A Safe Trip

For safe, economical, high-volume stockpiling, a producer replaces loaders use with a 580-foot tripper conveyor.

From April to November, Wissota Sand & Gravel stockpiles material 24-hours a day. "We load out trucks 52-weeks a year, but we can only produce material when Mother Nature lets us," says Dennis Simniok, a 30-year industry veteran who is supervisor of the company's Milwaukee pit. The operation yields 1.2 million tons of material, one-half of which is #1 stone (3/4"-). To meet seasonal demand and to stock up for the brutally cold winter months, the site must build and maintain a stockpile of up to 200,000 tons on its small 800-foot-long by 200-foot-wide footprint. Until just three years ago, the company tackled all its stockpiling with round-the-clock loader operation – a situation that created serious safety issues – and ballooning operating costs from maintenance, labor, fuel, and material loss due to contamination. Today, the site boasts a 580-foot, pillar-supported, tripper conveyor, one of the longest and tallest in the region. The custom-designed system was manufactured by Superior Industries of Morris, Minnesota.

Safety First

There are a lot of factors that led the operation to replacing loader use with a tripper conveyor system, one of the most important being safety. A disproportionate amount of surface mining injuries and fatalities involve mobile haulage equipment operating at various dump sites. The method of driving a loader up a ramp and dumping its load over the crest of the pile is described in MSHA safety studies as "fair" at best. Adequate berms (up to axle height) must be maintained, and even then, backing through or over a berm is a common cause of stockpile accidents. "Think about it – you're in a loader and suddenly you're up to 60-feet above ground level, on an inclined ramp. And, if you're stockpiling 24-hours a day, you have an individual doing that in the dark. It just becomes a huge safety issue," says Simniok.

Prevent Material Loss

Not only does it take time and labor to build and berm a ramp for stockpiling, it results in significant material loss. Simniok emphasizes that even if it were safe for loaders to continually run up and down ramps, it takes a tremendous amount of material to build the ramp – and then you end up with a contaminated pile. "The loader tracks sand up on the pile. Pretty soon, the ramp is all dirty and you have less salable product. When you load trucks in the winter, you can only load back to the ramp and then you've got to back away from it because the ramp is dirty and you can't load out that material. Furthermore, every spring, you have this dirty ramp to deal with – material which you can only sell to sewer contractors at a cut rate," he says.

Eliminate Costly Loader Use

Studies show that lifetime (8,000- to 12,000-hours) loader owning and operating costs are no less than 2.25 times higher than the unit's initial purchase price – and that figure does not even include labor and the effects of an ongoing tire shortage and fuel-cost crisis. It's a very expensive way to stockpile. Plus loader component and tire wear accelerates when the machine is operated on inclines exceeding 6-percent.

"During the day, our loader and operator would have to load out trucks as well as stockpile. So we would usually put a couple of additional loaders on stockpiling for a several hours at the end of the day, so that one loader could keep up with the job at night. What's more, you have to consider that each loader is stockpiling one bucket at a time. We were stockpiling 2,000 tons a day, but producing 5,000 tons a day. We really had to take a close look at the cost of running these machines," says Simniok.

Stop the Money Pit Madness

Simniok says that they opted to put in a tripper conveyor due to site limitations which called for a long, narrow, yet high-volume stockpile to meet demand. Traditional radial stackers would not be able to do the job. They started looking at different tripper conveyors in different configurations – taking a little bit from one setup and a bit from another. Then they got together with Superior Industries and its dealer, R.B. Scott, to hash out the details.

A Safe Trip

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"What we ended up with is a tripper conveyor system that runs unattended and stockpiles at 450 tons per hour – with no man hours, no machine, and no fuel. Obviously, today's fuel prices are triple what they were when we started up the system three years ago. So the payback is really huge right now," he says.

Typical Tripper Conveyors

Wissota Sand & Gravel operates a movable tripper. As described by the Conveyor Equipment Manufacturers Association (CEMA), trippers are devices which discharge material from a belt conveyor at points upstream from the head pulley. A tripper consists of a frame supporting two idling pulleys, one above and forward of the other. The conveyor belt passes over and around the upper pulley and around and under the lower pulley. The belt usually inclines to the upper pulley and may run horizontally, or it may then incline again from the lower pulley.

A typical movable tripper, says CEMA, is driven by the conveyor belt itself, by an electric motor, or by a cable and winch. The tripper moves in a forward and reverse direction to make a long pile on one, or on each side of the belt conveyor.

A Custom Fit

"Superior Industries came up with a tripper conveyor design that really fits our needs," says Simniok who lists the following parameters:

- Continuous operation
- A remote-controlled tripper car
- Remote-controlled discharge from one side to the other
- Ability to be installed on 57-foot-tall concrete pillars
- 30-inch belt
- Ability to span at least 60-feet between pillars
- Capable of building a big-volume stockpile of at least 180,000 tons
- Ability to handle 450 tph of wet material – without the head pulley spinning out

Simniok says that they chose the Superior Industries design over the competitive bids due to the integrity of its structure. "It's beefier with heavier angle iron (1/4" vs. 3/16"), and this gives us more bang for the buck. We didn't want to skimp as we only want to install something like this just once. And, with the heavier truss design we found that we could make a longer, 65-foot span between pillars, which meant we had to install fewer pillars," he says.

A flop gate allows a discharge of material to the north or to the south. Throughout the summer, he explains, they flop from side to side, going from pillar to pillar, until they have a pretty solid, full pile under that conveyor by the fall. "Toward the end of the season, we literally run that tripper every 30- or 40-minutes, inching it down the line to top the pile off so there are no pockets for the snow and ice to get into over the winter," he says.

A tripper trend

"Tripper conveyors are getting more common and with this fuel crisis, we'll be seeing more of them in the industry," says Simniok. "But usually you'll find tripper systems no more than 30- to 35-feet off the ground. At 580-feet, our tripper conveyor is one of the longest in the region and is certainly one of the tallest, because of the site we have to work with. I see this system being in place forever, and we are thinking of installing another to handle our sand product. Obviously, conveyors like these are the most safe and cost-efficient way to move and stockpile material. This system has already paid for itself," he says.