Willamette terminal expansion

by Tom McLaughlin, Greenberry Industrial, USA

The Pacific Northwest realised a significant boost to its cement supply beginning in March 2007. Ash Grove Cement Co transformed a dormant alumina import facility built in the mid-1980s into a vibrant cement handling complex. Previously, Ash Grove was the only one of the four major cement suppliers in the Northwest that did not import offshore cement to the region. Ash Grove had previously supplied the Northwest from its manufacturing plants in eastern Oregon and Seattle. The terminal complex will allow Ash Grove to increase its presence in the Northwest. Ash Grove Cement chose Greenberry Industrial, a Corvallis, Oregon based industrial contractor to help them complete this transformation.

In early 2001, the energy crisis in the US was in full swing and the alumina unloading facility in Portland was owned by Northwest Aluminum, operating as Goldendale Aluminum. The aluminum industry in the Pacific Northwest was facing the most critical time in its history. Among the primary factors in smelting aluminum is the cost of electrical power. Due to an extreme under-supply of power, transportation and other costs were rising dramatically and prohibiting aluminum smelting operations from moving forward in a cost effective manner. The majority of Northwest Aluminum's power had been provided by the Bonneville Power Agency (BPA), a federal power agency operating hydroelectric facilities in the Northwest. The turbulence caused by the Energy Crisis at the start of the new millennium and the forward prices of power, especially market power, where Northwest Aluminum was receiving almost 40 per cent of its power during some times of the year caused the economics of aluminum smelting to turn upside down. By the end of December 2000 Northwest Aluminum shut down all of its smelters and via their agreement with BPA had all of its contract electrical power remarketed by BPA. That agreement continues through to 2010. As a result, the Portland Alumina Unloading Facility was no longer required. In 2005 the facility was sold to Ash Grove Cement Company.

New cement unloading complex

"The Northwest and Rocky Mountain areas have been a very hot market in the last few years", said Dave Baker, vice president of sales for Ash Grove in Portland. "As a result, we saw an opportunity here to buy this other terminal where we can import and supplement our supply to better serve the market."

Figure 1: Van Aalst unloader and new pedestal

The Ash Grove expansion is also good news for Oregon and Washington area contractors who have faced project delays and escalating costs due to cement shortages.

"The site will bring more cement into the Portland market and will help ease some of the shortfall," said Rich Angstrom, president of the Oregon Concrete and Aggregate Producers Association. "It will be a big deal for ready-mix producers and contractors," he said. "In addition to facing a nationwide production shortfall, the cement market has also been squeezed by the high costs of transporting the material by rail from other regions," Angstrom said. "Ash Grove is capitalising on the shortage with their movement to site another cement facility in Portland," he said. The import terminal offers storage capacity of up to 63,000t that could help maintain a larger, more easily accessible cement supply in Portland.

"The Ash Grove expansion is going to add more capacity to the Northwest cement market. Plus, it's probably going to help alleviate some problems inland in states farther east because of the access to rail that they'll have", said Kevin Richardson, a Portland-based sales representative for Lafarge. Lafarge, currently Portland's smallest cement supplier, was one of several companies to unsuccessfully bid on the Goldendale facility. "Ash Grove isn't going to be constrained to their manufacturing limitations now," Richardson said. Ash Grove currently has five cement manufacturing plants in the West and

has expanded two of them in the past five years, increasing production to 3,265,300t from 3,049,000t.

Ash Grove already operates a cement truck load out facility (with a storage capacity of 18,000t), immediately south of the old Goldendale Aluminum facility. The new redesigned complex would allow Ash Grove to dramatically increase its cement storage capacity (by 63,000t), offer flexibility in transportation (train and truck load out), rail access points, but most importantly begin importing cement from manufacturers in Asia. The new complex will also increase Ash Grove's waterfront to three-quartres of a mile along the Willamette River.

The challenge

The existing facility would need to be modified in all areas from the shipunloader all the way through the process to the rail scales in the rail load out. The facility is immediately adjacent to the Union Pacific Rail Yard in Portland. The other boundary is formed by the Willamette River. While three-quartres of a mile long, the site averages less than 100ft wide at its widest point.

A definitive construction plan was developed by Greenberry Industrial to address everything involved with the safety, demolition, refurbishment and new construction of the new facility. The balance of all plant mechanical equipment procurement was also handled by Greenberry. A brief review of each of the major areas of the facility follows.

Shipunloader

An existing Alesa shipunloader was replaced with a larger capacity unloader from Van Aalst. A significant amount of demolition was involved to remove approximately 17,000lb of steel. Due to the very restricted access, barge mounted cranes were used to do most of this work.

Figure 2: new 250˚ tank distribution truss

Van Aalst did a thorough review of the existing unloader. Its supply included the new unloader arm itself (see Figure 1), a new hydraulic skid, additional blower capacity and a new receiving vessel. New support steel as well as a new pedestal for the Van Aalst unloader were required for the old Alesa base structure to support this effort. All new steel and piping was fabricated by Greenberry. Airslides from the Receiving Vessel to the unload airlift were also refurbished. At the end of the day, throughout the plant, over 900 total feet of airslides were completely refurbished.

