

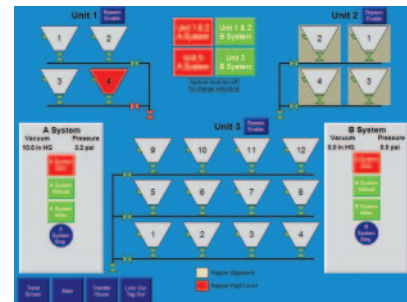


Case History Success Story

Fly Ash System Overhaul Increases Efficiency, Yields More Flexible Control System

Neundorfer, Inc. was contracted to upgrade and improve the fly ash evacuation system at a large power generation plant. The customer's system evacuates fly ash from a total of 20 hoppers on three separate precipitators (i.e., Units 1, 2 and 3).

This particular fly ash evacuation system is fairly unique in that it uses both vacuum and pressure to pneumatically convey the ash from the hoppers to a storage silo. The fly ash is pulled from the hoppers under vacuum to a collector in the transfer house. Once in the transfer house, the ash is emptied from the collector through airlock feeders into another transport line and conveyed under pressure to the silo. The transfer house contains two separate systems, designated A and B. The A System consists of a vacuum pump, a collector with a bag filter, two airlock feeders and a blower. The B System consists of a vacuum pump, a primary collector with two airlock feeders, a secondary collector with a bag filter and one airlock feeder, and a blower. A spare blower and vacuum pump are available for use on either system. Under standard operation, the A system handles Units 1 and 2 while the B system manages Unit 3. However, either system can individually handle ash from all three units.



The Issue

The customer had reliability concerns with their current technology. The user interface for the control of the ash system was a large panel with control switches and indicator lights. They were relying on discrete relays and cam timers, most of which were obsolete, to operate the existing transfer house system. The configuration required a maze of wires, modified and/or abandoned over the years, with no current documentation, which meant that if something went wrong, troubleshooting and recovery was complex and difficult. And the system provided very little flexibility to make any needed adjustments.

The hopper evacuation for all three precipitators runs on a PLC, with wired connections back to the transfer house controls; the customer sought to consolidate to one PLC from a central point, with an HMI. In addition, it was important to avoid outages on any of the three Units, meaning that either the A or B system had to remain fully functional throughout any system upgrade.

The Solution

First, Neundorfer worked with the customer to understand the existing configuration and its function. Then Neundorfer was able to build a separate control panel with an Allen Bradley SLC 500 PLC to control the operation of the whole system. The system changeover was accomplished without outages, by alternating shutting down, wiring and testing first system A, and then system B.

A remote I/O communication interface was set up between the old PLC-5 I/O and the new PLC so the field wiring for the hopper evacuation control would not have to be modified at all, thereby reducing costs. In addition, the user interface was upgraded to an Allen Bradley Panelview Plus 1500 with a touch screen to provide enhanced graphical and supervisory support for the new system. A guided radar level sensor was added to each of the feeders under the primary and secondary collector to read the level of ash in each feeder. Also, a pressure transducer was added to the airlock feeders to monitor the internal pressure. Along with the hardware upgrades, Neundorfer was able to configure their SmartAsh software and install it on a PC in the control room to provide an additional HMI along with intelligent alarming and ash collection data, all customized to the customer's operation and functional requirements.

The function of the ash system is continuously monitored by the Neundorfer SmartAsh software, recording each gate actuation for hoppers and feeders, level and pressure readings from feeders, and all of the line vacuum and pressure signals. The data recorded is used by the operator to determine the most effective settings for the hopper and feeder timings. By monitoring the vacuum signal along with hopper gate actuations, the SmartAsh software determines how much ash is pulled from each hopper. The software is set up to alarm if no ash has come out of a hopper over a certain time period. This is the first warning that a hopper may not be functioning properly.

The Results

With the hardware and SmartAsh software changes to the fly ash evacuation system, the customer has access to process information previously not available. As a result, the customer has a lot more information about the system and its operation, allowing them to solve problems more quickly and operate more efficiently.

The Panelview Plus 1500 graphical interface provides indication of what position every gate should have in the system, giving operators a quick visual indication. All aspects are user-configurable through password-protected setup screens. Plus, robust statistical tools are now readily available for analyzing the system and its performance. By removing the physical obstacles of the previous configuration, system modifications and improvements are now possible with simple logic changes. As a result, the customer has a more flexible control system with a greater level of diagnostic and troubleshooting capabilities.

Additional Benefits

- High-vacuum latch repeat for each hopper - increases the amount of ash removed from each hopper.
- Level sensor in the airlock feeder - senses how full the feeder is, instead of using time-based cycles, accelerating the dumping process.
- Electronic tag-out procedure - provides safer control when isolating/disabling or re-enabling equipment.
- System operation can be remotely monitored (off-site) through the Smart Ash system.



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