



DRAX POWER LIMITED – Drax Power Station Mitigant Plant Operations & Maintenance

Overview

In order to secure long term generation opportunities for Drax Power Station, DPL made the decision to convert a number of the units to burn wood pellet, with the first of these coming online in 2013. Now with 4 operational biomass units generating electricity for the grid, Drax Power Station is the largest renewable fuels power plant in Europe.

Despite significant advances in renewable generation, the boilers encountered numerous issues with early outages identifying a residue being left on the internal surfaces and this was attributed to the plant failures. In 2016, research followed by a lengthy trial period confirmed that by injecting coal PFA slurry into the system alongside the biomass, this slurry provided significant protection for the major boiler components by effectively "shot blasting" the internal surfaces and helping to keep them clean. This slurry mix became known as 'mitigant'. The coal PFA slurry was created by excavating previously land-filled pulverised fuel ash and conditioning it with water.

The challenge for Drax was determining the method by which the slurry could be transported from the ash lagoon area and fired into the boilers. DPL released a tender specification for design and installation of a bespoke new system, but a temporary interim solution was needed and that was where Hargreaves were able to assist.



Aims and Objectives

The challenge was to reclaim and excavate over 100KT of pulverised fuel ash (PFA) from the ash lagoons and process the product into a slurry, which could then be pumped into the generation system via the existing coal mills. A continuous supply of between 4 and 10 tonnes per hour was required (subject to unit requirements) during all times the boiler is in operation.

What We Did

Working with the DPL materials handling team and boiler engineers, Hargreaves came up with a system to transport the excavated PFA to a designated area and despatch into tanks which mixed the PFA with water. The slurred product is then pumped into traditional cement mixer units (operated by Hargreaves) and transported to the receiving tanks at the unit area for firing into the boilers as required by DPL.

Hargreaves also carry out all maintenance, spares and components for the mitigant plant and equipment. There have been several challenges with pipes blocking up and material solidifying in the process and Hargreaves have proposed a number of solutions to combat these issues, including; a flushing system introduced from the top of the mill to the dose pumps (fig.1), later extended to include the transfer pipe. This back-flushing system has meant less defects raised, and less isolations requested. We also introduced screening mesh at receiving tanks to trap oversize and prevent contaminants entering the process. (fig.2).



Figure.1 – original back-flushing system implemented by Hargreaves



Figure.2 – mesh baskets fitted to receiving tanks

Outcome

Jointly we successfully established a low-cost materials handling solution to a potentially costly problem. Our process is still operating today following its original concept in 2016 and may well negate the need for a fixed plant solution entirely.

So far, we have achieved a significant reduction in failures of critical components within the biomass boilers, saving an estimated £85K per day when the boiler is non-operational and achieved continual supply of mitigant slurry to all biomass units when in operation.



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