

Measuring pulverized coal in bunkers

power



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Challenge

Continuous level measurement is a critical process in coal-fired power plants. It is essential to measure the level of coal in bunkers that feed the turbines which, in turn, generate electricity. Unreliable levels of coal in the bunkers can potentially interrupt electricity generation and cause disruption in service.

At a large coal-fired power plant in the United States, the raw coal is delivered via barges along a major river coming from the Gulf of Mexico. After some chemical treatment with sodium powder to reduce the emissions levels into the air, the coal is conveyed to bunkers and dispensed via a moving tripper car on a rail system. At that point, the coal is pulverized into a very fine powder to fuel the plant. The burner system creates heat through combustion. This heat turns water into steam through a pressurized water system that drives large turbines, which are connected to the electric generating system to form an electrical charge. The electrical charge moves across the transmission lines to provide electricity to homes and businesses. The cooling system condenses the steam back into water for regeneration into the plant.

Maintaining a constant supply of coal in the bunkers has proven to be a challenge. In the past, high level mechanical type switches were used for alarm control near the top of the bunkers. Many plants still have operators that make use of a rope and weight to measure the level in the fifty or sixty foot tall bunkers. Many times, the bunkers would run empty of coal, which would cause a disruption/delay in fueling of the burner and leading to electricity delays.

The bunkers are filled by a tripper car system. The system consists of a large conveyor belt with two chutes

for unloading near the top of the bunkers on a rail track. The tripper cars move along a railcar track dispensing the coal into each bunker. When the high level switch is touched, the material stops unloading and the tripper car moves to the next bunker for unloading. Coal passes through grates filtering out any last coal chunks. When the bunker fills, the rail car automatically moves to the next bunker and begins the process again.

Solution

Siemens installed SITRANS LR460's radar level transmitters on the coal bunkers to provide continuous level monitoring. The SITRANS LR460 provides the customer a continuous level measurement throughout the entire range of the bunkers which controls the movement of the tripper car from one bunker to the next.

The 24 GHz, FMCW SITRANS LR460 features a robust design and measures very difficult solids materials within bunkers and silos up to a range up to 100 m (328 ft). The SITRANS LR460 produces a 4-20mA signal and has the highest signal-to-noise ratio on the market today. This signal is able to penetrate the very dusty atmosphere and provides reliable echo profiles of the coal surface. SITRANS LR460 has Process Intelligence echo processing, providing extremely reliable measurement of the true material level even in these adverse conditions. Once wired-up with power and signal output, the transmitter is configured with the Quick Start menu via an infrared handheld programmer or with Simatic PDM software on a laptop. SITRANS LR460 small stainless steel horn antenna requires a mounted opening of only 10 cm (4"). The built-in Easy Aimer angles the unit properly as required on materials with a steep slope.

Benefits

Continuous level measurement of the coal levels in the bunkers has automated the tripper car system. Processing of the coal is more accurate, more efficient and the entire storage capacity of the bunkers is used. Maintenance and operations staff are able to track the true level of the coal even through the thick dust. Operators are confident that there is always sufficient quantities of coal in the bunkers to fuel the burners. As the bunkers approach empty, operators are alarmed to refill. Reliable measurement of these bunkers provides valuable time for operating personnel to engage in other tasks. Plans are to install SITRANS LR460 transmitters as standard equipment in all the other plant locations to measure the level of coal in the bunkers.



A coal-fuelled power plant in the United States automates the filling process of their coal bunkers by using a tripper car system and SITRANS LR460 to measure the level of coal in each bunker.