

Working Smarter, Not Harder: Turning to Automation to Level the Playing Field

White Paper



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Executive Summary

- The ongoing labor shortage continues to impact the industry;
- To combat its impact, contractors need easy-to-use solutions with clearly measurable returns on investment; and
- Technology can be a professional partner that complements existing team members' efforts.

Many challenges face the construction industry today, but one of the biggest is the ongoing shortage of skilled workers. It has plagued the industry for years, and it impacts nearly every aspect of the jobsite today. That is especially true for a role requiring the level of experience a skilled excavator operator brings to a project.

For such a labor-driven and labor-intensive industry, the deficiency can wreak havoc on companies and their ability to complete jobs and meet their bottom line. Companies cannot source talent with the level of experience they need, and recruiting and training new team members is not an option.

The COVID-19 pandemic has further exacerbated the shortage, and, to compensate, contractors are rethinking their relationship with technology.

Contractors need certainty. They are willing to deploy new, easy-to-use solutions that enable them to lessen how long they need to complete a project and reduce the probability of mistakes. It all comes down to the bottom line. The old adage "time is money" is especially true on the jobsite today.

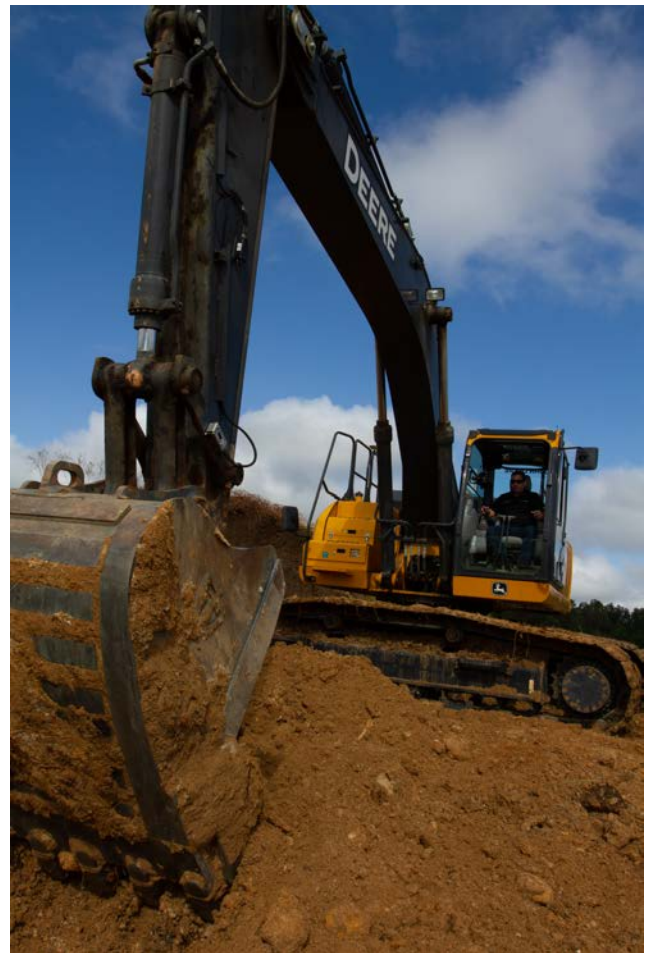
The semi-automatic excavator is the perfect example of how technology improves tried and true tools to align them with the modern construction approach.

Technology is a professional partner that complements existing team members' efforts, allowing them to fulfill more tasks without complicated additions.

Background

- The digital revolution is impacting every element of the jobsite;
- Technology is helping contractors mitigate the effects of the COVID-19 pandemic; and
- Smaller companies, in particular, are adopting digital solutions to grow their business and effectively compete against their larger counterparts.

The ongoing digital revolution is changing every aspect of the jobsite, as new solutions make even the most difficult tasks easier to manage. Mastering an excavator takes years of practice, making excavation is potentially one of the most problematic areas of a job, but it is also one of the best suited for automation.



The Civil Quarterly (TCQ), a publication from Dodge Data & Analytics, found 47 percent of contractors use machine control, and contractors that do so use it on a majority (61 percent) of their projects. Concurrently, many others are looking to go in that direction.

In the wake of COVID-19, machine control has again proven its worth on the jobsite. A more recent poll from TCQ revealed nearly one in three (32%) contractors cite machine control as one of the most widely adopted new technologies helping them minimize negative business impacts amid the COVID-19 pandemic.

Larger companies tend to use technologies such as machine control two-to-three times more frequently than smaller operations. However, smaller companies are often adopting these digital solutions to grow their business and effectively compete. Because technology levels the playing field, smaller companies can turn to a larger base of prospective employees. It also allows smaller companies to compete on larger projects that might otherwise require deeper experience.



Challenges

- The excavator is perhaps the most complex machine on the jobsite today;
- One common mistake that arises from an inexperienced operator is over digging, which has a ripple of adverse effects;
- Grade calculation errors are easy to make, and often result in having to redo work at the contractor's expense.

