Brightwater ENGINEERING

Flake Conveying System

PROJECT REPORT

CLIENT: THE LAMINEX GROUP, AUSTRALIA

INNOVATIVE SOLUTIONS TO INDUSTRY

CONCEPT DESIGN MANUFACTURE INSTALL COMMISSION OPERATE

The Situation

The Laminex Group operates a Particle Board manufacturing plant in Dardanup, Western Australia. The plant is Laminex's primary source of particle board for both the Australian and international export markets. The plant produces in excess of 260,000 cubic metres of board per year and utilises numerous sources and types of raw material in the production of Particle Board.

A key material component is "flake" which is produced on site by processing wood chips through a Pallmann PZK 14-450 ring flaker. The capacity of this flaker is 14TPH. The flake material is a preferred ingredient in the production of Particle Board as its use promotes a higher quality yield.

Laminex wished to increase their flake material volume by installing two additional Pallmann PZK 14-450 ring flakers. This would bring the total capacity of available flake material to 42TPH. This upgrade would be completed in two stages:

1. A second PZK flaker to be installed with a new conveying system.

2. The third flaker to be installed at a later date but the new conveying equipment design to incorporate redundant capacity for this third "future" flaker.

The Solution

Laminex approached Brightwater to provide a concept and engineer a solution to successfully convey the required flake material from three ring flakers at 42TPH from the PZK building to a receiving silo. This posed quite a challenge in conveying material from below relative ground level (beneath the flakers) to a point 17m above relative ground level and 100m linear distance across the plant. The delivery time frame was also demanding as the equipment was to be installed and commissioned by July 2011. The project start date was January 2011.

The existing two stage pneumatic conveyor system had a number of ongoing issues including blockages and high wear as well as very high power consumption (installed ~350kW).The established site geography was of such a complexity that traditional alternate material conveying solutions would be expensive and have a negative impact on operations during construction and installation. The challenges can be summarised as follows:

- **Capacity** – Existing system unable to manage proposed increases in material volumes
- **Efficiency** – Existing system had a history of blockages and a proportionately high running cost
- **Transportation** – How to get the material from origin to destination

The answer required a method of addressing all of the issues at hand and comprised of the following solutions:

1. **En-Masse Conveyor** - The flake material is conveyed from beneath the PZK flakers by means of a drag chain or "En-Masse' conveyor. The conveyor's inlets are located in a pit area beneath the flakers and the outlet feeds onto a Tubulator™ belt conveyor approx 8m above relative ground level.

2. **Aspiration System** - The En-Masse conveyor is engineered to interface with an "aspiration" system. This system is necessary to handle the air flow generated by the ring flakers. The induced air is ducted through a cyclone with the separated particulates directed into the Tubulator™ conveyor inlet resulting in a highly efficient "open" loop system.

3. **Transfer Tower** - The transfer tower accommodates the structural support of the interface between En-Masse and Tubulator™ and provides access to the equipment for maintenance. In addition the transfer tower acts as the "fixed" point for the support of the Tubulator™ conveyor at the inlet. As a consequence the Tubulator™ outlet would be "floating" allowing liner expansion. The discharge chute was fitted with expansion bellows to accommodate this activity.

4. **Tubulator™** - A Tubulator™ belt conveyor was utilised to convey the material from the En-Masse conveyor 100m across the plant to the receiving silo. The Tubulator™ is an innovative form of conveyor where the conveyor belt runs on an air cushion within a fully enclosed tube, reducing the possibility of emissions and eliminating the high maintenance conveyor idlers.

This method of conveying is an effective solution in bridging the distance with minimal disruption to existing equipment and buildings. The Tubulator structure is supported by two mast towers and a system of guy wires. The structure has much in common with a typical cable suspension bridge design.

