Don’t underestimate cost of operation for HDD tooling
Tooling can have a big effect on machine and jobsite productivity

By Gregg Hennigan, features writer

“Cost of operation” is a commonly heard term among underground construction contractors. It can refer to the expenses incurred when using a piece of equipment, such as fuel consumption, maintenance and wear parts.

In the horizontal directional drilling (HDD) market, cost of operation will frequently come up during the process of buying a new drill rig. And for good reason; it’s as important to understand what a drill will cost to operate as it is to know what it will cost to buy the machine.

Less common, however, is considering cost of operation when buying and using tooling for directional boring machines. Such an oversight may have ramifications for a company.

“Downhole tooling can have a substantial impact on the overall productivity of a machine,” says Carrie Ver Ploeg, Cutting Edge product manager for Vermeer, a position that includes oversight of product development of HDD tooling.

The tooling selection process begins with understanding the productivity goals of your given job and known challenges, such as jobsite footprint, ground conditions and obstacles to your bore path. Overlooking any one of these variables can lead to a poor tooling decision, including:

- Selecting drill bits — Choosing a drill bit that is not designed to perform in, say, cobble or hard pan can affect the speed and accuracy of the pilot bore in these conditions. Or, the inverse, selecting a bit that is designed to perform in rock, when you are working in loam, could unnecessarily increase your tooling costs.
- Selecting the housing — Sonde housing features that promote strong signal strength, consistent steering and ease of operation that match the demands of your planned bore path are critical.
• Selecting backreaming accessories — Having the right nozzle placement for the ground conditions can also affect cost of operation. In the backream, a reamer selection that does not have the geometry to maintain both speed and hole size can lead to production loss.

The point is, downhole tooling matters a lot. This is especially true at a time HDD contractors are facing tighter project deadlines and margins. But it also is important in a hot market like fiber installations.

“Many times in the current fiber market, the cost per foot that contractors are being paid is much lower than what they’ve become accustomed to over the past few years,” Ver Ploeg says. “They are expected to produce a large volume of feet per day. So, again, having the appropriate tooling that can help increase the speed of the bore potentially has a huge impact on their overall cost of operation.”

TOOLING UNDERESTIMATED

Despite this, tooling is still often underappreciated. Because tooling is a wear item and so much of its usage occurs underground, where operators may not be sure what they’re engaged in, there’s a tendency to accept the amount of wear no matter what.

“Oftentimes, we will ask contractors, ‘How long do you expect your bit to last or your reamer to last?’ And they’ll say, ‘It depends on the ground conditions,’” Ver Ploeg says. “They just kind of chalk it up as, it’s a wear item, it’s going to vary.”

That view is starting to shift as directional drilling contractors encounter tighter margins, Ver Ploeg says. They are now paying more attention to how many pieces of tooling they need on a job and how many feet they’re getting out of them. Some tooling manufacturers are incorporating carbide to improve the quality of their cutting tools, and more and more HDD contractors are educating themselves about the different grades of carbide and what manufacturing processes are being applied.

Another example of tooling being underestimated is sonde housings. How well it transmits a signal is very important to a job, but it’s not always high up in a contractor’s considerations when planning for a bore. Having a sonde with a lid whose design allows it to consistently transmit a signal can help improve the accuracy of a bore and the time spent to complete it.

CALCULATE COST OF OPERATION

Calculating the cost of operation for tooling does not need to be complicated. Having a solid bore plan is an important first step, according to Ver Ploeg. Understand the bore path, know as much as possible about ground conditions, have in stock the correct tools that will be needed and bring them to the jobsite to reduce time waiting for a tool to arrive. Also consider whether the estimated life and productivity of a piece of tooling justifies its price point.
“Estimating the cost of operation can be done by considering, ‘Here are the different tools that I will need and here is the amount of life that we expect we will see before we’ll need to replace that wear item,’” she says.

She also recommends a contractor work with a partner, such as a dealer or the manufacturer, to find the best fit for their drilling operation. She says Vermeer offers customers quality tooling products that fit their jobs and their budgets.

DON’T CUT CORNERS

Trying to get the best value out of your tooling is smart business. Trying to reduce costs by ignoring best practices is not. Yet some HDD contractors do just that, and it’s most often seen with tooling connections.

There are different connection pieces in a drill string, and there are best practices regarding connections. Some contractors may be tempted to skip these best practices by leaving important components out of the drill string in an attempt to reduce the total cost of operation or to reduce the time spent connecting that piece.

Using tooling and a drill in ways not intended by the manufacturer can be a safety hazard and result in lost productivity. Some manufacturers have created tooling that won’t allow someone to leave out required connections. Cutting corners in this area should not be done.

TOOLING AND FLUID MANAGEMENT

Tooling selection can also affect drilling fluid management.

“One of the biggest variables in cost of operation is the amount of fluid that a contractor needs to use on the jobsite,” Ver Ploeg says. “So any features or nuances of tooling that can help contractors control and have just the right amount of fluid, whether that's increasing fluid in rocky conditions or reducing it in dirt boring, can have a significant impact on their cost of operation.”

The sonde housing a contractor selects can affect fluid management. Vermeer, for example, designs its sonde housings in a way that gives a contractor the ability to choose how much fluid runs through the housing while still protecting the electronics within the housing. When selecting sonde housings, Ver Ploeg recommends a contractor look at its fluid capacity and whether it has the ability to manage the volume and direction of fluid coming out of it. The electronics within the housing can be expensive, so contractors should make sure the housing they use allows enough fluid to pass through to cool them properly.

Reamers are much the same. A contractor should consider how many nozzles are on a reamer and their size and orientation. The direction the nozzles are facing and whether they will allow an operator to strategically place the fluid where needed can help the tool cut more efficiently.
Nozzle placement can be a matter of debate. Contractors vary in their preferences, and what works best for them is usually OK. Generally speaking, in solid rock, more penetration is desired, and a straight-ahead blast often works best. Ver Ploeg compares it with a shower head adjusted so that the water comes hard out of the middle of the head. As ground conditions become less abrasive, more spray is desired. In the shower head analogy, this would be like setting the water stream so it sprays out from the edge of the device.

Ver Ploeg says because of the importance of drilling fluid on tooling and an overall project, contractors should provide new operators training in their desired methods of fluid management. It’s an investment on the front end that may pay dividends down the road.

“Using the right amount of fluid is critical for a job and for the tooling,” she says. “If an operator uses too much fluid, it kind of has the same effect as when you have too many crushed ice cubes in your straw. It can do more harm than good. If not enough fluid is used, then the inverse happens. It’s not pushing away the debris.”

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