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Start of installation of SIEMAG TECBERG hoisting technology in the Sishanling iron ore mine in Benxi, China.

In early 2017 **Tianjin SIEMAG TECBERG Machinery Co., Ltd.**, the subsidiary of SIEMAG TECBERG GmbH headquartered in Haiger, Germany, and **Benxi Longxin Mining Co., Ltd.**, a company forming part of the Jianlong Group China, signed a supply agreement for three sets of hoisting & conveying systems to be divided between two shafts in the Sishanling iron ore mine near the city of Benxi in the Province of Liaoning in China.



Fig. 1: Start of installation on site with the fitting of rope sheaves in the winding head of the Sishanling mine. Copyright 2022 Tianjin SIEMAG TECBERG.

The customer

The Sishanling iron ore mine operated by the Benxi Longxin Mining Co., Ltd. (Jianlong Group) is one of the largest iron ore mines currently being opened up in China. The Jianlong Group integrates new industries in the field of raw materials, steel, shipbuilding and electromechanics. In 2020 crude steel production in the group stood at about 37 million tonnes a year, so putting the company in eighth place amongst the world's steel-producing companies.

Ore deposits

The Sishanling iron ore mine has 2.5 billion tonnes of proven iron ore reserves with an average iron content of about 31 %. Because of the concentrated ore body and its even distribution these reserves are suitable for extraction on a large scale. They are the largest proven and registered iron ore deposits in China, having a long-term planned extraction capacity of 30 million tonnes a year. Initially 15 million tonnes will be achieved a year in the next five years. In 2016 the project was included in the Ministry of Science and Technology's „13th Five-Year Plan“ and declared a demonstration mine for research and application of theory and technology for the exploitation of underground resources.

Development of the project

After the customer and the design institute initially planned a total of three production shafts to be able to extract a total of 15 million tonnes a year at the first stage, after intense consultation with SIEMAG TECBERG the concept was optimised to two shafts each yielding 7.5 million tonnes a year. A service shaft equipped with a total of two service winders for the transport of personnel and machinery will also be sunk.

The overall concept thus initially provides for a total of three hoisting systems: a double-skip production system in the production shaft in the form of a 6.75 m 6-rope machine and a cage counterweight system for personnel and machine transport in the form of a 6 m 6-rope machine and a smaller cage counterweight system for emergencies in the form of a 4 m 4-rope machine in the service shaft. Early in 2017 orders for these systems were awarded in a public bidding procedure in which Tianjin SIEMAG TECBERG won out

against international and local competitors for the supply of all three hoisting systems, not least because of the company's capacity for system integration of very large, deep and complex shaft hoisting systems.

Scope of SIEMAG TECBERG's delivery

The current agreement requires SIEMAG TECBERG to undertake the engineering, production, delivery and supervision of the installation and initial start-up of the following equipment:

Shaft hoisting systems for raw material extraction (production shaft)

- **System 1.** Double-skip hoisting system. Tower-based 6-rope Koepe hoisting machine, dia. 6.75 m, for skip hoisting (55 t payload per hoisting skip) at a depth of 1,500 m with an overall drive output of 16 MW (2 x 8 MW), which is designed for a hoisting performance of 7.5 mill. tonnes p.a. Split plain bearings with bearing lubrication, 1 set 6-rope rope sheaves for rope deflection, an ST3-F (closed loop technology) hydraulic braking system with 12 pairs of BE 250 brake elements, 4 sets SM150 DC indirect converters (IGCT), automation equipment including machine control system, energy distribution system and a shaft signalling and loading and unloading control system complete this hoisting system package.

Shaft hoisting systems for personnel and equipment (service shaft)

- **System 2.** Large-cage hoisting system. Ground-based 6-rope Koepe hoisting machine, dia. 6 m, for large-cage hoisting with a drive output of 3 MW (2 x 8 MW). Rolling bearings, 2 sets 6-rope rope sheaves for rope deflection, an ST3-F (closed loop technology) hydraulic braking system with 14 pairs of BE125 brake elements, 2 sets SM150 indirect converters (IGBT), automation equipment including machine control system, energy distribution system and a shaft signalling and loading and unloading control system complete this hoisting system package.

- **System 3.** Cage hoisting system. Ground-based 4-rope Koepe hoisting machine, dia. 4.5 m, for cage hoisting with a drive output of 1 MW. 2 sets 4-rope rope sheaves for rope deflection, an ST3-F (closed loop technology) hydraulic braking system with 6 pairs of BE125 brake elements, 1 set SM150 indirect converters (IGBT) and automation equipment including machine control system complete this hoisting system package.

The special feature of the three hoisting systems is the central control system. The control room is located in the hall of the hoisting machine of the service shaft. In normal operation the hoisting systems in the production and service shaft are all in automatic lifting operation. Furthermore, the two systems in the service shaft are fitted with wireless communication devices that enable the hoisting equipment to be controlled from the cage direct. This enables personnel to reach different levels direct.

Early in 2022 SIEMAG TECBERG started on the installation of the equipment on site in Benxi.



Fig. 2: Reference photo SIEMAG TECBERG 6-rope Koepe hoisting machine installed on tower Copyright 2022 Tianjin SIEMAG TECBERG.

Planned expansion of production

The operator Benxi Longxin has meanwhile begun with preparations for production shaft no. 2 in order to achieve the expansion level of 2 x 7.5 million tonnes a year in the medium term. SIEMAG TECBERG is supporting the customer intensively with planning and because of the initial order has a very good chance of being successful with this bid too.

The Company

The SIEMAG TECBERG Group focuses its technical activities on the development, design, manufacture, commissioning and technical service of shaft hoisting systems for vertical and inclined hoisting of raw materials. The group of companies commands pronounced engineering expertise in mechanics, hydraulics, drive and automation technology. Worldwide unique reference projects attest to the SIEMAG TECBERG Group's overall system expertise and leading position.

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. Following a management buy-out in 2007, SIEMAG TECBERG was founded by Jürgen Peschke, who is CEO and Controlling Shareholder.

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 (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 400 people worldwide. The business volume amounts to approximately 120 million EUR p.a. (as of 12/2019).

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