Heavy Plant Machinery

Case Study

Biomass Rail Load Out Terminal
Continuous Condition Based Monitoring

Drive Management Services

Engineering Reliability Specialists

Biomass power station protected by condition monitoring.

Biomass power stations currently generate more than 11,000 MW, the second largest amount of renewable energy in the UK. The term biomass covers a wide range of fuels, derived from timber and agriculture. Some sources are grown specifically for electricity generation. Others are waste, such as sugar cane once it has been crushed to extract sugar.

Biomass technologies use combustion to produce electricity, and biomass power stations have much in common with coal- and oil-fired stations, in that they can quickly generate power in order to meet fluctuations in demand. In many instances, coal- and oil-fired stations are being converted to process and burn biomass fuels. In other cases, new stations are being built.

A new biomass power station is currently under construction in the north of England. It will operate 24/7 and fuel will be transported to the station's burners via hoppers, conveyors and feeders. Keen to protect the plant and machinery involved in loading the burners, the operator has turned to Drive Management Services (DMS) - collaborating under the Diagnostic System Integrator (DSI) partnership as announced in 2012 - to develop a conditioning monitoring system to feed into the site's Supervisory Control and Data Acquisition (SCADA) system, located in the main control room.

In designing the condition monitoring system, DSI determined that multiple assets should be monitored for rises in vibration levels and temperature. An important consideration was the environment, as Biomass fuels represent a fire and explosion hazard, and every aspect of the monitoring system had to be intrinsically safe. Therefore, Zener barriers were installed inside the panel to ensure the system was completely intrinsically safe.

DMS Solution

Issue:	Unplanned downtime can run into £Millions each year.
Challenge:	To design and install a LIVE continuous condition based monitoring system to predict potential problems.
Solution:	DMS continuous monitoring system, that could communicate via ethernet & be compatible with the existing SCADA system.

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The sensor type selected for monitoring vibration and temperature levels was the MTN/2285IT. Certified to ATEX and IECEx Group II it is an intrinsically safe dual output sensor with a 4-20mA DC current output proportional to velocity (mm/s) and / or acceleration ("g") and a DC voltage proportional to temperature.

The sensors are permanently mounted on motor, gearboxes, fan assemblies and bearing housings, and DSI used its collective expertise to determine what the sensitivity of each sensor should be based on the parameter of importance. For example, fan and gearbox faults are best detected by measuring velocity (in mm/s). Bearing wear is best detected by measuring acceleration; in which case the RMS velocity measured by the sensor is not as important as how quickly velocity changes (in mm/s/s).

The sensors feed into a wall-mounted microprocessor-based monitoring unit with an HMI screen. Due to the size of the installation there are some long cable runs, which partly drove the selection of devices with 4-20mA outputs; as they are not so prone to signal losses over distance.

The monitoring unit then connects to the station's SCADA via Modbus TCP Ethernet. The Alarm levels are set in the SCADA and can be viewed on the monitoring unit's HMI. A 'look-back' history can also be viewed on the SCADA and the monitoring unit.

Following the installation of the complete monitoring system including all sensors, a commissioning phase began which included determining the normal vibration levels and temperatures for all assets, so as to set realistic alarm levels. Too high and developing faults can go undetected for too long. Too tight and false alarms would prove too distracting.

The monitoring system is doing its job, and has already provided early warning on assets in need of lubrication.

In addition, the system has considerable scope of expansion. Additional sensors can easily be added.

DMS were also engaged to provide a consultancy service to accompany the monitors. This service included the regular monitoring of devices on site, a monthly performance report identifying changes in the performance, a full condition based monitoring service with root cause analysis reports.