11 Lessons in Digital Transformation for the Heavy Construction Industry

Machine control technology continues to revolutionize earthmoving in expected and unexpected ways.

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The Association of Equipment Manufacturers recently polled attendees of their annual trade show on technology adoption.

The results were surprisingly clear and emphatic: Nothing in technology comes close to machine control adoption, with 58% of over 1,000 respondents declaring they were already machine control users (with an additional 20% planning to do so soon). Fewer than 15% said they had no plans for a machine control investment.

Why the surging acceptance? The expected reasons — grading accuracy (80%), improved efficiency (72%) and improved operator performance (59%) — should be no surprise. To that list, you could add one more: Ability to compete in an increasingly digital-first world.

> **I really don't see how you win bids without it. I know someone just starting out might get by without machine control. Even then, you're using lasers to check grade. More and more, owners not only expect machine control, they require it.**
>
> **STEPHEN BRIDGES**
> Vice President, Georgia-based Construction Laser

10 vs. 30

The quickening adoption rate has also gained momentum from word of mouth, as contractor after contractor report remarkable before and after stories. The comments of Dan Wolfard, operations manager at RV Associates, a Washington state general contractor, are typical.

"The very best year we had moving dirt before machine control was about 500,000 yards. Last year, with machine control, we moved nearly two million yards of dirt," Wolfard said. Pat Brown, foreman, at Florida underground utility and excavation contractor W. Gardner, seconded Wolfard's experience.

"With stakes, I could grade about 10 residential pads a day. With machine control, we're easily grading 30 pads a day with a lot more accuracy."
For operators of tech-enabled graders, excavators, dozers, wheel loaders, compactors, drillers, pilers, milling and pavers, the new normal ushers in a vast new field of opportunity. New technology muscle enables contractors to chase bids that were once well beyond their reach in terms of tempo, scale and precision.

For some, that business-building realization is bittersweet, as it was for Daniel Miller, project manager for CMES, Inc., a heavy highway contractor. "Our big regret is not having invested in a positioning system earlier. We could have bid more competitively and won more jobs," he said. Miller now credits their digital transformation for helping CMES secure DOT premier contractor status, a huge advantage in state highway project bids.

Force Multiplier

Few dispute the power of machine control to transform the heavy construction industry. Some say the disruption is nearly complete: The sector is in an exciting, new post-digital phase.

The sight of stakes, string, surveyors and walking crews is already becoming less common in many regions. That absence not only speaks to a safer workplace but also symbolizes the speed and versatility operators now command without the constraints of analog positioning. The new freedom to perform at unprecedented levels also means fewer templates to follow. After all, what other arm of construction has come this far, this fast in its digital transformation?

Rapid progress has led to some growing pains. For industry leaders, it raises an assortment of questions. How do you preserve your edge when others can claim similar earthmoving speed, precision and scale? What is the tiebreaker? What's the best way to outfit equipment? At the factory or aftermarket? What about mixed fleets? What differentiates machine control solutions? The following investigates these challenges and others as decision-makers look to gain — or maintain — the high ground in a brave new marketplace.

11 Lessons

The beauty of a machine control investment is the logical, iterative upgrade path it presents. For example, an entry-level 2D system performs a diverse range of tasks, including trenching underground utilities and site prep such as foundations, footings, septic systems and landscaping. Perhaps your team started with 2D.

During your digital journey, you may have identified opportunities and challenges that you didn't hear about during the sales process. Here's a look at 11 sometimes overlooked machine control lessons to consider:

1 Repeatable Workflow.

The hallmark of any business, in any industry, is a repeatable, consistently high-value outcome. In short, no unpleasant surprises. That service replication might be easy enough for a fast-food or clothing chain. Not so easy for a heavy construction contractor working with crews with diverse backgrounds and used to different processes and procedures. Lack of uniformity can lead to over-and under-grading, excavation, or digging, or other missed requirements. Machine control brings an order of common control across dispersed teams at the operator and supervisor level. Machine intelligence anticipates and offsets common mistakes, offering a level of project forgiveness unknown to traditional positioning methods.

