Cutting batch plant clean-up costs

By Mark Walde

Asphalt batch plants have an excellent opportunity to raise profitability with a cost-cutting improvement that unfortunately seems to be escaping notice in many locations. Thousands of dollars per year are being wasted by material loss, man-hour cleanup expenses and inaccurate metering, all resulting from conveyor-belt carryback that could be greatly reduced by adding effective belt cleaners.

Batch plants typically operate with anywhere from eight to twenty belts, perhaps half of which usually are candidates for belt cleaners. Among these, none need good cleaning more than the high-speed slingers that distribute sand, gravel and stone within the rotary kiln…and as a result have special requirements discussed below. But whether the kiln receives its virgin aggregate by slinger or gravity feed, either method receives its material from a weigh-scale conveyor, which needs good cleaning for a unique reason.

Carryback — stuff that sticks to the belt and shakes off somewhere along the underside return run — distorts the accuracy of measured weight going into the kiln. Small at any given moment, it adds up to significant error and impairs the plant operator's ability to gauge the actual quantity of materials consumed, in turn making cost and profitability tracking more difficult than it has to be.

Across the plant, carryback also results in a lot of unnecessary shovel time, which is especially disruptive considering that most batch plants are highly automated operations run by a small staff of two to four, whose other duties shouldn't get delayed or left undone because cleanup demands attention. However, few plant operators like the idea of routinely hiring outside labour to do this work.

Probably the most compelling reason to minimize carryback is the fact that once virgin aggregate is spilled on the ground, these materials cannot simply be scooped up and thrown back into the product stream, because now they have been contaminated…and recleaning them is more trouble than it's worth. Lost materials alone can be very costly to a plant operator over the course of a year.

Over the long run — through perhaps harder to assess — cleaner belts will last longer, suffer less splicing and tracking problems, extend the life of pulleys, idlers and bearings, and generally keep replacement and repair costs as low as possible.

Asphalt plant slinger presents tough, demanding application for conveyor belt cleaners.

Across the entire aggregate industry, there's no tougher, more demanding application for belt cleaners than on an asphalt plant slinger. Yet batch-plant manufacturers typically do not include a head-end cleaner as part of the slinger assembly. What is most often seen on slingers in the field is a rotating brush-type cleaner usually mounted farther back along the return side, where it drops the removed carryback onto the plant deck area. While this cleans the belt, it does nothing to address the material loss and cleanup problems described earlier.

For any belt conveyor, in order to keep the cleaned-off carryback in the product stream, the primary cleaner must be located at the head pulley. On most slingers, normal operation moves the head end in and out of the kiln, while on stationary types, the head end stays inside the kiln. Either type exposes its head pulley cleaner to excessive heat, typically around 450°F at the kiln intake. The slinger belt, travelling at around 122 m/min, cycles in and out of the kiln quickly enough for standard belting to escape the harmful effects of overheating. The cleaner, however, must be a special type designed to tolerate high-temperature environments. For the same reason, slinger head-end cleaners must have an all-metal mounting and tensioning system instead of the elastomeric self-adjusting cushions widely used on belt cleaners throughout the aggregate and asphalt industry wherever heat is not an issue.

Fortunately, the type of cleaner blade that removes even fine, sticky material most effectively is tungsten carbide, which naturally provides a heat-resistant alternative to the urethane blades used at many belt-cleaner locations where ambient temperatures are more normal and where belts are joined by mechanical fasteners. Because of their hard-edged, scrape-clean action, tungsten carbide blades usually are restricted to belts joined by vulcanizing.

As most asphalt slingers are the moving type, their conveyor belt runs on an inner moveable frame which is mounted on a track-and-roller suspension within a stationary outer frame. This means the cleaner's mounting and tensioning system must able to fit entirely within the moving inner frame, which usually requires minor customizing of the cleaner mounting hardware.

On stationary as well as moving slingers, the head pulley usually is 254 to 304 mm diameter, which may require the cleaner blade to be set a bit higher than its normal contact point of 15° below the head pulley's horizontal centerline. This is no problem as long as the blade tip addresses the belt at a 90° angle and stays below the normal flow path of material being discharged. The path of discharge from belts moving at slinger speeds should provide ample clearance. In extremely tight clearance situations, however, extra-short blade support arms can provide another alternative for varying the blade height.

Where slinger belt head pulleys are

Installation of Flexco Eliminator® H-Type® high temperature belt cleaner at the head pulley of a moveable slinger shows tungsten-steel blades mounted higher than usual, with cross-pole blade mount and spring tensioning mechanism trimmed to fit within slinger's moving inner carriage.

In rest position outside the kiln, slinger head-end shows why stainless steel blade-tip shields are needed to keep buildup off cleaner-blade mounting bolts for easier blade replacement.

crowned to maintain proper belt tracking, segmented-blade cleaners have the advantage of allowing their end segments to be shimmed slightly to follow the curve of the crowning, for more uniform cleaning across the full width of the belt.

Slinger-belt cleaners also must be able to accommodate reversible belt operation, which is required for blend analysis and calibration adjustments at the start of each production shift. In most plants, reverse operation usually begins each day as well, for cleaning old materials out of the hopper feeder bins before new aggregate is loaded in.

Although slinger and weigh-conveyor belts are the logical places to start exploring the benefits of effective belt cleaning, other places where product is being lost and cleanup is making unnecessary work typically include the transfer points between belts that transport the virgin aggregate mix from the main gathering belt to the weigh-scale belt. Evaluate all opportunities and you may find that the savings from lost material reduction alone can pay for at least one belt cleaner per conveyor in less than a year. ❑

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