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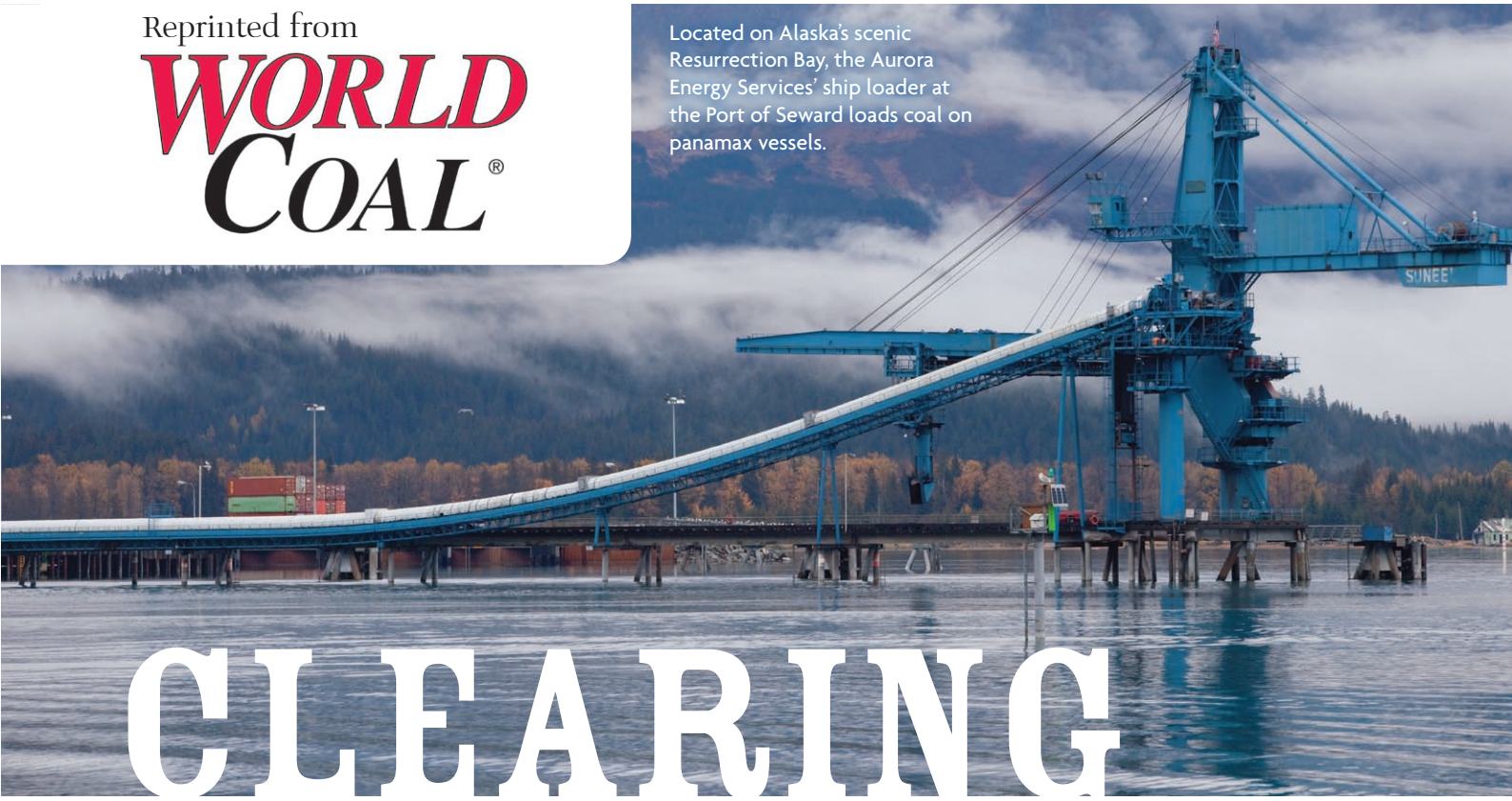

Located on Alaska's scenic Resurrection Bay, the Aurora Energy Services' ship loader at the Port of Seward loads coal on panamax vessels.

CLEARING THE CLOUDS

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EXPLAIN HOW A NEW CONVEYOR LOAD ZONE HELPS SEWARD COAL TERMINAL, ALASKA, REDUCE DUST WHILE INCREASING THROUGHPUT.

Seward, Alaska, is a century old shipping town, with a harbour at Resurrection Bay. It has also recently become one of Alaska's primary cruise ship ports, with an estimated 100 vessels docking each year. However, because the new cruise ship dock is adjacent to the older coal trans-loading terminal, image conscious community members have grown increasingly concerned about the stark incongruity between the bay's natural beauty and the vital industrial activity of the port.

