

Shawnee Fossil Plant â?? New Hopper Design for Conveyor BC-9

Description

Industry: Energy & Power | **Service:** Structural & Mechanical Engineering, Conveyor Engineering & Analysis

Location: Shawnee Fossil Plant, Paducah, KY

The Challenge

Shawnee Fossil Plant needed to replace the reciprocating feeders feeding Conveyor BC-9 with new vibratory feeders, and replace the existing rack-and-pinion gate with a heavier-duty unit. What began as a local reinforcement and modification project evolved into a full hopper replacement when it became clear that the extent of modifications required â?? combined with the poor condition of the existing hoppers â?? made redesign more practical than repair.

The engineering challenges were significant:

- Tight space requirements dictated a substantial reduction in hopper height relative to the existing design
- The reduced height decreased hopper wall slope angles, requiring careful assessment of flow adequacy with the new vibratory feeders
- Complex geometry was created by the locations of the new feeder suspension supports
- A 40-foot coal stockpile above the hoppers imposed very heavy wall pressures and feeder head loads

The Solution

DSE designed two new hoppers sized to the available space, using Hollow Structural Sections (HSS) connected with shear plates and stiffeners to resist the moment and torsion created by the feeder suspension loads â?? a geometry that would have been difficult to resolve with conventional wide-flange framing.

Applying experimental pressure distribution data for stockpile loads (which can reach nearly 60% of hydrostatic pressure), DSE calculated the wall pressures from the 40-foot stockpile and specified closely spaced reinforcing ribs at the hopper walls to resist them.

To protect the new vibratory feeders from the high head load of the stockpile above, DSE designed triangular-shaped deflectors to reduce the pressure on the feeders. The deflectors incorporated adjustable liner plates to optimize material flow onto the feeders after installation.

Result

Both new hoppers were successfully designed and installed. The new vibratory feeders and heavy-duty gate were accommodated within the tight space envelope, and the deflector system ensures appropriate load management onto the feeders under the 40-foot stockpile condition.

Contact DSE to discuss hopper design and conveyor structural engineering for your power plant.

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