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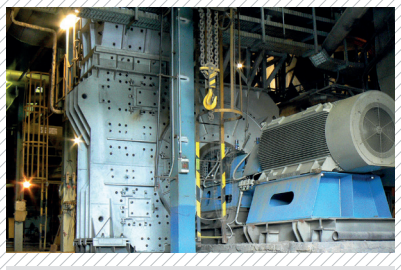

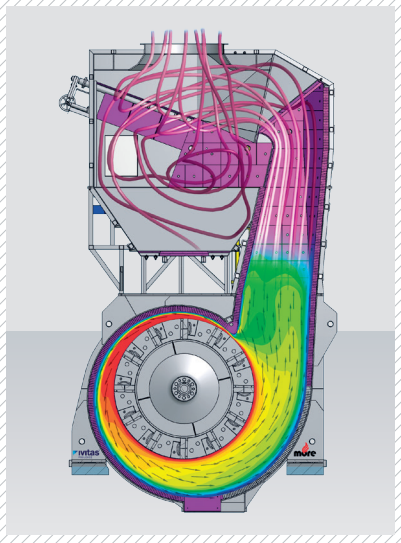

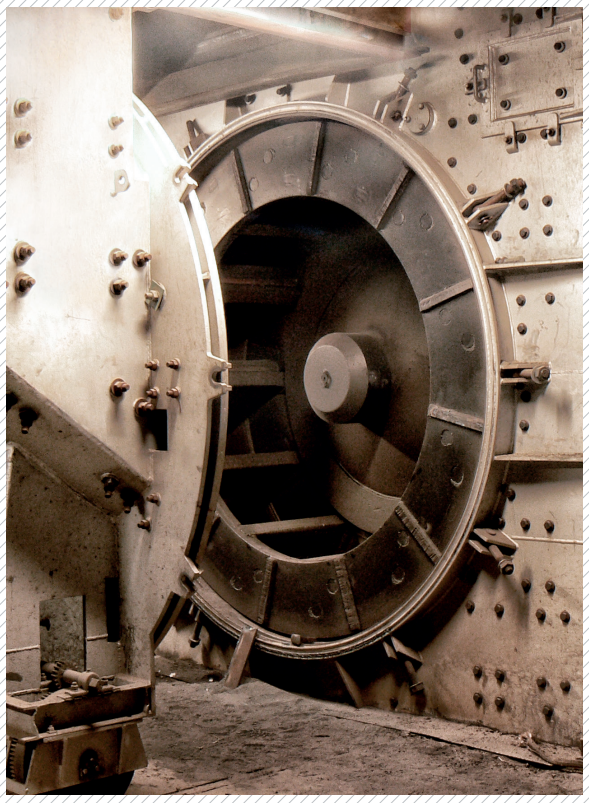

Case study
CEZ Melnik II Power Plant

» A new, better designed beater wheel mill for the energy giant CEZ

CEZ is the largest electricity producer in the Czech Republic and one of the 10 largest energy companies in Europe. In 2009, CEZ commissioned IVITAS to design, engineer and deliver a completely new beater wheel mill for their Melnik II Power Plant in the Czech Republic.

The project qualified for a grant from the Czech Ministry of Industry and Trade. The IVITAS led project was carried out together with its partners MORE (CFD modelling and functional design, operational analysis and optimisation) and UAM Brno/VITKOVICE UAM (FEM modelling). This winning team developed, designed and constructed a new and better designed beater wheel mill, which is currently successfully installed and in operation at the CEZ Melnik II Power Plant.

The beater wheel mill officially went online in November 2011.

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Project summary

Design, construct and deliver a beater wheel mill* which meets the following criteria

- Provide constant fine grinding of coal throughout the range of the mill's load
- Ability to accept a wider range of coal load at input
- Assure operational stability of the boiler
- Set up the basis for further reductions of NOx emissions by applying primary measures (i.e. directly addressing the cause of emissions rather than just reducing the generated pollutants by secondary measures)
- Increase boiler efficiency by lowering the level of unburned residue in the fly ash
- Ability to accept lower quality fuel while maintaining combustion efficiency without compromising the maximum boiler rate

*Mill for the pulverizing of brown coal with 26 % water content and an energy content of 12 MJ/kg

Goals of the project

1/ Nominal mill coal rate of 40 t/hour

ACHIEVED

- Up to 40 t/h with the added benefits of improved grinding quality and flow rate
- Maximum load of 47 t/h as reserve capacity, which helps to improve boiler operational stability and reliability, while avoiding reduced power output of the boiler if one or more mills go offline
- Allow for the use of coal with an energy content of 9 MJ/kg – 10 MJ/kg while maintaining the rated output of the boiler

2/ Increase grinding efficiency and fineness

ACHIEVED

- 0.09mm oversize coal particles <40 % (grinding at 40 t/h) for faster ignition, use with modern low NOx burners and compatibility with the best available methods of NOx reduction by primary measures
- **Patented** functional design of the classifier
- Reduction of unburned residue in the fly ash which contributes to higher boiler efficiency

3/ Wider mill load range

ACHIEVED

- 45 % – 117.5 % of nominal rate (40 t/h) for flexibility in meeting output needs of the boiler
- Siemens frequency convertor for reliability, trouble-free operation, ability to compensate for wear on the beater wheel mill and outflow temperature changes