Alaska's only significant coal producer is Usibelli Coal Mine Inc. (UCM), located nearly 400 miles north of Seward. Eager to capitalise on the expanding international export market, UCM and its affiliate, Aurora Energy Services LLC (AES), the operator of the Seward coal terminal, have determined that the road to becoming a significant player in world coal markets leads through the Port of Seward, one of Alaska's few year-round, ice free harbours.

Seward is also the southern terminus of the state-owned Alaska Railroad, and offers terminal facilities – owned by the railroad and operated by AES – with the

shiploading resources to feed the expanding international export market. Since 1985, the Port of Seward has shipped over 16 million t of coal, all of it originating at UCM, which now exports over 45% of its annual production. However, through 1999, the port facility's ageing infrastructure had seen few improvements. Upgrades began in 1999 when Alaska Railroad became the owner of the terminal. Even with the upgrades, by 2008, the facility had become both a logistical bottleneck and, with its occasional dust clouds, a source of environmental complaints.

The transfer point loading the boom conveyor on the AES shiploader was improved to increase its flow rate and serviceability, while reducing the chance of fugitive material.

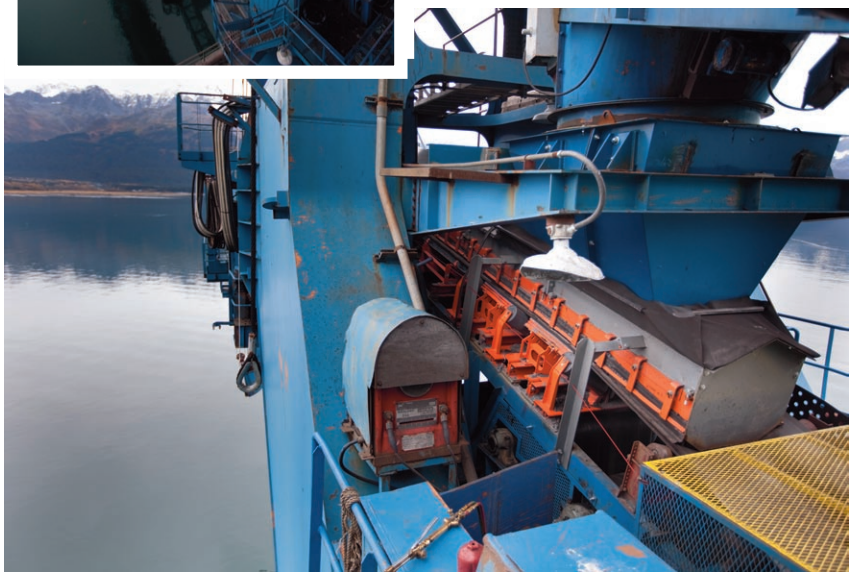
One of the worst problems was the shiploader itself. Constructed in a less environmentally sensitive era, coal dust clouds garnered negative attention that threatened the community's acceptance of the entire facility. Additionally, the malfunctioning shiploader's slow throughput extended coal loading times.

Debottlenecking the shiploader

With a view to expanding Usibelli's export market share, AES began taking steps to increase throughput at the port facility. The initial steps to increase belt conveyor speeds to carry 2000 tph through the shiploader proved almost entirely unsuccessful: "Working with what we had, we could only really do 600 – 700 tph," said terminal general foreman, Vic Stoltz. "We made some improvements and got up to a steady 750 tph run rate. But as we did, there were still some major issues with coal backing up in the chute."

AES determined the situation was unacceptable, and the terminal asked Martin Engineering to develop a model to see how throughput could be enhanced significantly, while mitigating dust buildup.

The need to balance UCM's desire to increase throughput capacity at Seward, while protecting the environment, led AES to Martin Engineering's conveyor technologies. With its ability to control fugitive materials, the new EVO™ load zone and Inertial Flow™ chutes virtually eliminate any visible sign of coal loading while simultaneously enabling faster run-rates. By drastically decreasing product spillage, the chute significantly reduces post-loading clean up times and creates a safer work environment for AES employees.



The loading zone on the boom conveyor was recently upgraded with new components from Martin Engineering's EVO conveyor architecture, including a hood-and-spoon chute and modular belt support cradles.

