

Dewatering Feeder Slide Gates Mt Vernon Transfer Terminal Indiana

Testimony (ref. 189213)

PEBCO® recently assisted Mt. Vernon Transfer Terminal (MVTT) in Mt. Vernon, Indiana by providing dewatering feeder slide gates and chutes (See Right Photo 1) for handling -2" coal at 55 pcf in a gravity flow application within a reclaim tunnel. The feeder gates were installed to provide product flow control onto a conveyer belt below open stockpiles. Coal flow regulation onto the conveyer belt is controlled at ~4,200 TPH.

Dewatering feeder slide gates were provided to replace the original feeder gates PEBCO® installed when the terminal was originally constructed in 1983. The PEBCO® dewatering feeder gates and chutes had the following design enhancements to increase the operational life and overcome maintenance issues that were identified during the discovery phase of the project.



Photo 1: PEBCO® Dewatering Feeder Slide Gate

Significant features of the PEBCO® equipment are:

- All stainless steel feeder gate construction including assembly fasteners
- Enhanced structural supports to assure both product and dozer support capability
- Dewatering feature to eliminate water draining onto the conveyer belt
- High force, accurate positioning hydraulic operation to include a new hydraulic power unit, which utilizes static o-ring connections and integrated circuit designs to eliminate fluid leakage

Dewatering Feature: The PEBCO® Dewatering Feeder Slide Gates were constructed with 304-stainless steel. The front dewatering design includes a sloped drain trough with a drain pipe connection and two clean water flushing connections.

The gate was designed with a front dewatering trough and pipe connections to direct free-water from the coal above into a drainage system rather than dripping onto the conveyer belt. MVTT has decided that at present time, the drain piping and connections to the dewatering trough were not necessary. During an interview with an employee of MVTT, the employee stated, “[...] because the gates are so tightly sealed; there is no need for the dewatering feature [to be connected into the drain piping]”.

Hydraulic Actuation: Gate actuation is achieved by a heavy-duty, front head-mounted hydraulic cylinder. PEBCO® included a hydraulic power unit for operating the gates. The gates are typically open two at a time to control coal feed rate onto the belt below.

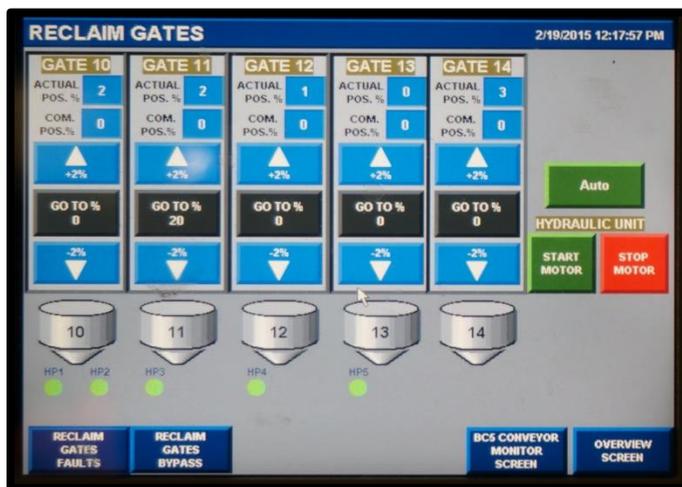


Photo 2: Electrical Control

Electrical Controls: Control of the dewatering feeder slide gate is through a touch screen panel (See Left Photo 2) located in the MCC room, remote from the reclaim tunnel. The controls provide infinite blade positioning of each dewatering feeder slide gate as well as control of the HPU. The feed rates can be set manually or an auto-function will modulate the feeder gate opening to maintain a set flow rate.

Blade Position Feedback: Feeder blade position feedback is accomplished through the use of a linear potentiometer that is integral to the hydraulic cylinder. This design provides high resolution and a rugged and robust installation.



