TECH WATCH:
IT'S ELECTRIC

ON-BOARD TRUCK SCALE:
MAXIMIZING EACH LOAD

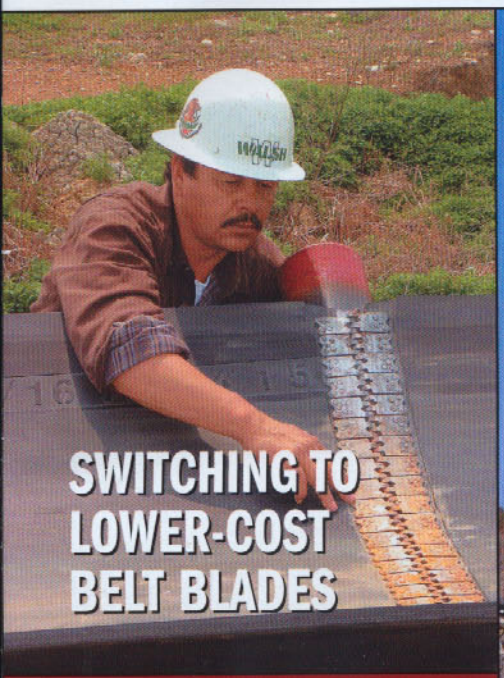
90TH ANNIVERSARY:
1940-1950

PIT & QUARRY

1916 2006 90 YEARS

MAY 2006

EQUIPMENT ■ OPERATIONS ■ SOLUTIONS



SWITCHING TO LOWER-COST BELT BLADES

PRIMARY CONCERN

Shawnee Rock replaces its primary crusher and production goes sky high

Mega Producers 2006

Pit & Quarry's 2006 top producers list

A QUESTEX PUBLICATION

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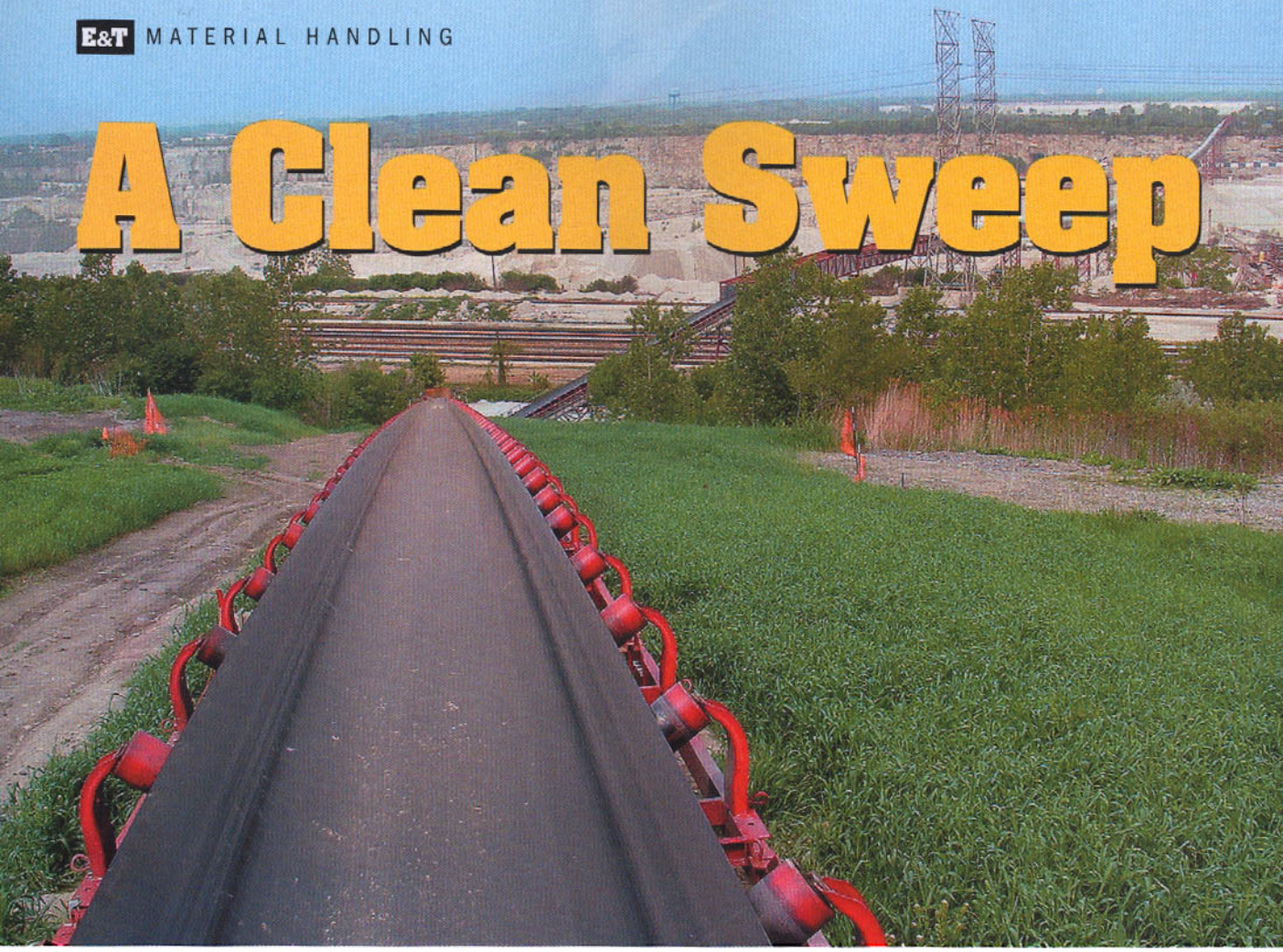
A Clean Sweep



Challenge

Finding conveyor wiper blades that can handle heavy, wet silt and sand.