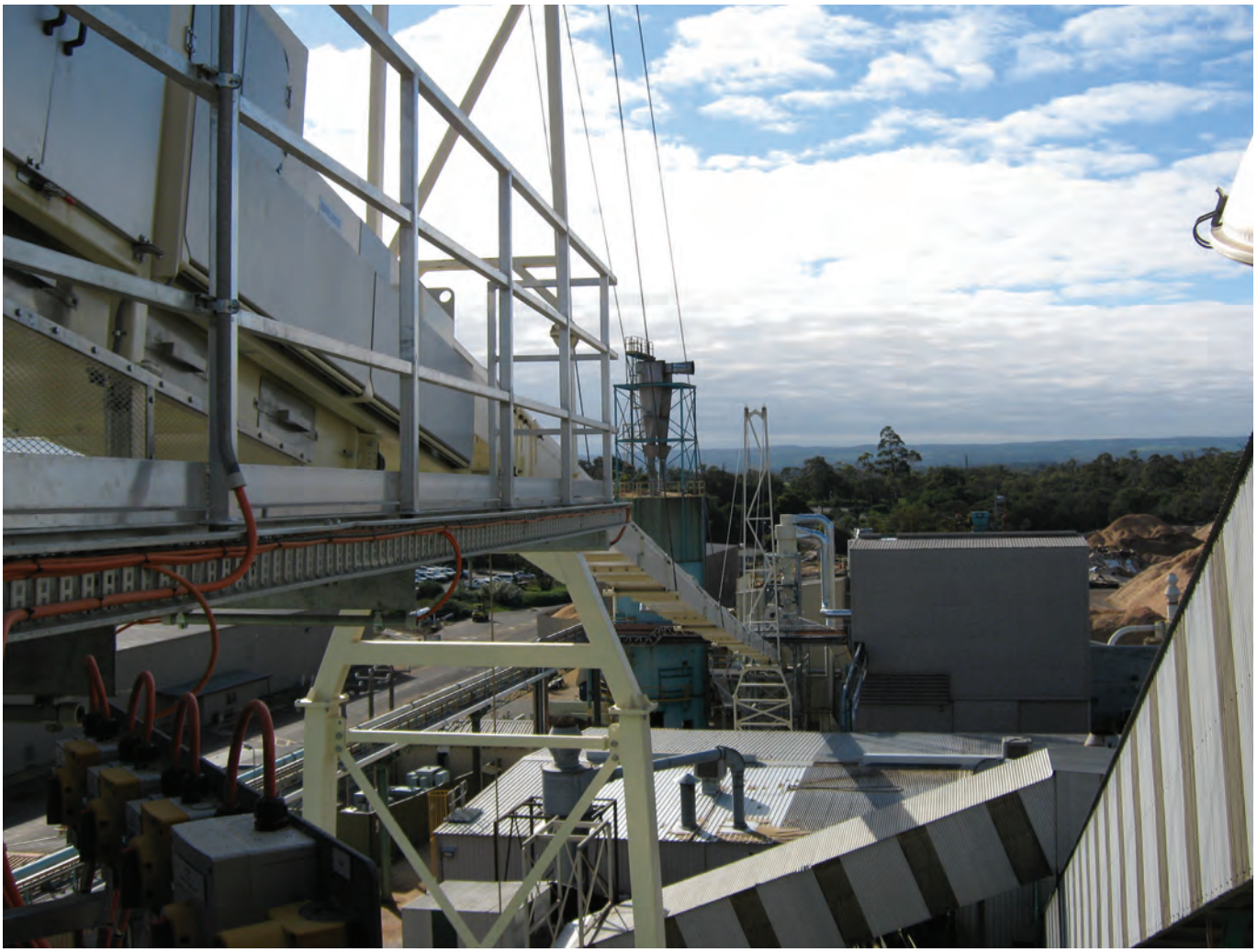
This type of belt conveyor utilises an air carry and return system with four fans mounted on the conveyor. The use of these fans acts to separate the belt from the conveyor body thus reducing friction and wear. In addition this arrangement and application ensures minimal maintenance, disregarding the need for traditional trough/idler rollers sets, access platforms and walkways.

Completed Aspiration System & Transfer Tower

The Benefits

The new flake conveying system was successfully commissioned in July 2011. The benefits can be summarised as follows:

- The application and integration of the Tubulator™ conveyor design has substantially reduced capital costs in conveying the flake material across the existing plant. This design utilised minimal structural steel in comparison to a steel truss structure found in a traditional belt conveyor with the necessary supports, idler rollers and access walkways.
- Design capacity of system exceeds the output from 3 x Pallmann 14-450 PZK flakers @ 55TPH
- The equipment was installed in a 10 day period whilst the plant retained full capacity. There was minimal impact on site activities during this period.
- Equipment installed with zero safety incidents or injuries
- Total installed power of new conveying equipment = 81 kW for 42 TPH compared to 350kW for 14 TPH from the existing method. This leads to a substantial saving in energy and operating costs
- The aspiration system exceeds required induced air flow rates through the PZK's @ 21,500m^3/hr
- A fully enclosed system of conveying resulting in zero emissions and spillage
- The site now has a way forward to increase its flake output and improve upon capacities, quality, energy use and instances of downtime.



View from Receiving Silo Back Along Tubulator to PZK Building

Completed Installation (Side View)

Completed Installation (Feed View)

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