4/ Maintain comparable consumption to similar beater wheel mills

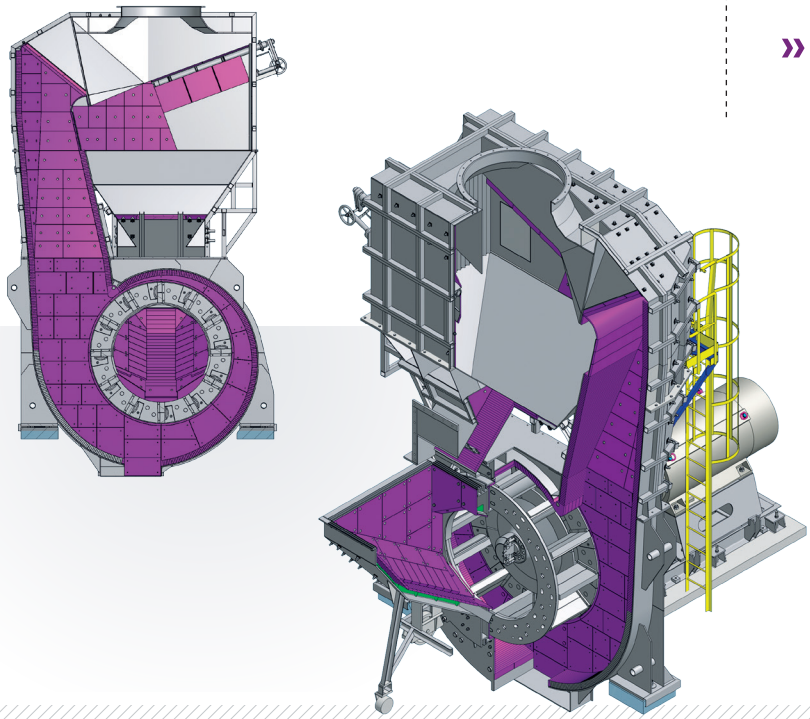
ACHIEVED

› Consumption was maintained, even after increasing milling fineness

5/ Extend the life-cycle of the beaters to more than 2,000 hours

ACHIEVED

› New **patented design** of the beaters allows for **more than 5,000 hours** of operation which reduces replacement costs and allows for longer service intervals



Additional benefits

of the IVITAS designed beater wheel mill

» **Newly developed classifier construction**

Symmetrical classifier with more predictable performance

Ability to accept a wider range of coal quality

» **Modern Drive with frequency convertor**

» **More efficient regulation of the mill's load range**

Increased operational reliability of the mill

» **User-friendly and ease of operation**

» **Problem-free operation**

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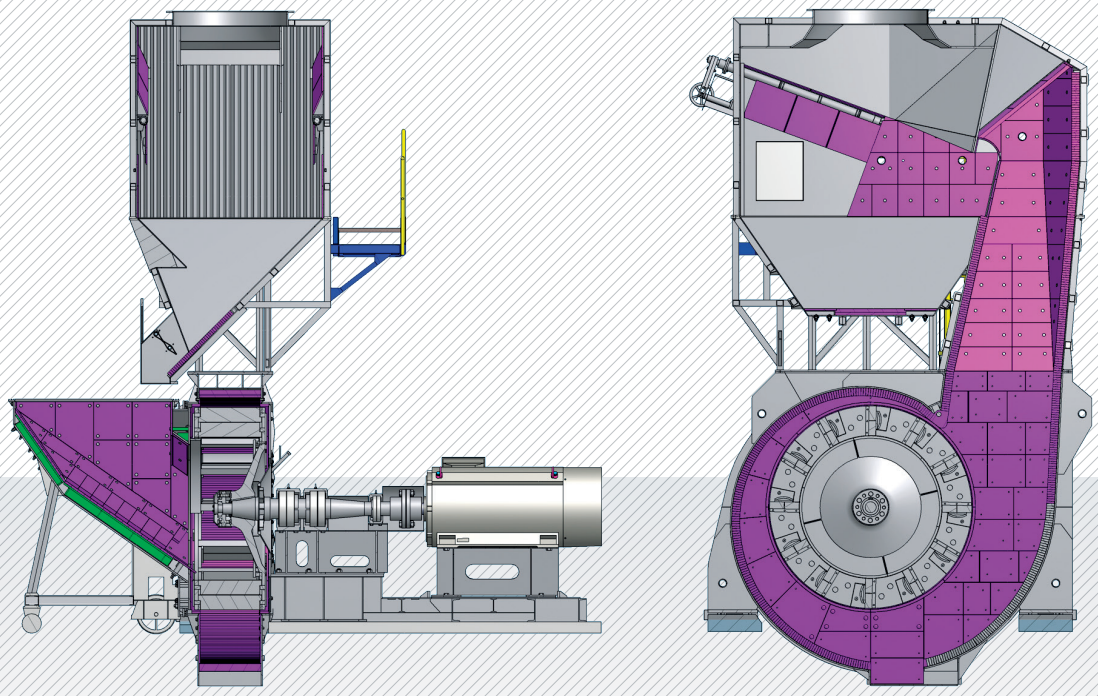

Grinding circuit parameters

5 mm beater	Original Mill	**IVITAS-designed Mill**
Effective width of beater (mm)	680	**740**
Rated mill speed (rpm)	600	**666**
Speed control	NO	**YES / 551 – 666 rpm**
Mill load range	21 – 35 t/h	**18 – 40 t/h**
.09mm oversize coal particles	+/– 50 %	**+/– 40 %**
Output reserve	NO	**17 % increase / up to 47 t/h**
Acceptance of coal with lower energy content	11 MJ/kg	**9 – 10 MJ/kg**

ACHIEVED INCREASE IN OPERATIONAL LIFE AND OVERALL COST SAVINGS

200 % – 250 % increase
in the operational life of the inner and outer beaters

23 % – 48.5 % reduction
in overall operational and maintenance costs (over a 2 year period)

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