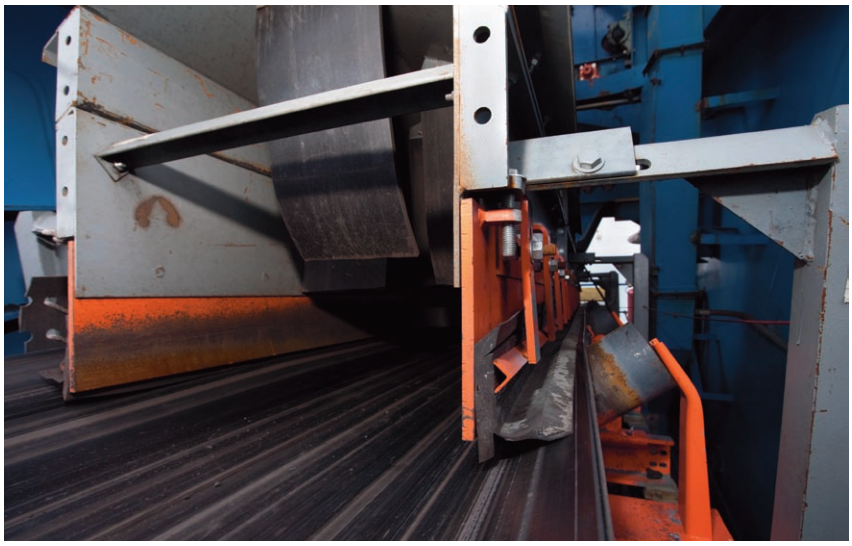
A plan for improvement

In February 2008, AES began seriously looking at chute modifications to correct the shiploader bottleneck. It sent a couple of buckets of the typical conveyed material down to Martin Engineering's research centre. The coal sample was tested to determine its flow properties in order to design a chute, using Discrete Element Method modelling, capable of properly handling the coal. "When Martin Engineering sent us back the computer models, we saw that we were able to pass 1500 tph and still control dust spillage, while keeping within our capital budget," said Stoltz.

In April 2008, the conveyor manufacturer followed up with an environmental audit, while AES was loading a ship. It consequently suggested additional improvements, and AES decided to implement several significant modifications. The final proposal included a new EVO equipped shiploading chute, which is designed from the beginning to shed build-up to contain and control fugitive coal dust.

A new conveyor architecture

The transfer point makes use of Martin® Inertial Flow transfer technology, where the chute is custom-engineered and modelled in 3-D to provide the correct design for the material and the flow rate required. Inside the chute, a custom engineered hood controls the flow of material from the discharging conveyor, maintaining a coherent material stream and minimising induced air. A smooth line loading chute or "spoon" places the stream of coal onto the shiploader's boom conveyor at the proper speed and angle and without impact to minimise material degradation, belt abrasion and the expulsion of airborne dust. By controlling the flow of material, this engineered transfer chute eliminates blockages, shapes the load, and minimises the creation of dust.



The external wear liner of the EVO system is hung on the outside of the skirtboard, to simplify installation, inspection and maintenance, while providing effective sealing at the belt edge.

Martin Engineering redesigned other components to contain material and improve maintainability. Improved belt support cradles installed under the drop chute absorb impact and stabilise the belt line to prevent spillage. Installed on the outside of the load zone's existing skirtboard, the EVO external wearliner allows effective sealing and, because it is on the outside, it is easier to install, inspect and adjust, without requiring entry into confined spaces.
Pre-engineered modular chutewall sections simplify the design and construction of transfer point stilling zones to manage airflow and control dust. At the exit end of the load zone structure, dust curtains act as baffles to slow air movement and allow airborne dust to settle back onto the conveyor.

Designed to adapt to the unique needs of a specific facility, the EVO conveyor structure has made the new transfer chute easy to install. Martin Engineering shipped everything up to Seward by container, and it was all organised, numbered and labelled. Designed to connect simply and quickly to an existing structure, the EVO load zone took only five days to install, after which it was immediately put into service.

Shakedown operation

The first thing the AES crew noticed was the improved material load rate. During its initial shakedown run with the new EVO shiploader chute, the operators running the system from the control room looked at the conveyor's weigh scale. Though pegged at over 100%, the belt did not shutdown. "It got to the point where they asked the stacker operator to deliberately try to make that chute plug up and he couldn't. He had run that machine for 20 years and even though the belt scale danger light was on, there was no shutdown," said Stoltz.

Additionally, following the EVO system's initial run, the shiploading area was virtually free of fugitive material build-up. AES crews were able to reduce their clean up time from days to only hours: "After the first boat, all you needed was a dustbin. The clean up time has been reduced by over 40 man hours/shipload," said Stoltz.

Paying for itself

Immediately after the first ship was loaded, Steve Denton, vice president of business development for UCM, went through the numbers in the vessel's statement-of-fact. Ignoring time lost to crew time, he found that the loading rate with the new system was 21,000 tpd, a record for the terminal and a significant accomplishment.

Since the installation, AES throughput production rates have increased to more than 20% above the former levels. AES has increased the typical average load rate for the entire shiploading process from 700 to 858 tph. With the new conveyor load zone, the terminal has gone from an absolute maximum of 18,000 tpd with dry coal and optimal loading conditions, to more than 20,000 on average – including operations in poor weather and less than ideal operating conditions. "That saves us tremendously on the cost of ship demurrage, which helps us to pay for the cost of the overall investment," said Stoltz.

