Capability Statement

Sticky Iron Ore

428 Successful installation in applications handling sticky Iron ore
Established in 1965, WEBA is a specialist bulk material handling company with a specific focus on transfer chutes. The development of WEBA Transfer Chute Systems has positioned our company as a pioneer in the bulk materials handling industry.

While transfer chutes are as old as basic conveying technology itself, it is only in recent times that appropriate scientific effort has been put into the efficient design of these systems. In the early 1990’s, WEBA, led by Werner J Baller, conducted an intensive study into the negative and cost-incurring aspects of conventional transfer chute design and the result was the groundbreaking WEBA Transfer Chute System concept — a streamlined and scientific approach to the dynamics of bulk materials handling at transfer points.

There are currently more than 4000 WEBA transfer chutes doing duty in the bulk material handling industry worldwide, handling coarse, dry, slightly wet or sticky materials alike. Although the technology is common, each WEBA Chute System is uniquely tailored to the specific application. The WEBA Chute System offers a substantial cost saving over any known conventional chute installation using liners, rock boxes and any other method intended to control material flow in a transfer point, regardless of belt speed, belt width, material size, shape or throughput. Major cost savings are achieved from maintenance requirements, improved transfer conditions and higher throughput, if incorporated during the design phase, but the biggest savings are achieved on the highest cost item — conveyor belting. The WEBA Chute System ensures that material being transferred is not dropped on the belt in free fall, eliminating a high proportion of wear and tear. Controlling the material also minimises the rebound that traditionally sends clouds of unhealthy dust billowing into the air.

- Multiple conveyor belt loading.
- No replacement liners required.
- Up to 80% maintenance free.
- Reduction in noise levels and dust pollution.
- Up to 80% reduction in damage to outgoing belt.
- Almost supervision-free transfer points.
- Easy access to transfer chute owing to less bulky chute design.
- No impact idlers required under chute.
- Overrun storage facility.
- Maximum belt capacity usage.
- Increased protection against injury.

**Product Advantages**
- Reduces degradation by up to 80% (mainly applicable to coal).
- Reduction in wear and tear by up to 80%.
- No skirting required.
- Greatly reduced spillage.
- No uneven conveyor belt loading.

WEBA is so confident of its design methodology that we offer the end user a performance warranty.
Services

At WEBA, we possess the knowledge and expertise required to comfortably handle both large and small-scale transfer chute projects. Our capabilities include:

DESIGN, MANUFACTURE & INSTALL

We pride ourselves on comprehensive analysis of our client’s needs to thoroughly scope all projects, so we can cost them appropriately and realistically. Our process leaves no stone unturned and differentiates us from our competitors.
Our design team adopts a simple philosophy; to give a total solution for problems traditionally associated with transfer points.
Certain materials are much more challenging to transfer than others and we have the experience and know-how to find cost-effective solutions.
Our manufacturing is tailored to meet client standards and the standards required by the country or state.
Once the chute is ready, our professional team provide installation of equipment or supervision thereof, depending on client requirements.

RETROFIT

We offer retrofitting, or replacing a client’s existing chute (often a competitor’s chute), and designing a customised WEBA chute to fit within the constraints of the clients building and performance requirements.

IRM

Our teams carry out chute maintenance every three to six months, which involves replacing components, wear materials, auxiliary items and more. And we’re experienced working within the rules and requirements of each site and make safety our number one priority.

FEA, DEM & 3D LASER SCANNING

We conduct Finite Element Analysis of structural elements and Discrete Element Modelling for transfer chute design in support of hand computations.
We also provide onsite 3D Laser Scanning to support all forms of work we undertake, including ascertaining envelopes within client building structures and interference analysis.
Products

Our aim is to give a total solution for problems traditionally associated with transfer points. Although best results are achieved by incorporating the WEBA Transfer Chute System during the design phase of a new project, we can assist with established projects too.

The WEBA transfer chute range consists of two (2) main systems:

- The Cascade Chute System
- The Superflow Liner System

**The Cascade Chute System**
Providing great financial savings to the end user, the Cascade Chute System is designed to carefully control material flow, velocity and direction. This system solves nearly all problems associated with transfer points.

**Benefits**

- Maintenance costs can be seven times lower than traditional chutes.
- Saving on belting costs, which are typically the highest cost item – WEBA Cascade Chute System ensures materials are not dropped on the belt in free fall during transfer, which negatively impacts on the belt.
- Reduced system wear thanks to material on material impact.
- Easy to adjust or augment when material characteristics change.
- Easily replaceable components.

