



Analyzing Different Types of Screw Conveyor Failures

Question

I have about 30 screw conveyors in my plant for conveying various bulk materials. Most of the screw conveyors work great with very little maintenance or down time. However, sometimes a screw will fail at the end of the screw near the internal collar and coupling bolts. Sometimes the failure occurs where two screws are coupled together at a hanger or even at the drive end. The center pipe of the screw looks like it has been ripped open like a beer can! What the heck is going on?

Answer

Screw conveyors are the ideal solution for conveying thousands of bulk materials. The failure that you have described is caused by the internal collar breaking free from the center pipe of the screw. Once the internal collar breaks free, the center pipe of the screw will fail at the coupling bolt holes. Please refer to the photo below of a typical screw failure.



Typical Screw Failure Due to Internal Collar Breaking Free from Pipe

The torque of the drive unit rotates the screw to convey the bulk material. Under normal design and operating conditions, a screw conveyor is designed to handle full-motor torque with no mechanical failures. The center pipe of the screw and internal collars are designed for full-motor torque when the two become an integral welded assembly.

Internal collars must be properly welded into each end of the center pipe of a screw section. For properly manufactured CEMA standard screws, the internal collars are plug welded to the center pipe. Typically, two plug welds are placed on each side of the pipe for a total of four plug welds. Please refer to the photo below for proper plug welds and location.



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Proper Size and Location of Plug Welds

There are two methods for plug welding. For CEMA standard screws mounted on schedule 40 pipe, a plug welding machine is used. The plug welding machine deposits a weld that totally penetrates the wall of the pipe and breaches the internal collar but does not break through to the inside diameter of the collar. A second method for plug welding requires a few more steps. First, ½-inch diameter holes are burned in the center pipe using a hand-held plasma torch. Please refer to the photo below.



Internal Collar Fits Snugly in Pipe
After Holes are Burned

Typically, four holes are cut in the pipe with two on one side and two located 180-degrees apart on the other side. Then, the inside of the pipe is cleaned up and the internal collar fit into the pipe. The internal collar fits snugly in the pipe with the edges flush with the end of the pipe. Using a wire-feed MGAW welder, the holes are filled with weld material. The plug weld penetrates the internal collar and is joined to the center pipe as the hole is filled. This process is repeated for all plug weld holes.



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More on Next Page »



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A properly designed and manufactured screw will provide many years of uninterrupted production. Even when a screw conveyor is subjected to an upset condition and the drive unit generates full-motor torque, there should not be a mechanical failure of any component in the screw conveyor. Once the motor reaches locked-rotor amps, the motor heaters or a circuit breaker will “kick out” and power will be immediately turned off to the motor.

As the leader in the screw conveyor industry, KWS always supplies CEMA standard screws with a minimum of four plug welds per bushing for a total of eight plug welds per screw.



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