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2 Self-Performance.

Reliance on surveying subcontractors is an expensive proposition. Surveyors can charge up to $300 per hour, with a four-hour minimum. It becomes a variable cost that nearly defies bidding accuracy. You're also at the mercy of the surveyors' availability, which could lead to costly downtime. Many heavy construction contractors now confidently self-perform positioning functions with on- and off-machine control solutions, such as rover and total station and GPS-powered machine control systems. "We don't hire a sub surveyor now," Miller said. "We handle it all in-house. No more checking grades with tape measures and rulers." Self-performance simplifies workflow and helps margins and project scheduling.

3 Factory Fit or Aftermarket.

There are numerous pros and cons for outfitting equipment with machine control at the equipment factory or later, as an aftermarket addition. What's right for you? That depends. You may be fine with your present installation method. Many contractors prefer the built-in simplicity of a factory-fit solution, despite the take-it-or-leave-it machine control vendor approach. Other contractors like the freedom to choose technology vendors.

Leica Geosystems, for example, offers its machine control solution on this basis. Not only does the contractor own the portable technology (it's not captive to the dozer, scraper, etc.), but Leica Geosystems also allows the contractor to reposition the technology across company equipment as needed

4 Open System or Closed System.

The earthmoving business is tough enough without restrictive, closed-system software. It may make economic sense for the technology maker, but not much business sense for the contractor. Bridges has some ideas here. "Make sure the software powering your machine control system plays nice with what you're already using in the office, like Carlson or other software vendors," he explained. Leica Geosystems is the only vendor that supports contractors with an open-system, vendor-agnostic software approach, he said. A Leica open system preserves your technology investment without prohibiting future changes over incompatibility.

5 Operator Shortage.

The U.S. Bureau of Labor Statistics estimates the demand for heavy equipment operators will grow 10% through 2028, double the average rate for all other occupations. If you think it's tough now to find and keep talent, just wait. While turning over a $200,000 dozer to a rookie 20-something fresh out of trade school might not be the most exciting idea, it's one that is quite manageable with the machine guiding operator actions.

Craig Moore, superintendent at RV Associates, said, "I have some young guys that like to drive fast and keep the equipment in high gear. With machine control, we find they can achieve the same accurate grade as others can going slower." The lure of the latest technology may be a selling point in attracting or retaining a capable operator.

6 Mandated Compliance.

It's no secret most state transportation department projects require machine control. More than ever, it makes sense to equip your fleet and operators with machine control functionality and expertise. It's the way to preserve your competitive edge in a changing market.

7 Grade Stakes.

Old-school position mapping, with grade stakes and blue topping, is gradually disappearing. Luis Munilla was the Texas operations manager of Munilla Construction Management. His team was involved in a major project, demolishing and rebuilding an airport runway. "We saved an immense amount of time compared to conventional paving and string lining. Our crews didn't do any staking or blue topping. That eliminated a lot of hours," Munilla said. They relied on machine control and total station mapping to save time and maintain precise measurements.

