Balancing drum wear and tare

Operational changes are forcing producers to view the truck-mounted mixer as an expendable item rather than as a capital investment

With all the wear and tear involved in ready-mix concrete production, nothing takes more pounding than the truck-mounted mixer drum. Over the years producers have viewed the drum as a capital investment and tried to extend its life by patching and replacing fins.

A survey of ready-mixed concrete producers, commissioned by Oshkosh Truck Corp., Oshkosh, Wis., suggests a strong interest in mixer-drum life-cycle costs. Most producers surveyed indicated that they strongly agreed with the statement: "Stronger alloys that lengthen drum life would be worth the extra cost." In the same survey, producers also indicated that drum durability was their most important concern when they considered overall truck dependability. Why are producers' attitudes toward their drums changing?

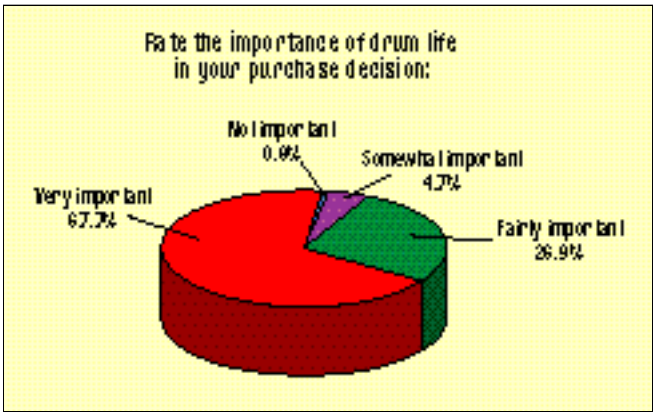
While the salesman welcomes this delivery, fleet managers know that with every turn, these drums are wearing out.

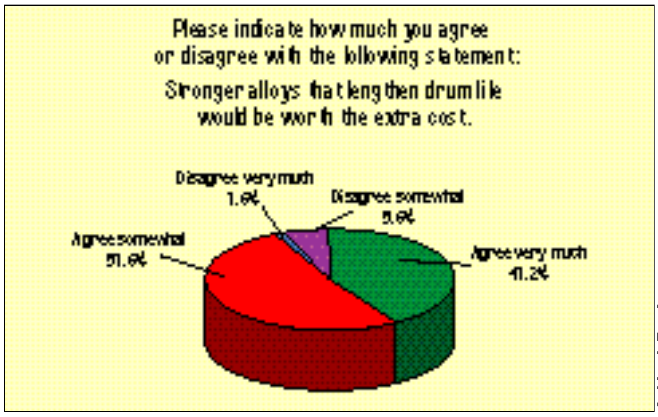
Field repairs becoming expensive

Mixer wear rates are a regional phenomenon, directly correlated to the coarse aggregate's abrasiveness. Even so, producer responses on one survey question indicated that on average, managers expected a standard steel mixer drum to last about five years, significantly less than the expected life of its truck chassis. This life-cycle difference often forces producers to choose between extending drum life through field repairs and purchasing a replacement drum.

Many producers are finding the operational cost factors of extending drum life through field repairs have changed:

- Mixers are no longer idled for long time periods as the concrete construction season has become almost a full-year operation
- Producers no longer own that extra truck that gets set aside for drum repair work
- Field repair costs have risen dramatically, due to OSHA's confined-space and respirable dust regulations
- Producers no longer have paint shops to touch up after interior welding, making it difficult and expensive to maintain drum and truck appearance, an increasingly important marketing aspect of business
- Producers have generally found that mixing consistency is poorer in old drums with retrofitted, field-installed fins than with a manufacturer's new drum, due to warping





Oshkosh Truck

A recent Oshkosh Truck study reported that drum life is a key concern of ready-mixed concrete fleet managers.

The drum as a complete unit

With field repair less of an economical option, producers are turning to drum manufacturers for help. "Increasingly, producers are viewing the drum as a complete unit, rather than as shell and fins," says Tom Harris, vice president of sales at McNeilus Truck & Mfg., Dodge Center, Minn. Drum manufacturers are finding more customers interested in customizing the material in both the drum and fin.

But selecting the correct steel type and thickness for drum and fins is no textbook exercise. In standard practice, producers' and manufacturers' steel choices have centered in the 200 Brinell hardness range, with thicknesses of 3/16 inch or ¼ inch. While many drum manufacturers have forming equipment capable of handling other steel types, it's the producers' tare-weight limitations that narrow their options. When producers select the ¼-inch thickness on an average 10-cubic-yard mixer to gain more potential steel wear life, they surrender about 1,000 pounds of tare weight, or about ¼ cubic yard of capacity. Many producers have traditionally chosen to extend drum life by using thicker steel. Drum life may be extended by about 25%, when compared with thinner, standard-hardness steel.