Storage tank distribution

Three 90 x 90ft storage tanks existed at the facility. Because of the difference in flow properties between alumina and cement, the existing airslides were changed from an existing 5˚ slope to a new minimum 8˚ slope. For unloading this meant raising the distribution point 30ft higher to a total height of 125ft. A new 250ft long truss (Figure 2) was fabricated and installed by Greenberry across the top of all three storage tanks. This included structural additions to the airlift tower, removal and replacement of the wear elbows as well as piping, installation of DCL supplied diverter valves, new dust collection piping and refurbishing the three roof mounted baghouses. In total, seven baghouses were completely refurbished in the plant.

Figure 3: aerated floor installation

Storage tanks

Three storage tanks of identical design were radically modified. The previous floor was a rather simple configuration at a 5˚ slope. After numerous redesigns, the final design involved removal of more than half of the steel plate floor, half of the support sand, construction of a new concrete access and removal tunnel and a new concrete floating floor designed by FLSmidth.

Greenberry, under separate contract with FLSmidth, fabricated all of the air distribution boxes and piping distribution system for the floating floor. To accomplish this, a 20 x 20ft opening was removed from the face of each tank. After the floor was installed (Figure 3), this opening was replaced. At the end of the day, over 3200 yards of concrete and controlled density fill had been poured in each tank. A new piping ring header system feeds 40 different zones in the floor of each tank. The new cement removal system included DCL rotary valves, isolation valves and new airslides.

In Tank No2, refurbished airslides distribute to the railcar loadout. In Tanks No1 and No3 this is accomplished with conveyor belts fabricated by Greenberry. This design was used at these two tanks to minimise the amount of concrete demolition which would have been required for these two tanks to use

Figure 4: railcar loadout truss

airslides. The baghouse at the Railcar Loadout was one of those completely refurbished. A construction elevator was installed by Greenberry to reduce man-hours and consequently, labour costs, required to get to the top of the tanks during construction.

Railcar loadout

The tank unloads proceeds to the railcar airlift tower which is then transported via airslides across a refurbished and modified truss to the rail loadout building. The receiving bin at rail airlift was refurbished by Greenberry along with all of the airslides from the railcar airlift tower to the rail loadout building. Modifying this steel was probably the easiest on site, despite having to use a 100t crane with less than 50ft between this steel and local 115kV power distribution lines (Figure 4) while swinging a 100ft truss. A Distribution Box distributes cement to one of three storage bins in the railcar load out building.

Railcar loadout building

DCL provided a new distribution box, isolation valves and loading spouts in the railcar loadout building. The previous configuration was a single swing spout which was loaded from all three bins. This configuration was significantly modified to allow for two new spouts which can each be loaded out from any one of the three bins. This requirement necessitated addition of a new blower, a completely revamped air distribution system a structural steel demolition and modifications. New railcar scales were supplied and installed by Mettler Toledo under subcontract to Greenberry. Complete refurbishment of the railcar pusher system hydraulics was performed on the 20 year old system which had not been operated for the last five years.

Overland conveyor

A second option to the distribution from the tanks to the railcar loadout building is conveyance to the existing Ash Grove truck loadout facility located 2000ft south, via an overland conveyor. The design of the overland conveyor is supplied by MVT, now owned by FLSmidth. Under contract to FLSmidth, Greenberry Industrial fabricated and installed the conveyor (Figure 5). This conveyor is will be operational at the end of November, 2007.

Figure 5: overland pipe and conveyor

Additional supply

Greenberry installed a new blower island (including six blowers and all piping to each tank) for the air distribution to the floor of the tanks (Figure 6), all control air piping to each of 44 control valves for each tank, a completely new compressed air system using a Quincy rotary screw compressor and distribution piping, fabrication and installation of all new handrail, guarding, etc, necessary to enable the plant to comply with today's safety requirements. Major commissioning support (equipment checkout plans, mechanical checkout, etc) was also provided by Greenberry.

Results

After over 100,000 man-hours invested in the construction of the project there were no lost time injuries. Safety was paramount. Project Construction Planning addressed issues including the proximity of electrical power lines, work over water, working on steel over 100ft in the air, as well as routine construction issues. Very few fit up problems existed due to the high quality of fabrication. While some operational issues still exist, Greenberry is proud of their success with this project. Since the first ship, which arrived on April 9, 2007 Ash Grove has unloaded nine ships thus far at the time of writing. The cost to do this work is confidential. However, having just completed two facilities (Greenberry recently received an award winning transformation for Lehigh Cement at Port Everett – see ICR November 2007) where Alumina unloading is modified to unload and store cement, the metrics for both plants in terms of dollars per storage tonne are very similar.

Figure 6: air distribution system to tank floor