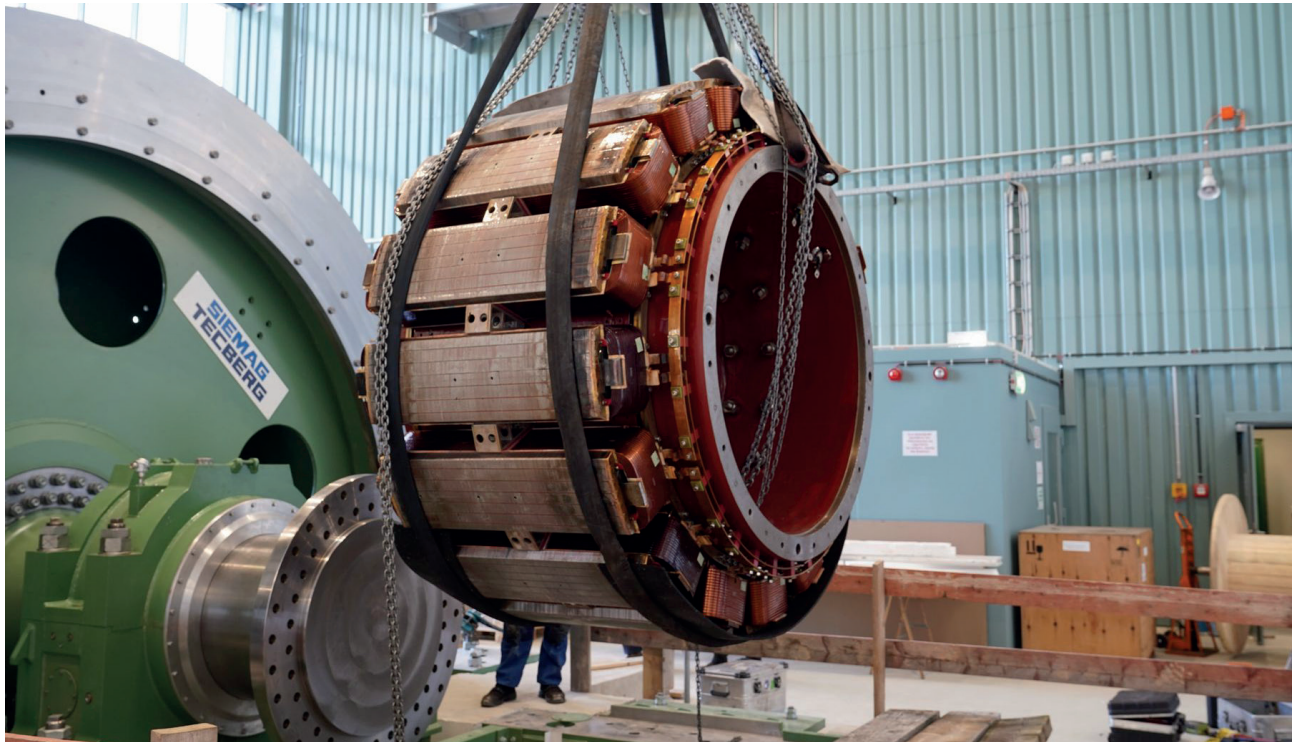


Fig. 3 Copyright 2022 BGE: Mounting the rotor on the shaft of the 2-rope Koepe hoisting machine in the new hoisting machine building of Konrad North Shaft 1. Image used with the kind permission of The Federal Company for Final Waste Disposal.

## Scope of supply

The current contract (commissioned February 2017) requires SIEMAG TECBERG to engineer, manufacture, deliver and supervise the installation and commissioning of the following items of equipment:

- Executed in 2022: Floor-mounted 2-rope Koepe hoisting machine incl. 2 hydraulic brake systems SB1 with electro-hydraulic brake control, bearing oil hydraulic unit for bearing lubrication with hydrostatic starting aid. A three-phase synchronous motor with 1,750 kW power as well as automation technology including the machine control complete the package of this hoisting system.