+10%

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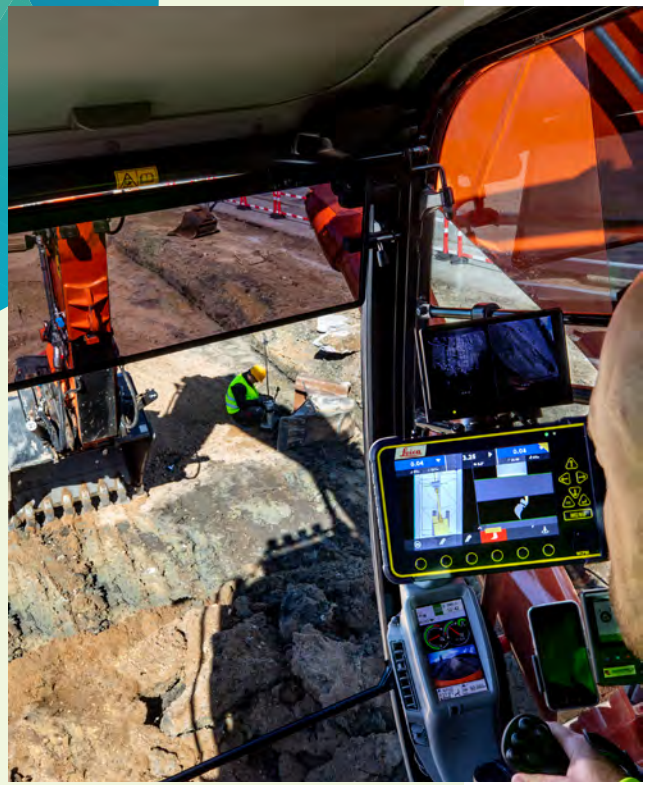


The new digital work environment helps speed and simplify the answers and more. Seamless integration with office-based estimating software can help decision-makers view real-time earthmoving progress.

8 Unexpected Capability.

Many contractors are pleasantly surprised by the robust capabilities of a machine control system. With proper training, an operator should be able to self-perform clearing limits, ground run topo to verify bid accuracy or request a change order, curb staking, pond as-builts, structure as-builts, and utility staking. That capability also includes 811 calls before you dig, helping to maintain buried infrastructure.

9 Project Visibility.

How much dirt has been moved? Are we on schedule? The new digital work environment helps speed and simplify the answers and more. Seamless integration with office-based estimating software can help decision-makers view real-time earthmoving progress. With connected machine control systems across different equipment, operators receive updates and corrections in real time to maintain efficiency and a single version of the truth.

10 Error Adjustment.

It's not unheard of for a curb contractor to make placement errors that make the existing grading plan useless. What then? Rather than default to string lines, the grader and their team can create a new grading plan that recognizes and accommodates for the curb-contracting error. No need for three string pullers to disrupt task efficiency.

