Choosing the Right Layout Solution for Your Construction Projects



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INTRODUCTION

As a contractor, you know the importance of performing layout with precision. Your ability to accurately translate the plan or model to the physical site plays a big part in the ultimate success of the project. If you miss layout points or make measurement mistakes, you may be on the hook for rework, RFIs, and change orders—all of which hurt project delivery and your bottom line.

30%

Rework is so common in construction that it accounts for 30% of the work performed.[1]

Layout errors can also create questions about the quality of your work that subsequently delay payment. If you're one of the three out of every five contractors who suffers from cash flow issues[2], you don't want to do anything that could increase the likelihood of slow payments.



"THE CONSEQUENCES of errors become greater and more and more expensive to correct the longer it takes to detect them."[3]

1 Miri, Mohammed; Khaksefidi, Mahsa. "Cost Management in Construction Projects: Rework and Its Effects." Mediterranean Journal of Social Sciences. Dec. 2015.
2 2019 National Construction Payments Reports. Levelset. Aug. 2019.
3 Josephson, P.E.; Larsson, B. "The role of early detection of human errors in building projects." Chalmers University of Technology. April 2001.

If you're also still using manual methods of layout, you could be at greater risk of these business challenges than those who are using better tools. Upgrading to a robotic layout station is a game-changer, helping you:

- Improve your accuracy when placing layout points in the field
- Catch and fix discrepancies before they become costly problems
- Increase layout speed and efficiency
- Document work performed
- Improve productivity with the team you already have

Read on to learn how a robotic layout station benefits your team and what to look for in a solution to ensure it meets your needs.

49% of construction payments are not made on time as required by the original contract.[4]



4 2019 National Construction Payments Report. Levelset. Aug. 2019.

3 GOOD REASONS TO USE A ROBOTIC LAYOUT STATION

Manual layout methods are a familiar go-to for many contractors. But continuing to use manual methods when there are better tools available is a risky proposition that could be hurting your accuracy and productivity.

Traditional layout is a tedious two-person job, requiring paper plans, tape measures, string, and plumb bobs. Even with a manual layout station, layout can take several days to complete. Should the project be large or complex, the more difficult and time-consuming it will be to perform layout this way.

Adding to the risks, the potential for human error is unavoidable. Whenever you're performing work manually, the possibility of mistakes and misjudgments is introduced. Human error is a major contributor to increased costs in construction and notoriously difficult to catch. Anything you can do to minimize its frequency will pay off in better project delivery.

A robotic layout solution addresses these risks and can produce dramatic improvements over manual layout processes. With a robotic layout station, you can increase accuracy and productivity, and create a record of your work should you need it.

1. Increase Layout Accuracy

A robotic layout station uses automated positioning and advanced capabilities to precisely place coordinates from the drawing onto the physical site. This eliminates the possibility of measurement mistakes caused by human error. Furthermore, because the tool does the work, the operator is free to move around the site and focus on visually verifying site conditions.



> **Putting that data from the field back in the model verifies accuracy and creates your as-built. Our accuracy went from about 80% to 99% plus."**
>
> — **Luke McCrea,** *BIM/VDC Project Lead, Intermountain Electric*

2. Work Faster and More Efficiently

When you use a robotic layout station, you need to assign just one person to layout. A single operator can complete layout in hours instead of days, helping you shorten project timelines. And because the tool is so intuitive to use and easy to learn, more members of your team can perform layout, allowing you to scale up operations if needed.

> **Apart from the time you save because you can lay out faster, you can just let people do what they need to do: make the installation. If you can improve the amount of time that employees spend productively by 10%, it will save you a lot."**
>
> **— Armand van Andel,** *Technical Director, Megens Installaties*



3. Document Work Performed

A robotic layout station that's able to collect measurement data on work performed brings much-needed transparency to your workflows. When design changes occur, you can use the tool to provide a record of original layout points as well as documentation of the changes that were needed. You're able to provide proof of work performed, as well as defend decisions that were made.

> **We're able to produce layout deviations, daily point layout summaries and field reports, and document daily production and existing conditions."**
>
> **— Chris Milford,** *BIM/CAD Manager, Trans Gulf Electro Mechanical*



While you may be comfortable with manual layout methods, they're unnecessarily time-consuming and error-prone. You wouldn't use a screwdriver when you could use a cordless drill-driver to perform the work faster and better. The same is true when it comes to layout. You'll find a faster, better tool in a robotic layout station.

WHAT TO LOOK FOR IN A ROBOTIC LAYOUT STATION

A robotic layout solution is an easy-to-use tool that can be just as easy to implement. You can use this five-step process to help you evaluate solutions, make the best decision for your needs, and start experiencing the advantages of robotic layout for yourself.

Step 1: Define your requirements

Before you decide on a robotic layout solution, you want to make sure it provides the features and capabilities that are most important for your needs. Developing a list of these requirements will give you a well-defined process for evaluating specific vendor solutions. Here are some questions you'll want to answer as you define your specific requirements:

☐ Is it easy to learn and use?

Why it's important: When you want layout professionals to give up familiar methods and make the switch to technology tools like a robotic layout station, you need to make it as easy as possible. Easy operation and intuitive workflows allow you to efficiently train new workers and ensure adoption of the new technology.

☐ Is it compact and rugged?

You don't need a tool that's unwieldy and hard to work with or susceptible to damage. A small and durable design provides the ultimate in functionality and ensures the tool will stand up to the demands of your work.

☐ Does it offer auto-positioning capabilities?

Why it's important: Having to manually level or calibrate the tool takes time and skill. Automated leveling and calibration functionalities make setup much faster and easier, while also ensuring precision when laying out points.