Photo 3: Linear Potentiometer



Photo 4: Hydraulic Power Unit

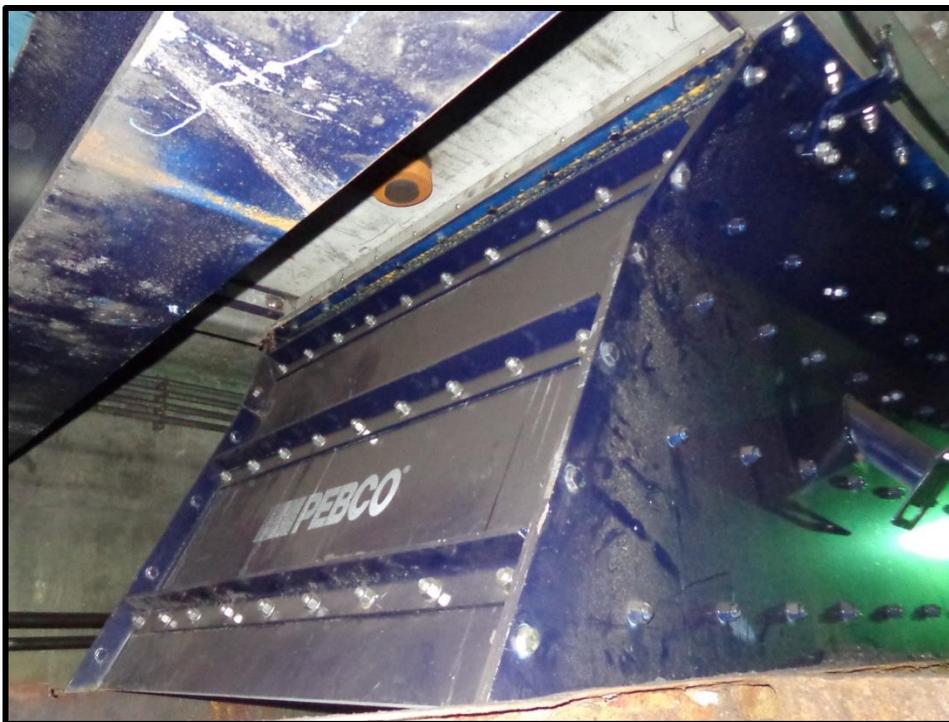


Photo 5: Chute Work

Chute Work: The gates were mounted above chutework designed to extend down past the skirt-boarding for the reclaim conveyer belt. These chutes were a bolt-together design and constructed of carbon steel with 304-stainless steel liners (See Upper Left Photo 5).

Spliced Gate: The PEBCO® dewatering feeder slide gates were designed and built in two separate modules. Because of the size of the reclaim tunnel, the full-sized gate could not be taken into the tunnel as a single unit. The feeder gate frame was designed with a splice plate connection near the interface of the retract area bonnet and the product flow area; essentially dividing the gate into two halves (See Lower Left Photo 6).