Solution

Cleaners designed for high-volume, abusive loads.

Tip

Blade material can have a dramatic effect on blade life.

A switch to lower-cost conveyor wiper blades solves a downtime problem for an Illinois earthmoving project.

BY MARK S. KUHAR

Imagine winning a contract to move 13 million tons or 7,000,000 cu. yd. of old overburden and building a three-mile-long, multi-million dollar conveyor to do it, then having the project bog down in costly delays owing to repeated failures among a handful of conveyor wiper blades. That's exactly what happened to Chicago's Walsh Construction Co., until a new blade design came to the rescue.

They call it the McCook Reservoir Project, and Walsh's assignment is to strip away a 35-ft.-thick blanket of silt, sand, clay, glacial till, cobbles and boulders covering approximately 226 acres. This long, narrow site is sandwiched between Illinois' Interstate 55 expressway and Chicago's Sanitary Drainage & Ship Canal, where both run diagonally through the city's southwest suburban area.

Once hidden beneath the Des Plaines River, which was displaced about 1,000 ft. to the north when the canal came through in the late 1800s, this stretch of unused land covers a limestone deposit targeted for aggregate quarrying once the overburden is gone. After the limestone is exhausted, around 2025, the remaining pit will become a nine-billion-gallon reservoir for Chicago's "Deep Tunnel" flood control system.

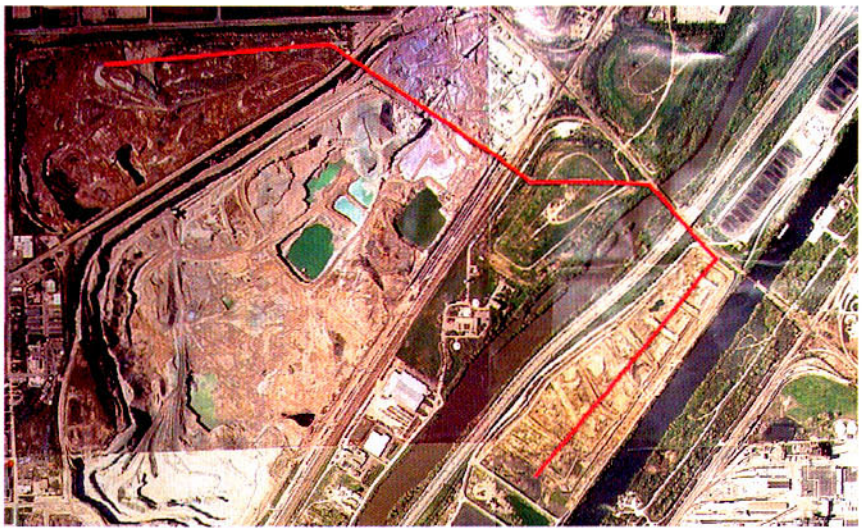
Such massive projects are not unusual for Walsh, a third-generation, family-owned firm prominent in Chicago area construction for more than a century and recognized as one of the nation's top 30 contractors. Its recent local activity most notably includes Chicago's Millennium Park, McCormick Place Convention Center, O'Hare Airport International Terminal, Wacker Drive Reconstruction, John H. Stroger Jr. Hospital of Cook County and many of the city's high-rise office and residential buildings.

Walsh's part of the McCook project, planned

in two phases scheduled for completion in 2007, involves excavating the soil and conveying it beneath I-55, across the river, over a 80-ft,-high landfill, over six sets of rail road tracks, under two ComEd high-power lines and through a working quarry, to end up filling in a smaller spent quarry nearby. This roughly V-shaped route starts out in a northeasterly direction then snakes back toward the northwest, initially using four conveyors linked by transfers at the turning points and feeding a mobile "finger stacker" at the final destination.

Belt spliced for shortening

Phase 1 excavation began approximately in the center of the worksite, with a mobile trap loader and shuttle conveyor feeding conveyor #1 approximately 3,500 ft. from the first transfer. Nearby, a 9-cu.-yd. backhoe excavates the overburden and continually loads 40-ton trucks for delivery to the trap loader. As earth removal advances toward the northeast, the trap loader and shuttle conveyors are periodically moved to keep truck haulage distance as short as possible.



After the limestone is exhausted from the project, around 2025, the remaining pit will become a nine-billion-gallon reservoir for Chicago's "Deep Tunnel" flood control system.

