Brightwater
ENGINEERING

Coal Handling & Preparation Plant

PROJECT REPORT

CLIENT: SOLID ENERGY NEW ZEALAND

INNOVATIVE SOLUTIONS TO INDUSTRY

CONCEPT DESIGN MANUFACTURE INSTALL COMMISSION OPERATE

The Situation

Solid Energy New Zealand operates an open-cast coal mine on the Stockton Plateau, 35km north of Westport, on the West Coast of the South Island, New Zealand. The Stockton mine produces high-quality coal for export to the steelmaking industry.

Stockton has accumulated stockpiles of up to 15 million tonnes of contaminated coal and will generate more as the operation continues to work through areas of historic underground mining. A prefeasibility study identified that a Coal Handling and Preparation Plant (CHPP) would produce 10 million tonnes of saleable high value product from this stockpile.

Solid Energy New Zealand commissioned Brightwater to participate with Downer Engineering to produce a Feasibility Report through Front End Engineering and Design (FEED) analysis. This identified the type of CHPP required, capital costs, operating costs, constructability and the timeline for Engineering, Procurement and Construction (EPC) of the proposed CHPP.

The Solution

Solid Energy New Zealand engaged Brightwater as the head contractor to design, procure, and manage fabrication and construction of the NZ$124 Million green-fields CHPP project, all within a fast-track schedule.

Contaminated coal is transported to the run-of-mine (ROM) platform via mobile equipment and stockpiled ready to be loaded into the ROM bin. This material is fed into the ROM bin through a grizzly screen with a 600mm square aperture size. The ROM bin discharges via a chain feeder, which delivers the coal to a primary screen with a pass size of 60mm. Passed coal discharges directly onto a delivery conveyor while oversized coal is delivered to a rotary breaker. The delivery conveyor discharges to a 300m³ surge bin, which in turn discharges onto a conveyor feeding into the Coal Preparation Plant (CPP).

The two key processing steps in the CPP are:

- Dense-medium cyclone (separation of coarse coal), (-60mm +1.4mm (ww)
- 3 parallel circuits of hydraulic classifiers (separation of fine coal) (-1.4mm (ww) + 0.045mm)

The CPP product is conveyed onto one of five 4,000t stockpiles. The product from these stockpiles is re-claimed by a front end loader and fed into a discharge bin which feeds a conveyor directly linking into the existing Stockton ROM product system.

The reject material from the dense-medium cyclone and the hydraulic classifiers is sent to a reject pad outside the CPP building. From here it is loaded and trucked to its final deposition location in one of the mine overburden dumps.

The tailings from the classifying cyclones and the reject dewatering screen underflow through a thickener before being dosed with flocculent and pumped to a nominated disposal site.

The Benefits

Designing and constructing the CHPP atop the Stockton Plateau brought a number of challenges. Brightwater, through innovation and experience, provided technical and practical solutions equal to the task.

- High wind speeds at Stockton result in high loadings on conveyor truss sections of rectangular profile. Brightwater designed totally enclosed circular cross-section conveyors, with a resultant drag force coefficient 40% lower than those of the rectangular type. Where circular section conveyors could not be used an "eye for detailing" yielded reduced profiles and rounded corners to minimise wind drag.
- Conveyor sections were modulised for fabrication and fit out at Brightwater's workshops. The benefit of in-house engineering and design allowed the fast-track programme to become reality.
- The CPP building foundations utilised rock anchors to reduce the concrete mass required to support high wind and seismic loads.
- Piping systems were spooled off-site and delivered with pipe support elements fully assembled and packaged.
- Brightwater's previous construction experience at Stockton was fundamental in achieving a "zero" LTI statistic over 400,000 man-hours. Constructability reviews at the design phase built safety considerations into the project with the added bonus of minimising installation time. With up to five cranes working at any one time in cold, limited-visibility conditions, Job Safety Analysis (JSA) was the primary process for eliminating, isolating or minimising hazards.

The Specifications

CHPP Process Capacity:	170 Tonnes/hour
Method of Supply:	ROM Bin, Chain Feeder, Primary Screen, Rotary Breaker
Surge Bin Feed Conveyor:	Fully enclosed 3m dia circular section, 100m long, 750mm wide belt
Surge Bin:	Height 14.3m, dia 8.7m, capacity 300m³
CPP Feed Conveyor:	Fully enclosed 3m diameter circular section, 113m long, 750 wide belt
Product Conveyor:	Enclosed rectangular, 210m long, 750mm wide belt, five stationary ploughs
Stock Pile Capacity:	Five Stock Piles, 4,000 tonnes each, total capacity 20,000 tonnes
Reject Conveyor One:	Stringer conveyor, 22m long, 750mm wide, total capacity 130tph, multiple load points
Reject Conveyor Two:	Gallery conveyor (unclad), 32m long, 750mm wide, total capacity 130tph
Loadout Conveyor:	Stringer/truss conveyor (with wind covers), 200m long, 900mm wide, total capacity 600tph

Construction Statistics

Lost Time Injuries:	Zero
Site:	Stockton Mine, 800m above sea level
Weather:	Up to 6m annual rainfall, fog, snow, wind 256km/h peak
Labour:	400,000 man hours, peak labour force 95
Materials:	1,554 tonnes steel, 11,000 m³ concrete
Project Schedule:	18 months
Site Construction:	14 months

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