

Close Up View of Drive End
Showing Square Hub
Connection



Cut Away View of Drive End
Showing Square Hub
Connection

Square Hub Couplings for Solvay Chemical in Green River, WY

General Description of the Application

The Solvay Chemical plant in Green River, WY is a mining operation that has been producing for over 30 years. This site produces large amounts of soda ash for the US market from a naturally-occurring mineral called sodium sesquicarbonate which is known as Trona in the industry. Since opening, Solvay has expanded its operations to include refining and chemical manufacturing. Although other products are produced on site, the largest portion of the business is soda ash which is used in glass manufacturing.

Trona is commonly known in the bulk handling industry and screw conveyors play a big role in how the product is transferred from process to process. The Solvay Green River operation is very large with hundreds of screw conveyors located all over the facility. Each screw conveyor is designed to handle Trona in different stages of processing. A common problem with all of the screw conveyors at the Green River plant was coupling bolt and shaft failures. KWS determined the cause of the failures and eliminated the problems for all the screw conveyors.

Design Parameters of Application

Product Type: Trona Ore

Material Density: 75 to 85 Lbs. per Cubic Foot

Capacity: 158,695 Lbs. per Hour

Duty: 24 Hours per Day, 7 Days per Week

Advantages Provided by KWS

Engineers from KWS examined some of the failed shafts and coupling bolts. Conveying Trona is very difficult due to high density and sluggishness. Trona can also be abrasive and cause wear on hanger bearings and coupling shafts. As the hanger bearings and shafts wear, the conveyor screws get out of alignment. The misalignment creates large cyclical loading on the coupling bolts and shafts. Over time, the connection between screw sections will fail and shut down production.

The existing CEMA standard connections between screw sections were not sufficient for the harsh environment of the mining industry. Working with reliability engineers at the Green River facility, KWS helped Solvay redesign the connection between screw sections using a square-hub design. The square hubs transmit torque and allow for greater misalignment when compared to CEMA standard connections. Engineers from KWS performed FEA to determine possible areas of stress.

Special Features of KWS Design

Knowing the solution and making the design practical are two different things. The square hub connections would still need to use modern bearings and seals which are designed for round shafts. KWS manufactured the "male" coupling shafts from one solid piece of round bar using the latest in CNC machining technology. Each coupling shaft had square hubs on each end with a round shaft section in the middle. Each screw section was manufactured with a "female" square hub on each end so screw sections could be connected together with coupling shafts. A single coupling bolt was used to connect a screw section to a coupling shaft. KWS also added Stellite sleeves to the round section of the coupling shafts for extreme wear resistance. Stellite has been used successfully in the mining industry and KWS manufactures thousands of Stellite-sleeved shafts every year.



KWS Manufacturing

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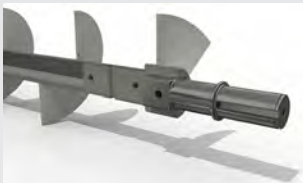
Testimonial

"The square hub design works great! Torque problems are thing of the past."

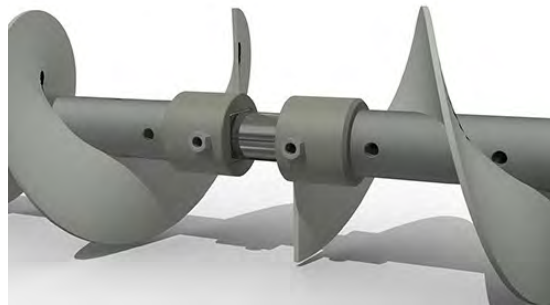
- Kevin, Maintenance Operations Manager – Solvay, Green River, WY



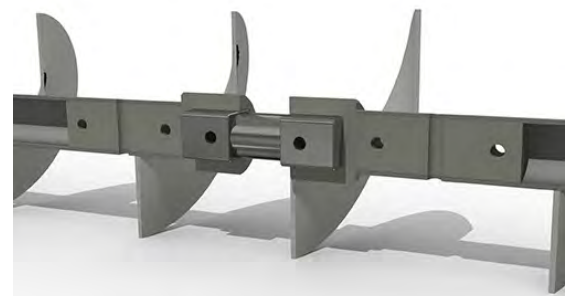
Close Up View of Drive End Showing Square Hub Connection



Cut Away View of Drive End Showing Square Hub Connection



Close Up View of Coupling Shaft Showing Square Hub Connection



Cut Away View of Coupling Shaft Showing Square Hub Connection



Cut Away View of 3 Screw Sections Coupled Together with Square Hub Connection



3 Screw Sections Coupled Together with Square Hub Connection



**Design
Engineering
Manufacturing**

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