The excavator is perhaps the most complex machine on the jobsite today. It takes years of experience for an operator to become an expert.

Someone who is not experienced at operating a piece of equipment such as an excavator will not be as efficient moving materials around the jobsite. All too often, it requires an operator to revisit a location for additional work if they cannot complete the task correctly the first time, or the contractor must bring in an expert operator to redo the job and fix the mistakes.

Grade calculation errors are easy to make, and consider its impact on a contractor. An error could result in an entire run of pipe being dug up and re-laid at the contractor's expense, which could easily add up to tens of thousands of dollars.

That has a real impact on a contractor's time to completion and their budget. It can snowball to affect material overages or shortages. Or, even worse, an inexperienced operator might be more prone to striking an underground utility, which, aside from being time-consuming and costly to fix, can be deadly.

An excavator requires precision. An operator needs to control the position of the bucket and its attachments, and he or she must also manage the machine's speed, a potentially tricky task for novice operators to pick up.

One common mistake that arises from an inexperienced operator is over digging, which has a ripple of adverse effects. Repairing an area that has been over excavated often requires testing to make sure the compaction of the dirt is correct, a potentially costly and time-consuming affair.



Solutions

- Using automatic controls is not inherently difficult;
- The solution enables contractors to tap into a larger pool of candidates; and
- It eliminates a layer of worry for operators, as they can complete a task with the peace of mind knowing it meets a job's requirements.

Automating the machine's movements allows an inexperienced operator a lot more confidence and effectiveness with equipment movement. The only requirement of an operator using an automated system is watching where he or she is placing the bucket down on the ground.

Using automatic controls is not inherently challenging, and it is not dramatically different than operating the machine in general. It doesn't feature any confusing interfaces or additional panels to distract from the task at hand. In fact, the solution eliminates a layer of worry for operators, as they can complete a job with peace of mind knowing it meets a job's requirements.

Because the solution requires less experience to operate, it enables contractors to tap into a larger pool of candidates. They no longer have to reserve specific tasks on the jobsite for a select few team members. In essence, even an employee on their first day can be as effective as a team member with years of experience.

Leica Geosystems' new semi-automatic functionality for the iXE3 3D excavator machine control solution, announced at ConExpo 2020 and brought to market in mid-November 2020, is implemented through the hydraulic controller. It requires the installation of a hydraulic control unit, and the advanced 3D excavator machine control solution offers several new functions:

- Simple engagement of the auto function by pulling the stick;
- The cross-cut surface protection prevents the operator from digging into other parts of the design surface;
- The solution automatically adjusts the bucket height to minimize over-excavation and costly rework;
- Intelligent slope detection to automatically snap to the correct slope of the surface under the bucket; and
- Rotation controlled cross-cut, combining the auto bucket and the auto-tilt functions to match the target surface regardless of the bucket rotation.



Outcome

- The solution enables an operator to execute complex tasks that would be difficult to manually complete and to dig faster and more accurately to the target design surface and cross slope;
- The semi-automatic configuration allows an operator to work 30% faster on a grading application than a machine equipped with a traditional machine control solution; and
- Productivity goes up because it's faster and less stressful for the operator.

Leica Geosystems' new semi-automated excavator functionality for the iXE3 3D excavator machine control solution is a flexible and easy-to-use solution that includes tilt and tilt rotator bucket automation. It allows an operator to select auto boom control, auto bucket control, auto tilt control and auto-rotation control, or any combination, to suit the operator's choice and the task at hand.

It enables an operator to execute complex tasks that would be difficult to manually complete and to dig faster and more accurately to cross slope and the target design surface.

The solution reduces manual controls, increases productivity, speed and accuracy of the work, even when used by less experienced operators.

Productivity goes up because it's faster and less stressful for the operator. Because the operator doesn't have to focus as much attention on keeping the bucket on the grade, the operator is less fatigued at the end of the day.

The semi-automatic configuration allows an operator to work 30% faster on a grading application than a machine equipped with a traditional machine control solution.

Automating the excavator on a jobsite increases productivity and accuracy and decreases operator fatigue and fuel consumption. A more focused and less fatigued operator is paramount to safer operations, reducing the risk of accidents and costly rework errors.



Case Studies

Automated and semi-automated solutions are truly the only way to go for modern construction projects, especially when considering different efficiencies. Smaller companies could not handle massive job sites without spending thousands of dollars on materials and labor.

It is cost-prohibitive for smaller companies to compete against their larger counterparts without the added boost technology provides. Automating the excavator levels the playing field, not just the construction site.

While the operator worked 30% faster, the benefits were multiplied considering he only had to perform his work once and without the need for rework. That actually makes the 30% estimate even higher.

While many challenges face the industry, there are often easy-to-use solutions waiting in the wings that make daily operations easier. It just requires a willingness to consider and implement new ways of approaching legacy methods and problems.

"The semi-automatic configuration allows me to work 30% faster on grading application than a machine equipped with traditional machine control solution,"

- Torsten Walter, excavator operator at V&C Metzner GmbH in Germany, said.

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