RETROFIT SEALS PROTECT PLANT EQUIPMENT AND PERSONNEL

Cement is made from a mixture of raw materials heated by a high-temperature kiln, often fueled by coal, to produce clinker. Clinker is then mixed with gypsum and ground into a fine powder to produce the final product.

In a cement plant located in the United Kingdom, several screw conveyors are used to transport coal throughout the facility. The screw conveyors, equipped with packing to seal the glands, were leaking coal dust into atmosphere, coating the floor and neighboring equipment. The abrasiveness of the coal, excessive shaft movement and frictional contact was causing the gland packing to quickly deteriorate, creating a leak path and allowing coal to escape into atmosphere. Exposed coal dust is extremely hazardous. Inhaling large amounts can lead to significant health issues and a single spark can ignite the dust, causing an explosion. The coal dust would also migrate down the shaft into the support bearings, two on each shaft, causing them to fail within a few months. Replacing the bearings and packing was expensive, frequent and ineffective. Several different types of packing and combinations of lantern rings, air and grease purged, were attempted. No combination was successful.

Due to the coal dust in the air, a weekly cleanup regime was required to ensure levels were acceptable. The weekly clean-up was carried out by a specialist outside contractor at a high cost. In addition to this operation, all workers were required to use extra health & safety protection.

CHALLENGE

Cement plant requires a new sealing system for the coal preparation plant because:

• Existing packed gland design required constant monitoring and maintenance
• Gland packing failed and allowed leakage of ground coal
• Coal leakage was a serious explosive/ fire hazard
• Working environment was designated a high respiratory area
• Clean up costs were weekly and expensive

SOLUTION

Inpro/Seal AM Solutions shaft seals

• Provide a long term maintenance free ATEX Certified seal system
• Prevent lost time injury and high cost incidents
• Negate weekly cleaning costs
• Improve air quality for local workers
• Eliminate bearing replacement costs
• Increase plant availability
A Permanent Solution

The cement plant turned to Inpro/Seal® for a permanent shaft sealing solution. Inpro/Seal AM (Air Mizer®) Solutions are non-contacting, non-wearing shaft seals that use small amounts of air to create a positive purge along the shaft, forming a barrier that eliminates leakage. Because AM Solutions™ shaft seals do not use contact with the shaft to create a seal, the abrasiveness of the coal was not an issue. Also, unlike packing, Inpro/Seal AM Solutions shaft seals fully articulate to accommodate radial run-out, axial movement and angular misalignment simultaneously. AM Solutions shaft seals unique, non-contacting design has no wearing parts, requiring minimal maintenance, making them the perfect sealing solution for this challenging environment.

Scored and grooved condition of the shaft due to high friction from previous contact sealing solutions.

These screw conveyors presented a unique challenge. Their shafts became scored from the abrasiveness of the coal and contact with the packing. Due to tight clearances required between the seal and shaft, a clean shaft is needed for proper function of the AM Solutions shaft seal. Therefore, a simple sleeve was mechanically secured to the shaft. Oversized o-rings were then used to ensure a good internal shaft to sleeve seal.

Success Summary

Since 2015, AM Solutions shaft seals have been installed on six of the coal plant’s screw conveyors. Since installation, the seals are working flawlessly with no recorded seal degradation experienced. Because coal dust was no longer escaping to atmosphere, creating a hazardous environment, the facility’s insurance premiums were greatly reduced and weekly subcontractor cleaning costs were cancelled.