NEUNDORFER
PARTICULATE KNOWLEDGE

Case History Success Story

Upgraded Granular Sulfur Feeder More Effective Than Molten Sulfur

Duke Energy Corporation's Allen Steam Station, a 1,140-megawatt coal-fired power plant with five generating units located on Lake Wylie in Belmont, North Carolina, worked with Neundorfer to upgrade its granular sulfur feed system installation on Units 3, 4 and 5. The SO_3 feed system is critical to electrostatic precipitator performance and the emissions levels for the plant, but the existing sulfur feed system was experiencing some significant operating inefficiencies.

For starters, the existing auger system was extremely unreliable. Rather than feeding the granular sulfur as intended, the auger crushed it into powder. Since sulfur powder tends to pack tightly into corners, it eventually blocked the flow completely. Removing this tightly packed sulfur is almost as difficult as removing molten sulfur that has solidified.

"This situation created two problems for us," said plant manager and engineer Jerry Ruc. "Though we had feed rate indications on the system, what actually went into the system was anybody's guess. The controls were all but useless. We found ourselves looking at furnace temperatures basically to make sure there wasn't a fire." The Allen Station team clearly needed more control over the sulfur feeding systems.

From a maintenance perspective, the Allen Station was averaging five emergency-type work orders every week among the three units, or about 75% of work orders on the sulfur feed systems. Because emergency-type work orders had to be completed within 24 to 48 hours to avoid potential opacity limit violations, the interruptions for plant operations were considerable. Other jobs had to be rescheduled, operations schedules were shifted to accommodate the necessary lockout for maintenance and the workforce was remobilized each time. "Each time we had an emergency with the sulfur feeders, it distracted the operator and their supervisors, engineers and managers from focusing on running the plant," said Ruc.

The Allen Station plant considered changing from its granular sulfur feed systems to molten sulfur systems, but Ruc's extensive prior experience with molten sulfur burning systems indicated that updating the granular system was the way to go. "For this type of application where low

flows are desired," said Ruc, "molten sulfur is not the best solution. A liquid molten system can be made to function, but it requires several unforgiving processes that the granular approach just avoids." Ruc also cites other common problems that can occur with molten sulfur systems, including steam heating problems, sulfur leaks and higher general maintenance and operator time requirements.

Having decided to upgrade its granular sulfur feed systems rather than migrating to molten sulfur, the Allen Station worked with Neundorfer to install the new sulfur feeder system on Unit 3 in December 2006, on Unit 5 in May 2007 and Unit 4 in June 2007.

Since the installation, there have been no emergency maintenance work orders generated. "We've had $0 spent on maintenance and no downtime attributed to the sulfur feed system since the improvements were made on each unit," according to Ruc. The only cleaning required so far is the window on the feeder front to monitor the sulfur feeding, which occurs about every three months and takes less than five minutes.

From an emissions standpoint, the Allen Station has also achieved significant improvements. Ruc tracked daily average opacity for all three units from 2003 through 2007 (when the granular sulfur feeder upgrades were in place). Compared to the four-year average (from 2003 through 2006) for Unit 3 which had the poorest performing sulfur system, opacity levels improved by 40% with the upgrade. Once the upgraded sulfur systems for all three units were operational, the average overall opacity level improved by 28% as compared to the four-year average. "Simply said, the average opacity levels for individual sulfur feed systems will vary, but the more time we give it, the better our performance gets," said Ruc. "Now the system just feeds granular sulfur flawlessly—as it was meant to be."

NEUNDORFER
PARTICULATE KNOWLEDGE

4590 Hamann Parkway
Willoughby, OH 44094
(440) 942-8990
Fax: (440) 942-6824

www.neundorfer.com