## Outlook for future scope of supply

- 2023: Underground loading facility for the removal of debris for Konrad 1.
- 2023/2024: Complete reconstruction of the guide frame of the Konrad 1 shaft (south/north). The original guide frame was constructed as a sinking frame and continued to be used as a guide frame after completion of the sinking work. For the subsequent operation of the Konrad 1 North and South man riding, the old guide frame must be completely dismantled and a new guide frame installed.

SIEMAG TECBERG, as a specialist in hoisting technology for repositories with their special safety requirements, is proving to be a competent, reliable and punctual partner also in this project for the Federal Company for Final Waste Disposal and is looking forward to the future implementation of the further scope of supply.

## SOURCES

- [www.bge.de](http://www.bge.de) (Thematic focus Konrad repository)
- Janecke, Florian; Meyer, Jan-Henrik; Roßmüller, Marc Bernd (2022): Endlager Konrad - Umbau- und Sanierungsarbeiten des nördlichen Trums der Schachanlage Konrad 1.  
In: GeoResources Zeitschrift, 3, 2022, S. 40-44 (some text taken from this with the kind permission of the authors.)





Fig. 4 Copyright 2022 BGE: Koepe winder North with drive. Image used with the kind permission of The Federal Company for Final Waste Disposal.



Fig. 5 Copyright 2022 BGE: Konrad 1 shaft from the air. On the left of the picture you can see the construction work on the building for the new workshop. Image used with the kind permission of The Federal Company for Final Waste Disposal.

## *The Company*

The SIEMAG TECBERG Group supports its customers in the commodity markets and transport infrastructure with energy-efficient and intelligent hoisting technology as a world's leading supplier in this field.

Whether in the extraction of precious metal and industrial metal ores to supply green technologies with the necessary natural resources, or in the extraction of mineral salts for the production of mineral fertilisers - SIEMAG TECBERG Group's system-integrative overall solutions always convince with excellent engineering know-how, extensive system tests of the equipment with factory commissioning on heavy-duty test fields and digital service concepts including condition monitoring and service management.

The technical focus of the SIEMAG TECBERG group is on the development, design, manufacture, commissioning and technical service of shaft hoisting systems for the vertical and inclined conveying of raw materials. In doing so, the SIEMAG TECBERG group has distinct engineering competences for mechanics, hydraulics, drive and automation technology. Unique reference projects worldwide demonstrate the overall plant competence and leading position of the SIEMAG TECBERG group. The group offers knowledge-based services for the supply of customized machinery and equipment for the following industrial applications:

### **Hoisting and conveying technology**

- OEM Shaft Hoisting Technology for Underground Mines and -Waste Deposits
- OEM Material Handling Technology
- Systems Integration Automation and Drive Technology

### **Cooling**

- Cooling and Ventilation Technology for Underground Mines, Waste Deposits and special Tunnels
- Systems Integration Controls and Automation

The niche specialist's technology emerged from a forge founded in 1871 in Siegerland, which produced equipment for local ore mining and the iron and steel industry in the German-South Westphalian Siegerland region. Following a management buy-out out of the SIEMAG-Weiss-SMS network 2007, SIEMAG TECBERG was founded by Jürgen Peschke, who is CEO and Controlling Shareholder of the SIEMAG TECBERG group.

The SIEMAG TECBERG Group is represented on all continents by at least one subsidiary and works together with cooperation partners worldwide. In addition to the headquarters with the assembly plant in Haiger (Germany) north of Frankfurt am Main, other locations are situated in Rugby (UK), Katowice (Poland) and Moscow, Norilsk, Berezniki and Belgorod (Russia).

Further sites with own assembly plants are located in Tianjin (China), Sydney and Mayfield East (Australia), Johannesburg (South Africa) and Milwaukee/Denver (USA). The group employs about 405 people worldwide.



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