Paving the way to success

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For transfer station operators, size, scale and incoming materials are key factors to consider when choosing equipment and designing a facility.

October 11, 2022



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Floors take a beating in many garages, manufacturing facilities and even high-traffic kitchens, but few have as tough a life as tipping floors in transfer stations.

Ryan Duckett, a senior project professional with Long Beach, California-based SCS Engineers (https://www.wastetodaymagazine.com/article/waco-texas-scs-engineers-develop-new-transfer-station/), says chemicals in trash, as well as friction and impacts caused by hard materials and wheel loader blades, wear down tipping floors quickly, necessitating regular maintenance or replacement.

For example, the tipping floor at a transfer station operated by the Montgomery County Solid Waste District in Moraine, Ohio–which processes an average of 2,500 tons of material daily–loses about an inch of concrete annually, says Bill Horst, the district's engineering manager.

"Our machines have rubber wear edges on them, so that's just the abrasive nature ... of the operation," he says.

Concrete, lumber, metal and the chemical "juice" that comes from some loads eat away at tipping floors as material is dumped and moved around by wheel loaders.

Prolonging the life of tipping floors is an important aspect of managing a transfer station, Duckett says, adding that rubber blades on equipment can help prolong the life of floors. As wheel loaders and other equipment scoop up materials, their buckets scrap along the floor. Buckets with rubber edges are gentler on floors than those with steel edges.

In addition to scrapes from buckets, other factors that can wear floors include the cumulative impact from hard items in the waste stream and the lateral tire forces from heavy-duty vehicles starting and stopping suddenly, Ducket says.

"Tipping floors are perhaps the No. 1 most critical piece of infrastructure within a transfer station that the whole operation relies upon," he says.



Asphalt or concrete

When the tipping floor inevitably needs replacement, Duckett says transfer station owners must choose between asphalt and concrete. There's not necessarily a right or wrong answer to that quandary because each facility is unique in its scale, the materials it receives and the equipment used to move material.

The choice between concrete, which is most commonly used, and asphalt boils down to balancing the cost of downtime with initial investment, he explains.

"Some sites are moving toward asphalt tipping floors, asphaltic concrete or flexible asphalt surfaces, which are generally cheaper and have a quicker curing time so there's less downtime when you have to redo the floor or patch the floor," Duckett says.

While concrete lasts longer between repairs or replacement than asphalt, the replacement cost is generally greater.

"Some facilities are turning to asphalt on a more frequent basis," Duckett says. "They might pave the facility every year, and it takes ... a day and a half to dry," he adds.

Concrete floors, on the other hand, typically can last five years or longer before replacement, but when it comes time to repour a floor, it takes 40 to 60 days for concrete to cure, he explains.

"[Owners are] almost throwing in the towel on this idea of spending half a million dollars or more on a foot-thick concrete floor and having to replace it every five to 10 years," Duckett says, adding the "foregone revenue from lost business" can sometimes be just as costly.

Those who stick with concrete also might choose to include chemical additives that protect the floor from physical impacts and chemicals sometimes found in refuse and recyclables, further extending the tipping floor's life, Duckett adds.

"One innovation that has come about is the enhancement of concrete through chemical additives that enhance the strength of the tipping floor," Duckett says. "There's a lot of companies that have proprietary offerings that incorporate constituents such as fly ash from coal combustion operations or waste-toenergy ... to increase the structural strength of the concrete, which presumably prolongs the life significantly."

Like concrete itself, the additives represent an additional cost but provide benefits over time.

One factor that could influence the choice between asphalt and concrete is a facility's ability to maintain operations on some level. While few transfer stations can close part of their tipping floor and continue efficient operations, Duckett says, for some "it might be feasible to section it off and do it in phases."

For those transfer station owners with multiple facilities in a metro region, he says routing concerns can make it difficult to send haulers to cross-town facilities during a transfer station's downtime.

Duckett says, "I think it's probably more common when there are multiple sheds or bays at the same location that one of the bays can be enough for a program for the amount of time it takes to redo the facility."



A matter of scale

The size of a facility and the price tag for repaving a tipping floor are factors in the choice between concrete and asphalt, but the idea of scale affects other operational decisions, as well, Duckett says.

Another important decision owners must face is whether to buy a compactor or use wheel loaders and excavators to tamp down materials before loading and shipping them to material recovery facilities or landfills.

"There's more capital investment for more sophisticated technologies and equipment at larger facilities because they have the economies of scale to be able to afford some of what I call 'labor-savers,'" Duckett says.

For those facilities that can afford them, compactors can streamline transfer station operations significantly.

"It takes a lot of effort to train and get a front loader operator adept at using ... the smash method," Duckett says. "And if he goes away, it might mean another month training somebody else. In the meantime, you're not getting good compaction. There's a lot of value in being able to hit a button and have it baled or otherwise compacted."

Compactors cost a good deal of money, so, for smaller operators, they might not be worthwhile investments, he says.

"With the maintenance of equipment, sometimes simpler is better," he says. "I've seen really efficient small transfer stations that just kind of have a gritty kind of brute force type style where they just get it done."

Duckett says smaller transfer station operators often are willing to wring as much as they can from the material stream they receive, as well.

"They do things like extract metal on the tipping floor to reduce not only their trash stream but to create a new revenue stream of recyclable metals," Duckett says. "You see them pulling out material with skid steers. So, it takes a lot of effort and energy, but at the end of the day, it really helps the economics and makes it feasible for these smaller sites."

Some larger sites might have a more difficult time pulling out recyclables from incoming materials because of the sheer volume they receive and heavier traffic, which can create a safety liability for employees walking the floor.

Regardless of their size and scale, it is wise for transfer stations to include some form of fire suppression, particularly as the use of lithium-ion batteries grows.

"Some of them vary from automatic sprinklers and spray systems to actual robotic autonomous vehicles that will go and scoop out a fire if it's detected," Duckett says of fire-control options.

The downtime after a major fire can be much longer and more expensive than the downtime associated with replacing a floor, he adds.

"The economic impact of those things being down for perhaps months on end if it gets bad enoughthat's pretty huge," he says. "All those waste hauling vehicles have to travel sometimes really far to get to the next possible dump facility."

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