The improvement has not stopped. As the AES crew has grown familiar with the new equipment, they are loading faster: "Loading at the maximum run rate is a whole new ballgame for our operators. We don't have slowdowns due to the chute clogging up which previously was a constant battle. Now our throughput can exceed 1500 tph," said Stoltz.

On a typical schedule, the Seward facility loads roughly 70,000 t of cargo onto a panamax vessel over a four day period. That schedule includes one or two ship moves during each 24 hour period, each requiring 45 – 120 minutes; this downtime further reduces the hourly average.

With the old system peaking at 1000 tph, and including ship and hatch moves, the terminal averaged a net rate of 700 tph. With the new chutes now in place on the shiploader, the system currently peaks at 1500 tph and averages a net of 858 tph: "When we maintain an all in load rate above 850 tph, we are pleased," Stoltz reports. "But we are going to continue to remove bottlenecks to raise our all in rate above 1000 tph."

Increased throughput equals less risk

To AES, the environmental and worker safety benefits of Martin Engineering's upgrades have been just as important as the production advantages. "Faster loading times help manage our risk, from both the environmental and the safety perspective," said Bartly Coiley, manager of environmental affairs, who is charged with staying ahead of environmental compliance at both the Seward port facility and UCM. "Poor weather conditions can and will conspire to generate more dust. Therefore, from an environmental standpoint, the faster you're able to load, the less risk you have that weather conditions will impact your loading cycle," said Coiley. "The longer it takes to load a ship, the greater the chances you have of creating dust."

The hood-and-spoon EVO chute itself creates a transfer point that is virtually dust free. And without coal chunks piling up around the transfer point, the new conveyor architecture provides a much safer work environment than what it replaced.

Service is critical to a conveyor's reliability. Situated 90 ft above the waters of Resurrection Bay, the shiploader is a very demanding area for maintenance personnel to work, but the EVO load zone's design allows for unsurpassed ease of service and maintenance. As most of the new components are external, it allows for easy and safe access for repairs and maintenance. Workers can remove and service most of the components from outside the conveyor structure without needing confined space entry. "There's less safety risks," said Stoltz: "The access for it is really easy and there are only a couple of occasional adjustments the operator needs to make."

The enhanced maintenance accessibility of the load zone equipment also helps keep the system in top operating condition with minimal dust accumulation, even in tough conditions like Alaska's severe winter weather.

Gateway to the future

Having an outlet to the ocean is vital for Usibelli. Not only is the export market consuming virtually half of what the mine currently produces, the Port of Seward "is the mine's growth gateway to the future," said Denton.

Domestic coal use in Alaska has an upper limit. Unless a new coal-fired power plant is built in the state, market growth will have to come from additional coal exports.

When Usibelli started pursuing the export market, they were shipping approximately 800,000 tpa. Even in 2009's tough market conditions, Usibelli plans to increase that figure this year. "Overseas, the market is virtually limitless. There are a lot of signs that Alaska is being recognised as an international supplier," said Denton.

Usibelli coal is sought primarily for its ultra low sulphur content, which is very important to customers in Korea, China, Chile, and to a lesser degree, Taiwan and Japan. "Alaska has a vast, virtually untapped coal resource," Denton says. "We're stable and, despite our winters, we don't have the kind of horrendous sort of weather issues that the Australians have faced. We're not going to have our draglines flooded out of the pits. Our customers see that we have large reserves, that we're a stable company, and that we're able to ship predictably."

UCM can now move ships in and out of port even faster. "The work that Martin Engineering did took away a chronic bottleneck for us. There were many things we were doing to increase our throughput, but it was impossible to realise those benefits until we cleaned up our loading operation with the installation of the new hood-and-spoon transfer chute," said Denton.

With throughput increased, shiploading times are being reduced, and costs are falling. Decreased shiploading times are an important advantage, making Usibelli's export coal more affordable to overseas customers: "Basically, we should be able to knock one day off our loading time for each ship. Over the course of 1 million tpa, that's a major saving for our customers as they'll be able to enjoy better FOB prices," said Denton.

Clean coal handling technology at work

The improved coal handling system is helping the Seward coal terminal prepare for further growth. The new conveyor load zone on the terminal's shiploader has eliminated most environmental issues, which has been good for the public image of coal in a town that sees a plethora of tourists each year. "Because our location is right next to the cruise ship dock, our facility is almost a tourist attraction in and of itself," says Stoltz. "After installing the EVO system, the cruise ship passengers don't see any dust and even the ship crews couldn't tell coal was being loaded."

"Martin Engineering's clean coal handling technology has helped us solve our coal handling challenges, especially from a public perception standpoint. If the public doesn't see a cloud of coal dust when we're loading, they have nothing to complain about. And frankly, we'd like it to stay that way," said Stoltz.