Some producers are attempting to extend drum life even further. They have selected drums and fins made with steels with higher levels of wear resistance. Standard drums made of these steels weigh about the same as drums made from 3/16-inch standard steels, but may outlive drums made from ¼-inch steel. SSAB Hardox, a Swedish wear-resistance steel manufacturer, has been working with several American mixer drum manufacturers to promote the benefits of longer drum life. "Our combined research with the engineers at SSAB Hardox shows that producers should be able to double drum life under most circumstances," says Archie Stam, product director for Oshkosh.

Producers, selecting abrasion-resistant steel, expound their benefits. "Around here we expect to get 15,000 to 20,000 cubic yards out of a standard ¼-inch-thick drum," according to Bill Ogle, president of Kenyon-Ogle, Bozeman, Mont. "We have already achieved that yardage with our abrasion-resistant drum steel, and they're still going strong."

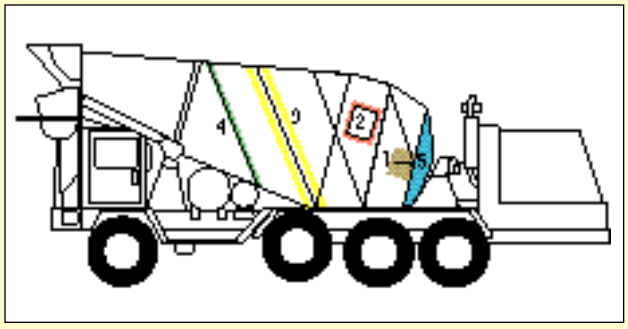
Listening for drum wear

Monitoring drum wear used to be an art. Fleet managers would walk by each loaded truck listening for the "tinny" sound that comes from the aggregate hitting against a thinning drum wall. Drivers would look each day for small denting or skin pops that preceded the first water leaks from pinholes. And when things got critical, mechanics would perform exploratory surgery to determine steel thickness by drilling small holes through the drum's outer metal or try to use calipers around inspection openings.

But according to Paul Mespelli, sales engineer for Panametrics Inc., Waltham, Maine, ultrasonic thickness gauges turn art into science. Mechanics can use hand-held, battery-operated instruments to quickly and accurately measure steel thickness on the entire drum. "Producers should select portable ultrasonic meters equipped with dual element transducers," says Mespelli. The additional set of transducer elements enable the instruments to factor out outer surface thicknesses, such as a paint coating or corrosion when measuring the drum's true metal thickness.

Advance Mixer

Producers should select ultrasonic meters equipped with dual-element transducers that measure the steel's true thickness even through thick corrosion or paint.



According to Dan Caine of Advance Mixer, Ft. Wayne, Ind., certain portions of the drum wear faster. These areas are (1) mixing paddles; (2) the area around the perimeter of the inspection hatch; (3) the area 6 to 12 inches on either sides of the fins; (4) the fins and fights; and (5) just outside the liner on the spun butt. Caine recommends drum replacement when the original 3/8-inch (.1875-inch) thickness measures between .05 to .06 inch.

Gauges determine thickness by measuring the time required for a short ultrasonic pulse generated by transducer to travel through steel shell, reflect from the inside surface and return to the transducer. This travel time is a few microseconds or less. The mechanic calibrates the instrument for the steel drum type and an LCP displays the thickness in inches or millimeters. Gauges measure steel thickness from 0.020 to 20 inches, and cost from about $1,500 to $4,000, depending on features chosen.

To learn more about ultrasonic thickness measuring methods and appropriate instruments from Panametrics Inc., circle 108 on the reader service card.

What factors affect drum life?

Producers face other variables that influence drum steel selection. Below are some operational considerations. Check with your manufacturer when specifying drum steel thickness and type.

Aggregate type. There is a direct relationship between erosion and the aggregate's LA Abrasion and hardness. In areas of the country where the predominant aggregate is trap rock, wear will be significantly greater than where a softer limestone is used.

Mix slump. Harsh, lower-slump mixes increase drum wear. There is less water available to reduce friction along the drum sides.

Drum speed control. Producers can control the drum abrasion by adjusting drum rotational speed. For about $500, managers can install a separate hydraulic control valve to limit drum rotation speed by governing hydraulic pressure.

—RICK YELTON

Shumaker Industries

Mixer drum manufacturers offer producers many choices in the fabrication process.

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