With each move, an expandable multi-loop belt takeup at the head end of conveyor #1 shortens the belt and gradually fill its 500-ft. capacity. This belt is mechanically spliced in 500-ft. sections with hinged-plate fasteners to ease removal of sections whenever the takeup is full. Unneeded belt sections are separated for removal by pulling out the hinge pins from their leading and trailing splices, then rejoining the fasteners on the remaining belt ends.

The conveyor framework left behind as belt sections are removed will be relocated along the southeast edge of the worksite and supplemented with a realigned conveyor #1 extending about 5,600 ft. back toward the southwest, anticipating excavation at that end during Phase 2. Repositioning the conveyor to one side will leave the limestone exposed in Phase 1 clear for quarry development, while the Phase 2 site is being lined with a slurry wall reaching down to bedrock in preparation for excavation there.

Wiper woes

According to Foreman Simon Ochoa, Phase 1 went into operation in mid November 2004. Rated for 3,500 tph at 770 fpm, it was projected to move more than 20,000 tons per day but didn't come close. "The head-pulley belt wipers built into the transfer chutes started giving us trouble right away," he recalls. "The silt and sand was very wet and heavy and would flip the blades back. When we added tension to keep the blades tighter against the belt, the blades got chewed up and their mounting poles bent. Then we'd be down for an hour or two replacing the whole assembly. This was happening at least twice a week, but under the worst conditions we could see it two or three times in half an hour. It really made our lives miserable out here."

The misery came with a big price tag, he adds. Loss of production revenue combined with the cost of idled labor and equipment adds up to more than $12,000/hour. A less tangible cost results from having to shut down a fully loaded conveyor, because it has to be restarted the same way.

On these 60-in. wide belts, troughed at 35 degrees, a full load equals one ton for approximately every 4 ft. of belt. "That's a lot of weight for a dead start, but our drives are sized to handle it," he points out. "We have 400 hp motors on the level runs and 600 hp on the 12-degree incline over the landfill, but pulley shafts and bearings, takeups, belting and splices still suffer from the extra stress, especially when it happens again and again."

Anxious to solve this problem, Ochoa

and Project Manager Terry Gill discussed it with their rep from Service Industrial Supply, Virgil Graening, who alerted them to Rockline belt cleaners, recently introduced by Flexco, Downers Grove, Ill. The cleaners are specifically designed for the high-volume and abusive loads of quarry applications. "Flexco makes the rivet-attached hinged plate belt splices and installation tools we use," Ochoa says, "so when their salesman Mike Feltes came out to help train our splicing crew, we set up a wiper trial."

New blade design

By then, he adds, the Walsh crew had already machined heavier solid-bar replacements for the 2-in. diameter hollow-pipe blade mounting poles furnished with the original wipers, aimed at preventing more bent shafts. "We learned that Rockline blades use the same type of mounting system as our original blades, so we could install them on our beefed-up poles and keep the rest of the original wiper support hardware in place, saving the cost of total replacement." Both blades are made with a molded-in metal track that lets an old blade slide off the pole and a new blade slide on, from one side of the belt, locking in place with a single pin so no tools are needed.

The most obvious difference with Rockline's patented ConShear design is its shape, Ochoa points out. The blade is a single piece of polyurethane molded with a claw-shaped cross section having a faceted profile. This geometry allows the blade to continually renew a sharp shearing edge every time blade wear reaches a new facet, which keeps cleaning efficiency high throughout the life of the blade. "That shape causes the blade to arch toward the pulley," he explains, "so it addresses the belt at a steeper angle that prevents the silt from pushing it away."

A less visible difference is blade composition, according to Flexco. Although both blades are solid polyurethane, the ConShear material is a proprietary formulation that provides 25 percent longer life as confirmed by independent testing. "Polyurethane blades generally work better with mechanical belt fasteners than metal blades do," Ochoa notes, "but for smoothest possible operation, we countersink the fasteners flush with the belt cover."

Flatter splices countersunk

Countersinking is done with Flexco's FSK belt skiver. This compact, hand-operated tool rides across the belt end on an integral ratchet-driven roller, carving a flat-bottomed trough as deep as 3/8 in. in a single pass. In addition to lowering the splice profile, countersinking brings fastener plates closer to the belt carcass for a stronger, more durable grip.

Also contributing to smooth, reliable belt wiper operation, the Flexco RAR6LP rivet-attached splices used here are a special wiper-friendly design with plates 24 percent thinner than standard Flexco R6 fastener plates. Their reduced thickness is compensated by an increase in toughness and corrosion resistance, using a special low-chrome stainless steel called RustAlloy.

"Our ConShear blade replacements went in near the end of January," Ochoa reports. "By the end of May, four months later, more than 560,000 tons had passed over them without one incident of blade flipping or any need for tensioner adjustment due to wear. They gave us what we needed — a quick fix for a bad problem, without having to change out all the wiper hardware."

It was a good time to be sure the wiper blade problem was solved, he concludes. In June, construction began on conveyor #5, which gradually will extend the discharge end up to 4,000 ft. across the destination quarry, this time using ConShear blades right from the start. By mid-July, the first sections of #5 were operating and production total was approaching 770,000 tons, with none of the system's ConShear blades yet worn out.

Information for this article courtesy of Flexco, www.flexco.com.