



Split Bottom U-Troughs for Great River Energy in Underwood, ND

General Description of the Application

Great River Energy (GRE) is a not-for-profit cooperative that provides wholesale electricity to more than 1.7 million people through 28-member distribution cooperatives in Minnesota, covering roughly 60 percent of the state. Approximately one-third of the people of Minnesota receive their electricity from the cooperative. The GRE Coal Creek Station plant is located just south of Underwood, ND and provides 1,100 megawatts (MW) of power.

As part of a clean energy initiative, GRE pre-grinds and dries lignite coal so it will burn cleaner and much more efficiently. KWS provided the original coal handling system in 2007. The system has been working continuously and successfully but improvements were desired. GRE contacted KWS wanting to improve the reliability and performance of the screw feeders and conveyors that are part of the coal handling system. KWS was asked to reduce down time and maintenance time for multiple screw conveyors. The existing screw conveyor layout had multiple inlets and support beams above the conveyors which made inspection, maintenance and replacement of new screw conveyor components very difficult. Together, GRE and KWS developed a very simple and unique solution to the problem.

Design Parameters of Application

Product Type: Lignite Coal

Material Density: 43 Lbs. per Cubic Foot

Conveyor Capacity: 5,814 Cubic Feet per Hour

Duty: 24 Hours per Day, 7 Days per Week

Advantages Provided by KWS

KWS discussed the application with the on-site Performance Engineer at GRE. KWS and GRE developed a new split-trough design to replace the standard solid U-troughs. Two sections of U-trough were split along the length of the trough at the bottom and installed in halves that bolted together. The split-trough design drastically reduced both operations and maintenance down time. KWS designed a special trough end which matched the bolt holes of the split-trough. The original equipment provided by KWS in 2007 utilized carbon steel troughs and stainless steel screws. After review of the abrasion and wear on the troughs, KWS upgraded the trough material to abrasion resistant AR400 for longer life. AR400 is approximately 4 times harder than carbon steel and is heat treated to provide abrasion resistance for difficult applications. KWS increased the trough thickness to 3/8-inch thick AR400 for even longer wear life. The split-trough design is much easier for maintenance personnel to handle during inspection and replacement.



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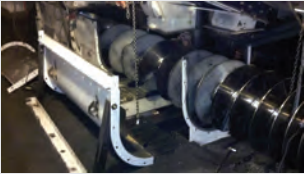
3041 Conveyor Drive
Burlison, Texas 76028

Toll Free: (800) 543-6558

Phone: (817) 295-2247

Fax: (817) 447-8528

www.kwsmfg.com



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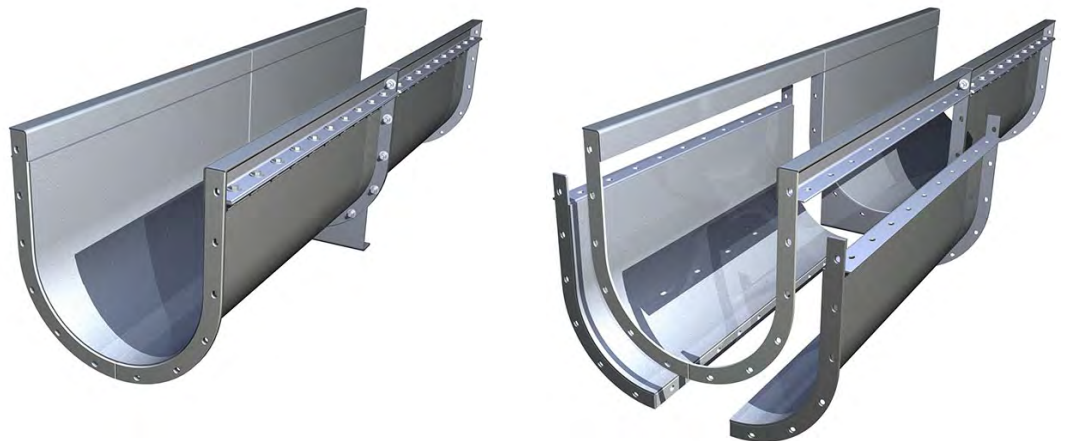
Special Features of KWS Design

The split-trough design increased up-time and productivity for GRE. By listening to the Customer and offering common sense solutions, KWS was able to help GRE solve a problem and reduce operating and maintenance costs. The 3/8-inch thick AR400 split-troughs will extend the replacement cycle by approximately four times or more. KWS modeled the new design used 3D Autodesk Inventor to make sure there were no interference issues. Engineers at KWS verified the new design would match the footprint of the original screw conveyors while keeping the multiple inlets and discharges in the exact original position.

Testimonial

"The split trough has been great for maintenance and inspections. Due to this screw conveyor being directly off the grating, with 4 different load zones overhead, inspections previously would require a lot of parts to be removed in order to lift the screw. With the split conveyor, we are able to remove half the trough and access the screw without removing bearings, seals and couplings."

- Tom Oakland, Performance Engineer - Great River Energy



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