Application :
Product:
Customer:
Task:
Requirements:

Travelling gear control DCS 600 Laubag

Revamping a multi-motor travelling gear

- Installing of DC converters in combined space Smooth communication between AC and DC converters
- Best price/value ratio for the revamp



260 DC motors move to a mouse-click



F60 overall view

The customer Lausitzer Braunkohle AG (LAUBAG)

Lausitzer Braunkohle AG (LAUBAG) Lausitzer Braunkohle AG (LAUBAG) is one of ABB Cottbus biggest customers. LAUBAG (5900 employees, with a turnover of 702 million Euro in 99/00) based in Lausitz is one of Europe's largest brown coal producers with an annual production of 50 million tonnes of brown

producers with an annual production of 50 million tonnes of brown coal in five open-cast mining sites. Approximately 315 million tonnes of overburden and 350 million m³ of water have to be handled annually.

The application

Every year, brown coal open-cast mining moves millions of tonnes of overburden and brown coal. High-performance conveyor and transportation systems are required in order to master these huge heaps of material.

The overburden conveyor gantry is a high-performance open-cast mining machine that removes the overburden in order to be able to work the brown coal layer below.





The F60 open-cast complex, which incorporates three Es3150 chain-and-bucket excavators, can now work 60 meter thick ground layers, convey them and dump them to the other side in one step. With a total length of more than 600 m and a height of 100 m, the F60 is considered the world's largest moving technical installation. The 25,000 tonnes heavy steel giant (the weight of four Eiffel towers) with hundreds of AC and DC drives and motors (ranging from 10 kW – 2 MW) can work up to 600,000 m3 overburden daily – the equivalent of 6,000 freight car loads.

The task

Revamping the F60 overburden conveyor gantry for brown coal mining

Revamping the F60 conveyor gantry covers the installation of the modern digital AD-VANT process control system for the entire open-cast mining site and the replacement of the analog converter technology with a 65 digital converters that supply a total of 260 DC motors.



Travelling gear, dump side

Some key data

Dump level:

32 converters DCS 602 with 140 A control 128 travelling gear motors.

Mass distribution (3 dumping sites + pre-dumping site):

Three saddle bottomed cars plus the slewing gear of the lateral discharge conveyor are supplied by the ACS 600MD.

Main working level:

20 DCS 602 control 80 travelling gear motors. 3 DCS 602 together with 12 motors form the travelling gear transformer car.

Feeder, upper working level / main working level:

10 DCS 602 for 40 travelling gear motors. **3 excavators:**

ACS 600 Multidrive for

- travelling gear with 8 inverters / 56 motors (4x 8 / 4x6)
- slewing gear with 4 inverters / 4 motors
- belt drive 1 and 2 each containing 2 inverters / 2 motors each
- 5 winch drives for bucket chain with 7 inverters / 7 motors

Rough conditions for DC motors with degree of protection IP 44

The DC motors have to work under the toughest conditions. Fine brown coal dust penetrates all gaps and forms a tough crust on the motor, due to rain, cold and heat.



DC motor IP 44

The more than 260 DC-motors of the travelling gear have to stand extremely hard environmental conditions. The power of one single motor is 10 kW. It's degree of protection is IP 44.

Only little space available for the enclosed converters

The installation of the converters in the electrical rooms mounted on the conveyor gantry was extremely challenging. The solution was to install up to three DCS 602-0140 in one MNS cubicle (HxWxD=2000x600x600 mm). Divided cubicle rows (AC busbar connection via cables) and corner installations were also implemented.





Overview drive control

conveyor systems

Reducing the maintenance costs to a minimum

Central recording and logging of process control and all malfunctions by means of AD-VANT and DRIVE WINDOWS allows to optimize the daily ground moving processes.Bottle necks in the systems are detected before serious damage can occur. All DC and AC drives can be monitored with the PC using DRIVE WINDOWS software.

Saving energy and reducing wear and tear through common control of DC and AC drives

The use of controlled DC and AC drives reduces energy consumption and maintenance costs considerably.

The current input always corresponds to the required power output of the drives. The control of the used drives responds to track position, wheel abrasion and curve runs and thus reduces stress on the mechanical components (e.g. the gear box) to a minimum.

Three DCS 600 in each cabinet

Process control via a mouse-click

The entire process control can be centrally operated from a control room in the so-called transformer car. All necessary control and diagnosis data is displayed in graphic and alphanumeric form. More than 3,000 fibre optic cables transmit more than 12,000 signals to the host computer for diagnosis only. Usually, the four travelling gears of the F60 are operated independently. If necessary, all travelling gears - they include 65 AC drives can be controlled in parallel with only one mouse-click.



Control room

WHY did the customer select ABB?

ABB Automation Systems in Cottbus is specialized in meeting the demands of the open-cast mining industry and has developed the electrical systems of more than 1,000 open-cast conveyor machines and belt conveyor systems in the past 50 years. After the take-over by ABB in the early nineties, the special focus has been low-cost revamping of existing plants.

ABB DC drives are an important segment of the revamping services offered by ABB Cottbus. According to each customer request, ABB Cottbus delivers everything ranging from power supply and distribution, complete drive engineering, product management and installation of DC and AC technology, control and diagnosis instruments, sensor, control and communication equipment all the way to supplementary systems for lighting, air conditioning, cabling and emergency power supply.

WHY DC?

Cost savings

Cost savings are the number one reason for the use of digital DC technology. The 260 DC motors with degree of protection IP 44 in the travelling gears were fully operational, therefore they did not have to be replaced.

Total communication between AC and DC drives

Since the ABB DC equipment can communicate with the remaining AC drives of the system, this issue will not cause any problems.

In comparison to AC equipment, DC converters have smaller mounting space requirements

The installation of the converters in the technical rooms mounted on the conveyor gantry was extremely challenging. The solution was to install up to three DCS 602-0140 in each one MNS cubicle (HxWxD=2000x600x600 mm). Divided cubicle rows (AC busbar connection via cables) and corner installations were also implemented.

WHY DCS 600?

Due to its special software the DCS 600 Series is the only one that allows full communication between drives and the overriding control system.



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