11 Model Evaluation.

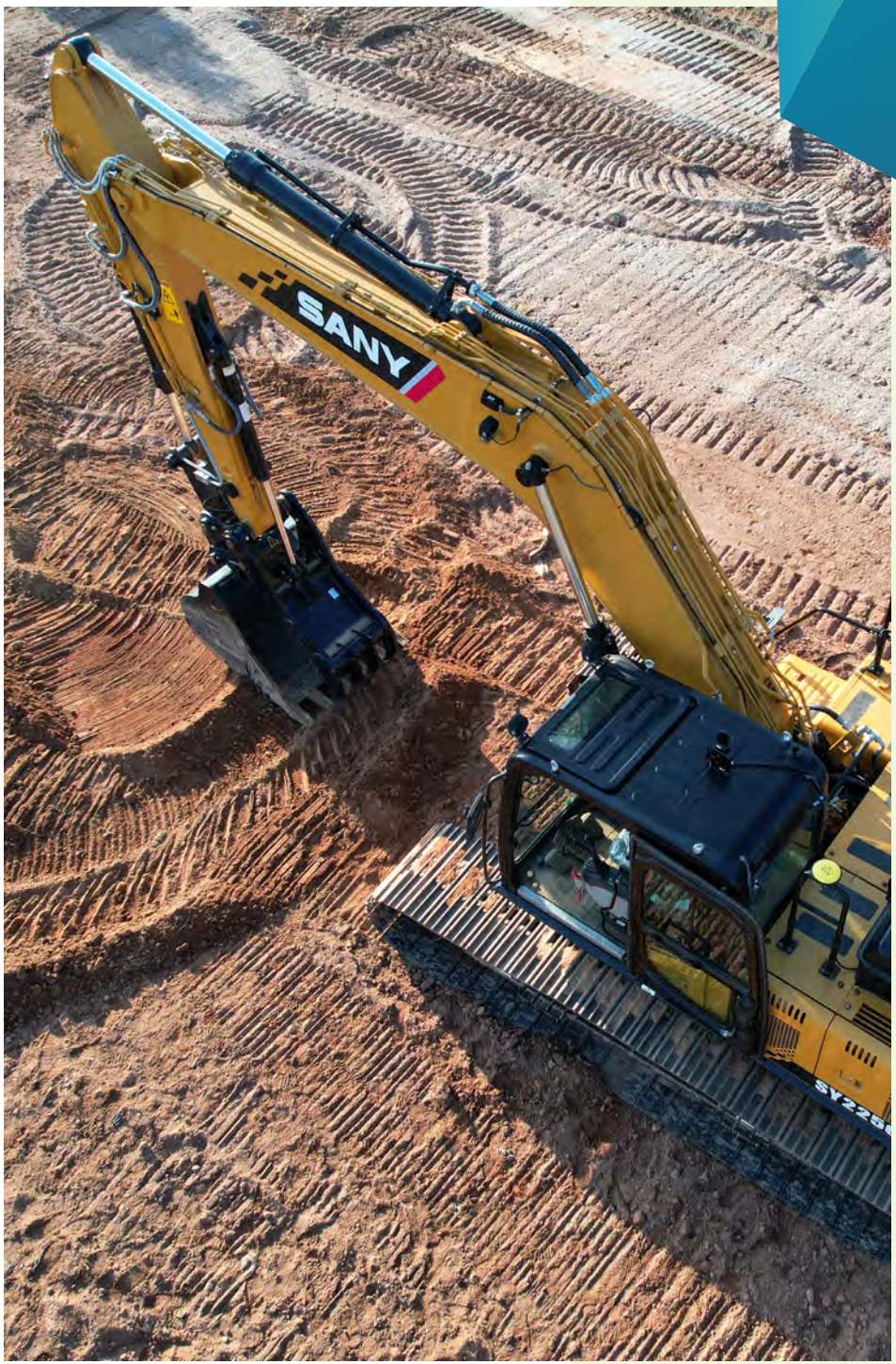
Software allied with the machine control system can help the contractor self-perform the machine control model. This can eliminate the risk of trying to perform heavy construction tasks based on a flawed model. Self-performance of the machine control model for a 20-acre site is valued up to $3,500, assuring an operational model that works and keeping those dollars in-house.

Final Word

If you've decided to invest in a machine control solution, you're acquainted with the preceding 11 issues. If you're still evaluating technology providers for an initial investment or considering a reinvestment through new factory-fit or aftermarket technology, take time to carefully weigh all options. Every company has unique requirements. Doug Browning, survey manager of Archer-United, a joint venture of Archer Western and Infrastructure Consulting and Engineering, said, "Data from the office to field is absolutely critical. Everything must run on the same platform because of the immense amount of data" on the $421 million, 17-mile highway project his team is responsible for.

Today Leica Geosystems is the only heavy construction technology partner that offers the contractor community a machine control solution that meets all 11 conditions, from open-source compatibility with nearly any software application to a versatile, cross-functional hardware platform that preserves technology investments today and tomorrow.

As you consider your options, investigate ease of use, field performance, references, and, perhaps most important, training and support. There is no "easy button" in construction, especially heavy construction. The best way to guarantee technology success is through one-on-one training of your operators and the certainty of anytime/anywhere platinum-level support.



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Hexagon Heavy Construction solutions provide actionable information that helps you to win, do and close more work, on spec, on time and on budget. At every stage of the life cycle of a construction project, from bid to sign-off; at every location, from field to office; at every level of coordination, from single-job to multi-job workflows, Hexagon's solutions make your work Dirt Simple.

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Leica Geosystems has been revolutionizing the world of measurement and survey for nearly 200 years. We provide powerful software, efficient workflows and experienced support for a complete construction technology solution. Our products give you the tools needed to increase safety, facilitate quick scene documentation, save money, and substantially reduce the probability of errors. Together we provide maximum productivity and exceptional results, no matter how complex the task at hand.

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