**The Superflow Liner System**

**Benefits**

- Unlike other chutes, no need for the six weekly shutdowns to replace the full liner.
- Planned shutdown schedule can increase to every 12 weeks rather than every six, minimising production downtime.
- Substantial increases in production.
- Easily replaceable components.
FEATURED PROJECTS

Solomon Hub (Iron Ore)
Location: Western Australia
Client: Fortescue Metals

Solomon Mine is part of FMG’s major expansion in the mineral rich Pilbara. The Solomon Hub is located 120 km west of the Chichester Hub and comprises the Firetail mine and the Kings mine. More than three billion tonnes of resources have been identified at Solomon, providing FMG with a long term, low cost production strategy.

Early earthworks commenced at Solomon in late 2011, with significant greenfields construction work undertaken since to develop the 60 mtpa operation. The US$3.5 billion Solomon site has two OPFs, three crushing hubs, a 125 MW power station, its own airstrip and three camps to house 30 000 people.

WEBA were awarded a contract to design 7 chutes for Solomon Mine in 2012. Four of the transfer chutes were specifically designed to cater for worst overrun conditions, with a required storage capacity of up to 30 m3 of ore. This was achieved by utilising a sophisticated and unique design, considered to be a first in transfer chute technology. The chute was fitted with an air cannon system to ensure that bulk flow was achieved once the system was restarted. By incorporating block chute detectors in the chutes, it can be confirmed that the chutes have completely emptied before the incoming belts are restarted.

The remaining three chutes are normal belt to belt transfer points that are capable of handling tonnages varying from 4 500 up to 7 400 tph on belt widths of 1 400 and 1 800 mm, travelling at speeds of 4.6 m/s.

<table>
<thead>
<tr>
<th>Feed Conv. Length</th>
<th>3737</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Rate</td>
<td>5400</td>
<td>t/h</td>
</tr>
<tr>
<td>Conv. Speed</td>
<td>4.5</td>
<td>m/sec</td>
</tr>
<tr>
<td>Belt Width</td>
<td>1400</td>
<td>mm</td>
</tr>
<tr>
<td>Material</td>
<td>BIB / DID</td>
<td></td>
</tr>
<tr>
<td>Bulk Density Min.</td>
<td>1.75</td>
<td>t/m³</td>
</tr>
<tr>
<td>Bulk Density Max.</td>
<td>2.4</td>
<td>t/m³</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>10</td>
<td>%</td>
</tr>
<tr>
<td>Material Size</td>
<td>12</td>
<td>mm</td>
</tr>
<tr>
<td>Coasting Time</td>
<td>60</td>
<td>sec</td>
</tr>
<tr>
<td>Max. Discharge Volume</td>
<td>25.7</td>
<td>m³</td>
</tr>
</tbody>
</table>

Photo 1: CV04 onto Stock yard conveyor
Karara Iron ore mine
Location: Western Australia
Client: Karara Mining ltd

Karara mine is located 200km south-east of Geraldton in the Shire of Perenjori, Western Australia. WEBA designed and installed eleven chutes at Karara Mine. The chutes included six belt to belt chutes, two HPGR chutes and one Secondary screening chute and three Stacker chutes.

HPGR No.2 has been designed to evenly distribute magnetite feed from a 1500mm wide conveyor onto two vibrating screens via a two-leg transfer chute system. Each feed chute incorporates a feed distribution box to facilitate water addition and mixing prior to delivering feed onto the vibrating screens. The system also incorporates Blocked Chute Detection mounts.

The primary objective of HPGR No.2 is to equally feed two vibrating screens from a single conveyor belt discharge.

By controlling the ore, the following benefits may be achieved:

- Selection of optimum belt size;
- Reduced spillage;
- Reduced belt wear;
- Increased liner life; and
- Greatly improved levels of safety.

