CASE HISTORY

THAYER SOLIDS FLOW CONTROL®

Twelve Heavy Industry Model MH Weigh Belts Supplied to Tampa Electric for Coal Blending Operation

TECO Energy (Tampa Electric) is an investor owned electric utility, headquartered in Tampa, Florida.TECO is the principal wholly owned subsidiary of TECO Energy, Inc., an energy related holding company. Another subsidiary of TECO Energy, TECO Power Services Corporation (TPS), which owns and operates several natural gas and coal-fired power plants.

The Big Bend Station, situated on Tampa Bay in Southeastern Hillsborough County, FL, has four coal-fired units with a combined output of more than 1700 megawatts and serve customers across the West Central Florida service area. The Big Bend Power Station is among the cleanest coal fired power plants in the US.

Power plants are designed and optimized to operate using specific compliant coal for each boiler, which ensures high plant performance and environmental compliance with relevant regulations.

Coal blending in power station was adopted to reduce the cost of generation and increase availability of coal. The low-grade coals can be mixed with better grade coal without deterioration in thermal performance of the boiler thus reducing the cost of generation.

Most power plant boilers are designed for bituminous coal with low to medium moisture, medium to high volatile matter and, within a reasonable calorific value range (“compliant coal”). However, an increasing portion of coal reserves are high moisture, lower calorific value, moderately high ash, and high sulphur non-compliant coals, which cannot be effectively used in power generation and other industries. Combustion of coal without specifically matching it to the power plant’s boiler design is the major reason for serious inefficiencies in coal combustion. This results in the reduction of electrical output, and more coal consumption per unit of output.

Coal mined by TECO Coal, a subsidiary TECO Energy, is processed and transported by means of railroad cars, trucks, barges or vessels, with rail shipments representing approximately 93% of coal shipments to the various plants.

Tampa Electric Big Bend Power Station coal is received by barge at TECO’s Big Bend Station coal yard.When the coal arrives at the site, the coal is unloaded onto belt unloading conveyors which transports the coal to twelve large 4,000 ton blending silos. Each storage silo terminates to a 4 ft x 8.8 ft opening equipped with an automatic slide gate valve and Thayer Scale’s Model MH-66 Heavy Industry Weigh Belts.

TECO BIG BEND POWER STATION

4,000 TON CAPACITY BLENDING SILOS WITH THAYER WEIGH BELTS

PROJECT OVERVIEW
In 1982 THAYER was asked to bid on a new coal blending facility at Tampa Electric that involved 12 large capacity weigh belts. The requirements was that the weigh belt were to be designed to feed 2" coal at a range of 100 to 1,000 TPH with a material head load of 350 psi and a maximum shear force of 5,000 lb. across the outlet. With the specification in hand Thayer's engineering department selected the best feeder to accomplish the task.

DESIGN CONSIDERATIONS
Thayer's Model MH Weigh Feeder represented a new generation of feeding machinery that utilized computer analysis, state of the art instrumentation and at that time twenty years of weigh belt manufacturing experience.

Once the model was selected the various features were designed to meet the applications specific needs.

A major factor in achieving uniform withdrawal from storage bins. THAYER takes very careful consideration of the inlet section design based on a given material density, particle size, head load and handling characteristics. The correct design allows for maximum efficiency and low energy consumption.

Installation of skirt boards along the entire length of the conveyor totally confines the material flow channel which helps control dust. Skirt boards are tapered and flared from the inlet to the discharge to prevent pinching of material between the skirt and the belt. The flare in the skirt boards also reduces friction and allows for lower motor horse power.

The weight sensing system (scale) is not mounted between the strands of the belt, but in a location outside of the material handling area such that the weigh idlers supporting the belt transmit the load to the scale. This design has several benefits. The scale is not prone to damage, is out of the way for cleaning, and is not subject to tare build-up that would change the weight, causing incorrect calibration.

Thayer's Flexure-Plate Suspension system utilizes a series of steel flexure plates to transmit gravimetric loads vertically from the load receiving element through levers to the specifically selected controls. The combination of mass counterbalancing against tare loads, frictionless flexure-mounted levers and a high resolution transducer produces a force measuring system beyond compare. Of significance is the fact that infinite weighments may be made without maintenance or calibration, regardless of atmospheric or factory conditions.

STILL RUNNING
Eleven years after the weigh belts were installed, due to an increase in power demand Tampa Electric contacted Thayer Scale and asked what it would take to increase the feed rate from 1,000 to 2,000 TPH. The easiest way to double the feed rate was to increase the belt speed therefore increasing the feed rate. Since the weigh belts had been designed with a chain and sprocket drive train the only new item required was a new sprocket to increase the belt speed. No other changes were required.

TAMPA ELECTRIC COAL YARD UPGRADE.
In 2011 Tampa Electric decided to upgrade their coal handling facility. As part of the upgrade they wanted to install new coal weigh belts. At this point the THAYER Weigh belt had been installed and performing well for 29 years.

Thayer Scale reviewed the details of the original installation and decided to make changes to the weigh belt design based on new technology that THAYER had developed since the original weigh belts were installed.

In particular THAYER would offer a new scale. While the original scales were still performing as the day they were originally installed the new scale design would allow for a better way to calibrate the scales.
The original design the scales used test weights that were hung on the scale. While applying the test weights to the scale is the most accurate way to calibrate it is time consuming for the operators.

THAYER proposed a new scale design that included calibration test weights built right into the scale. During the calibration process the weigh belt integrator promps the operator as to when the calibration test weight is to be applied to the scale. On the old system the test weights needed to be applied by hand. The new scale the weights are applied by pneumatic cylinders that lower and raise the weight onto the scale. This new desin significantly reduced calibration time.

New control instrumentation has was also included with the new weigh belts.