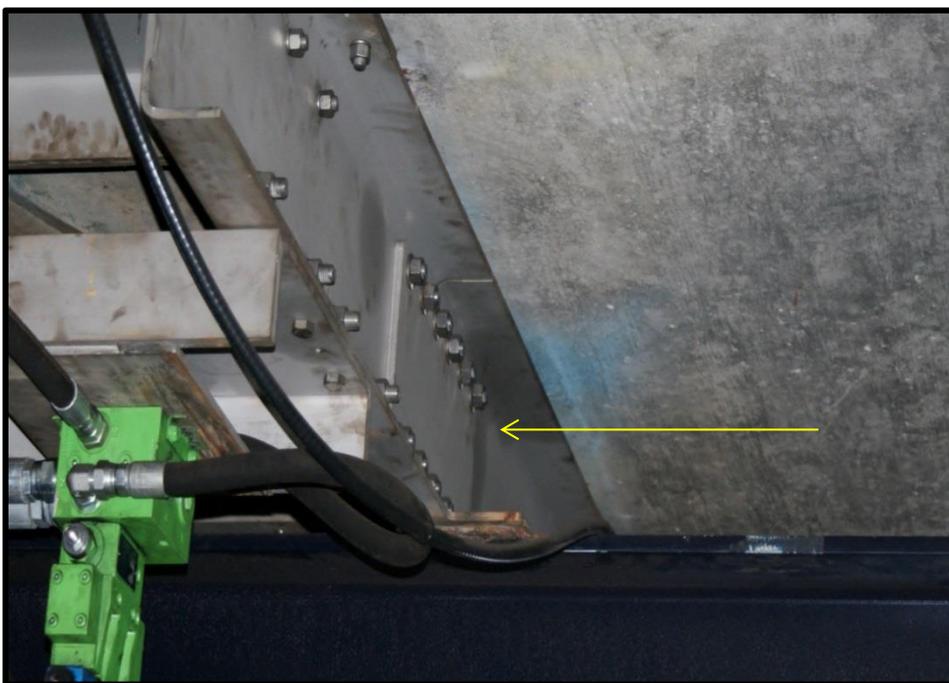


Photo 6: Gate Splicing

The gate was easily transported into the tunnel and reassembled using the splice plate connection to form the complete gate assembly. Stainless steel fasteners were used throughout the gate construction to resist corrosion associated with the moisture-laden coal and high humidity common in reclaim tunnels.

Blade Supports: PEBCO® used internally lubricated polymer blade supports (See Next Page Photo 7) rather than the more traditional roller bearing supports. The polymer blade supports were selected because they provide:

- High resistance to wear, providing longer operational life than roller bearing supports
- No lubrication required, reducing maintenance and providing consistent, long-term performance
- Extremely high resistance to moisture and corrosion, increasing operational life



Photo 7: Internally Lubricated Polymer Blade Supports

Anchors, Rockers, Beams: The design of the support structure for the feeder slide gates were part of PEBCO®'s scope of supply. Heavy structural beams were provided to carry the load exerted by the stockpile and the load associated with the dozers used to push the coal to the flow openings over the dewatering feeder slide gates (See Below Photo 8 and Next Page Photo 9).

A special design was used to connect the beams to the concrete walls of the reclaim tunnel. The end connection design was similar to that used in bridge construction to reduce stress in the concrete connections due to thermal and mechanical loads on the beams.

The support plates are rigidly fixed to the concrete walls of the tunnel. Pinned connections between the support beams and the support plates are used in conjunction with a rocker on one end of the beam.

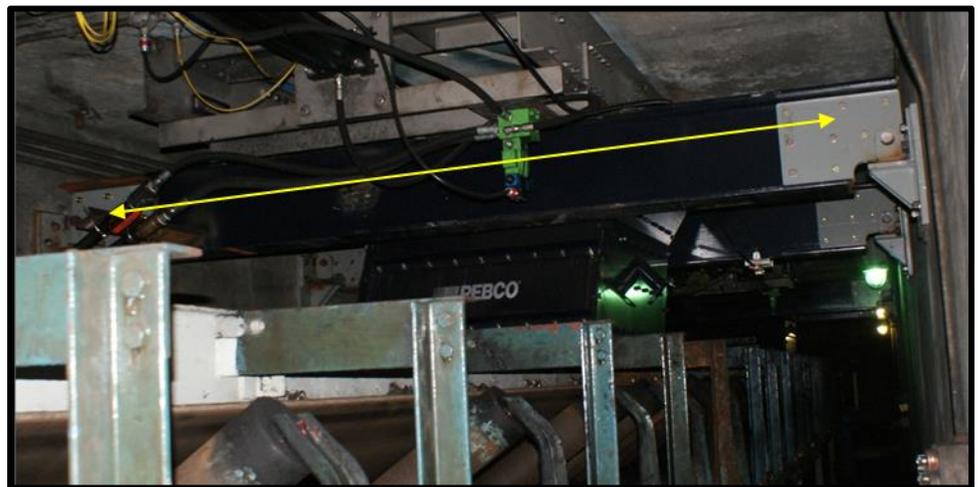


Photo 8: Support Beams

The combination of the pinned connections and the rocker support on one end of the beam allows the beam to deflect and the beam ends to rotate about the pinned connections; thereby reducing the stress on the support plates and the moment applied to the concrete tunnel walls.

The design also allows for the thermal expansion and contraction of the support beam without transferring stresses into the concrete walls of the tunnel.

MVTT personnel reported that the installation of the equipment went exactly as planned and without any problems. The dewatering feeder slide gates have now been operating for over one year flawlessly. Personnel at the site report complete satisfaction with the quality and performance of the PEBCO® provided equipment.



Photo 9: Rocker Supports