<table>
<thead>
<tr>
<th>Description</th>
<th>Ore Characteristics</th>
<th>Design Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore Type</td>
<td>Magnetite ore</td>
<td></td>
</tr>
<tr>
<td>Bulk Density</td>
<td>2.03</td>
<td></td>
</tr>
<tr>
<td>100 Particle Size</td>
<td>mm</td>
<td>40</td>
</tr>
<tr>
<td>180 Particle Size</td>
<td>mm</td>
<td>19</td>
</tr>
<tr>
<td>Bond Abrasion Index</td>
<td></td>
<td>0.48</td>
</tr>
<tr>
<td>Static Internal Angle of Friction</td>
<td>Degrees</td>
<td>60</td>
</tr>
<tr>
<td>Screen Feed Solid Concentration</td>
<td>%</td>
<td>Cw 50% w/w</td>
</tr>
<tr>
<td>Ore moisture content</td>
<td>%</td>
<td>3.0 (Max)</td>
</tr>
</tbody>
</table>
Paraburdoo Iron ore mine
Location: Western Australia
Client: Rio Tinto
Paraburdoo iron ore mine is situated 80km south of Tom Price in Pilbara, Western Australia. The Paraburdoo mine has been operational since 1972. The mine has an annual production capacity of 23 million tons per annum (mtpa).

Chute CV555 – Old Chute
- Handling very abrasive Hematite ore with up to 250mm lumps.
- Old chute was a Hood and Spoon design that was installed in 2003.
- Was the driving force for scheduled 6 weekly shutdowns as it required a 5 to 6-week shutdown frequency for full liner replacement. At week 4 temporary “outside” patching was required.
- Was responsible for numerous unplanned plant stoppages caused by the need for temporary “outside” patching between shutdowns.

New WEBA Chute
- The new transfer has operated successfully since installation in July 2009.
- The new chute can run trouble free with no blockages with normal, moderate cohesive ore types.
- The WEBA Cascade lining system is very effective in minimising wear.
- Liner life exceeds 12 months & the Planned Shut down schedule increased to 12 weeks from 6 weeks, giving substantial increase it production.
- This chute is no longer the driving factor in planning maintenance shut downs.
# Cost comparison

## Old Chute vs WEBA Chute

### Original Chute

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liner Change Labour (Planned)</td>
<td>$92,880</td>
<td>This does not include Plates used as patches</td>
</tr>
<tr>
<td>Liner Change Materials (Planned)</td>
<td>$141,900</td>
<td>3/4 of a set of liners used each shutdown</td>
</tr>
<tr>
<td>Clean up from spillage</td>
<td>$108,680</td>
<td></td>
</tr>
<tr>
<td>Loss of material from spillage</td>
<td>$28,600</td>
<td>1 ton per day (286 run days)</td>
</tr>
<tr>
<td>Un planned down time (Labour)</td>
<td>$46,800</td>
<td>104 Hours per year (patching chutes)</td>
</tr>
<tr>
<td>Un planned down time (profit loss)</td>
<td>$20.8M</td>
<td>104 hours per year (Not including run up and ramp down)</td>
</tr>
<tr>
<td>Increase capacity</td>
<td>$17.2M</td>
<td>Reduction of shutdowns (Shut strategy increased from 6 weeks to 12)</td>
</tr>
</tbody>
</table>

### WEBA Chute

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital cost of chute (Inc Installation)</td>
<td>$215,640</td>
</tr>
<tr>
<td>Liner material costs after 1 year</td>
<td>$22,000</td>
</tr>
<tr>
<td>Liner Labour costs after 1 year</td>
<td>$5,400</td>
</tr>
</tbody>
</table>

### Total costs p/a

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational costs</td>
<td>$418,860</td>
</tr>
<tr>
<td>Direct Tonnage loss</td>
<td>$20.8M</td>
</tr>
<tr>
<td>Increased capacity</td>
<td>$17.2M</td>
</tr>
</tbody>
</table>

### Total costs p/a

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational costs</td>
<td>$243,040.00</td>
</tr>
</tbody>
</table>
Marandoo Iron ore mine
Location: Western Australia
Client: Rio Tinto

Extremely Sticky Iron Ore application

Old Chute

- Handling very sticky Maramamba -6.3mm iron ore fines material.
- Old chute consists of a hanging chain design due to very cohesive and adhesive ore properties.
- Old chute required on-going (once per shift) complete wash-down to address blockages.
New WEBA Chute

- The new transfer has operated successfully since installation in October 2008.
- The new chute can run trouble free with no blockages with normal, moderate cohesive ore types.
- The mini air cannons fire once every hour when handling extreme clayish ore types and eliminate any material build-up that could result in blockages. The chute can be fitted onto load cells to automate the firing of the air cannons.
- The ledge system is very effective in minimising wear and no maintenance has yet been required on chute.
- Liner life is expected in excess of 12 months.
Locations

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