☐ Does it provide both a laser pointer and prism pole operation?

Why it's important: Using a laser pointer with a 300-degree vertical field of tilt allows you to easily mark points on ceilings and other horizontal surfaces, as well as measure steep angles. A prism pole allows you to measure existing elevations. A tool that supports both will increase the speed and accuracy with which these typically challenging measurements can be taken.

☐ Can the tool be operated with a handheld tablet or device?

Why it's important: A solution that allows you to work with a handheld device gives you freedom to move around the site and point, visualize, and position the tool from wherever you are. There's no need for an eyepiece, because the device allows you to see what the tool sees, capture images with the device's camera, and overlay data onto those images, bringing greater flexibility, efficiency, and reporting capability to the layout process.

☐ Does it include its own layout software?

Why it's important: Being able to take your plans to the field and access them via layout software loaded onto the handheld tablet or device helps reduce the complexity of layout. You can better visualize the plans in the physical space and follow a step-by-step workflow to capture all the measurements you need.

☐ Does it work for both 2D plans and 3D models?

Why it's important: Not every contractor works with 3D models so having the flexibility to work from 2D plans or digital PDFs in addition to 3D models helps you complete layout in the way that works best for your team.

☐ Can it record measurements of layout work performed and as-built conditions?

Why it's important: As your project progresses, having a record of the layout work you performed, as well as measurements of as-built conditions, ensures the model is closely aligned with the structure being built. Being able to document changes that are happening in the field gives you invaluable proof of work performed and helps you justify your decisions and defend your work if needed.

☐ Is it possible to integrate the tool with other software or systems?

Why it's important: Importing data from other systems, such as AutoCAD, Tekla, and Sketchup, as well as sharing it with other people facilitates better communication and collaboration. When structural, MEP, and other project teams can access and utilize the same consistent, accurate layout information, they're able to work together more effectively and identify potential clashes more easily.

Step 2: Create a short list of vendors to evaluate

When identifying a short list of vendors, consider the following:

- ✓ **Is the vendor a recognized leader in construction solutions?**
- ✓ **Do they have demonstrated expertise in working with businesses like yours?**
- ✓ **Do they have case studies demonstrating product applications?**
- ✓ **Do they have a community of satisfied customers?**
- ✓ **Do they provide thorough product details and specifications to help you make an informed decision?**
- ✓ **Do they provide transparent pricing and simple purchase options?**
- ✓ **Do they offer resources to help you quickly get started using the product (user guides, video tutorials, FAQs)?**

Why Reducing Layout's Labor Burden Is a Smart Idea

It's no secret that the construction industry suffers from a shortage of skilled labor. After the 2008 economic crash, construction workers left in droves and didn't come back.

Today, as the industry tries to replenish itself with a new generation of workers—who are often lacking in necessary skills and experience—companies large and small are recognizing the urgent need to make up for skill deficits while keeping up with productivity demands. Robotic layout stations are helping them meet this need.

Because a robotic layout station requires just one person to operate, you're able to do more with the team you have. Since the tool is so intuitive, your seasoned workers will be up and running in no time. You'll also be able to train new workers just as quickly and effectively.

Need more convincing? Consider the math:

- A two-person crew can lay out an average of 75 points per day using manual methods.
- The same crew can lay out 150 points using a mechanical layout station.
- But if you introduce a robotic layout station, a single worker can lay out 300 points per day. This translates to a reduction of 75% over manual layout.

To learn more about getting started with a robotic layout station, read the blog.



Step 3: Rate each vendor

Come up with a rating system, such as a simple point-based one, to help you understand how well each vendor can meet your requirements. For example:

0 = does not meet requirement
1 = limited support for requirement
2 = somewhat supports requirement
3 = meets or exceeds requirement

Revisit your requirements checklist, and evaluate each vendor against your requirements. It's helpful to create a column for each vendor and rate each one based on their ability to meet each requirement. We've provided a form that you can work from as follows. Use the blank rows at the bottom for any additional requirements you may have.

REQUIREMENTS	Trimble	VENDOR 1	VENDOR 2
Intuitive workflows and ease of use			
Compact, rugged design			
Auto-positioning capabilities			
Laser pointer and prism pole operation			
Handheld device operation			
Layout software included			
Supports 2D plans, PDFs, and 3D models			
Capable of documenting work and as-built measurements			
Compatible with software tools			
Compatible with our typical file formats			

Step 4: Demo the solution

A tally of the scores should identify the frontrunner and best solution for your needs. Ask to demo your preferred solution to solidify your decision. Thoroughly test the tool to make sure you have a clear understanding of its pros and cons, and don't be afraid to ask questions.

Step 5: Finalize your decision

Be sure to involve other teams who will be impacted by the decision and identify those you'll train first to champion the tool's implementation. Then work with your chosen vendor to finalize the details and take delivery of the tool.

TAKE THE NEXT STEP TOWARD GREATER ACCURACY, PRODUCTIVITY, AND PROFITABILITY

When you upgrade to a robotic layout station, layout becomes much more accurate and efficient. No longer a drain on your productivity, layout can be performed in a fraction of the time with a single worker.

An automated robotic layout tool that's intuitive to learn and use helps you:

- Improve your accuracy when placing layout points in the field
- Catch and fix discrepancies before they turn into costly problems
- Increase layout speed and efficiency
- Document work performed
- Improve productivity with the team you already have

Ready to see what a robotic layout station can do for your accuracy, productivity, and profitability?

LEARN MORE NOW



"We could get done with one person what would normally take five people. The technology allowed us to stay on pace with a compressed schedule and a complex project."

— **Luke McCrea,** *BIM/VDC Project Lead, Intermountain Electric*