Mining with a Shortcut

A gentle Alternative to Drilling and Blasting

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The deposit of Shenhua Beidian Energy is the first mine in China where surface miners are used for efficient coal mining that is gentle on the environment at the same time. The mining method has been specifically chosen because it entirely dispenses with drilling and blasting operations and the need to purchase crushing equipment.

Fig. 1: In soft materials, such as coal, surface miners with extended cutting drum width offer high production rates.

Pictures: Wirtgen GmbH

Some 70 per cent of China's entire energy production is covered by domestic coal mining, with environmental compatibility being an important aspect of the country's energy policy. The Chinese government is investing huge sums of money in renewable energy, and coal mining is to become more environmentally friendly as well. That is why Shenhua Beidian Energy relies on the use of surface miners.

The Coal Deposit

The entire coal deposit of Shenhua Beidian Shengli Energy, situated in the immediate vicinity of Xilinhot, encom passes an area of 340 km² and some 22.44 billion tonnes of coal. Mining takes place both above ground and underground. The site has been split into five separate mines. Shenhua Beidian Energy was incorporated in 2003. The new company's main activities focus on the development of Surface Mine No. 1.

This opencast mine, which covers an area of some 37 km² and resources of some 1.89 billion tonnes of coal, is the first of five opencast mining operations planned in the Shengli coal field. Some 20 million tonnes of coal per year will be mined in the Shenhua coal mine. The coal is supplied to a coal-fired power plant located in the immediate vicinity of the mine, which is one of the largest coal-fired plants in the world directly connected to a coal mine. The plant has a capacity of 8 x 660 MW.

The mine has meanwhile become a reference project in China for the environmentally friendly mining of coal using surface miners. "We have been very interested in the innovative surface mining technology right from the start. What convinced us in the end was a visit to coal mines in India that were operated solely by means of surface miners. We were very impressed by the efficiency of the machines," says Mr. Liu, President of Shenhua Beidian Shengli Energy Branch.

A Wirtgen surface miner of type 2200 SM equipped with a 3.80 metre wide cutting drum unit gives impressive proof in the Shenhua mine, too, of how high-qual-

ity material can be mined without the tremendous strain usually put on the environment by drilling and blasting operations.

Surface Mining Operation

Embedding the Shenhua mine into the Shengli large-scale opencast project places the innovative Wirtgen surface mining technology in a direct comparison with conventional mining methods.

Shenhua also used to employ conventional mining methods in the past: „We have employed two different mining methods: either dragline excavators which directly loaded the material onto trucks, or dragline excavators and mobile primary crushers. The first method involves very high current costs, however, while the second method requires a huge initial investment to be made. With the surface miners, we intend to strike a new and more efficient path in coal mining," explains Mr. Liu.

The 2200 SM has been in operation in two fields of the mine since the spring of 2009. In the first field, which encompasses roughly 50 per cent of the entire work space, the machine with a 3.8 metre wide cutting drum removes an up to 25-cm thick slice of coal seam. The cut material is deposited as a windrow behind the machine. While the surface miner changes to the second field for coal cutting, the material cut in the first field is loaded onto trucks by means of wheel loaders.

The wide cutting drum unit enables tremendous production rates to be achieved, as is shown by the Shenhua example: equipped with this drum, the machine cuts up to 5000 tonnes of coal in an 8-hour shift. A 1500 litre fuel tank enables operating times to be maximized while keeping breaks as brief as possible.

Fig. 2: Surface mining produces particle sizes smaller than 100 mm, trucks can thus accept more material per truck load.

A gentle Mining Method

Blasting is the standard method used to remove material in opencast mining and rock operations. It creates heavy vibrations, and the environment is polluted by noise and dust. In China, surface mining has been specifically chosen because the innovative mining method entirely dispenses with drilling and blasting operations.

Dispensing with blasting operations has a positive effect on economic efficiency: maintaining a safe distance to residential areas at the periphery of the coal deposit is not required, and maximum exploitation of the mine is guaranteed. In addition, the costs of material processing are reduced: Wirtgen surface miners produce particle sizes of less than 100 mm, which dispenses with the need to crush the material in an additional operational step. The use of surface miners reduces both the overall investment cost, as it dispenses with the need to purchase crushing equipment, and the current production costs.

These advantages have positive effects also on the coal mining operation in China: 97 per cent of the mined material has a particle size smaller than 100 mm. The small particle size enables the trucks to accept 10 per cent more coal per truck load. In actual figures, the use of conventional mining methods in the Shenhua mine required 526 000 truck transports per 10 million tonnes of coal. The use of surface miners, on the other hand, enabled the number of truck transports to be reduced to 500 000. Fewer trucks, less fuel and less maintenance are required for the same production volumes.

Selective Mining

Selective mining produces material of high quality, which is an important economical aspect that carries weight in particular in coal mining. Wirtgen surface miners enable the coal to be extracted in a precise operation, thus influencing the product quality at an early stage. The higher quality results in a higher calorific value: less coal is needed to generate the same amount of energy.

The coal mining project in China gives impressive proof that these surface miners are ideal candidates for the environmentally compatible, safe and economically efficient mining of useful minerals. ■

Surface Mining

Operating Principles & Advantages

- Surface miners cut, crush and load rock in a single operation – a single machine completes the job of various different pieces of equipment. Drilling and blasting is not required.
- Additional primary crushing is eliminated. The material can be either directly loaded onto trucks via a conveyor system or, alternatively, deposited as a windrow right behind the machine.
- The cutting depth of the surface miners can be adjusted to allow even thin seams of material to be mined selectively and with a high degree of purity.
- Surface mining does not create any vibrations.
- The excessive noise pollution levels caused by blasting are eliminated.
- Low levels of dust are generated during the mining operation. To reduce the formation of dust even further, the surface miner is equipped with large tanks from which water is directly sprayed onto the cutting tools and cutting drum.

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