



Ahead of the Curve: Embracing Automated Layout

Delivering faster, higher quality
installation for data centers, automated
warehouses, and hi-tech manufacturing

Layout—bringing designs to reality in **automated facilities**

In an automated facility (e.g., data centers, automated warehouses, and hi-tech manufacturing), interaction sequences between equipment and machinery are often long and intricate—involving hundreds of moving parts that require precision placement, alignment, and installation in order to integrate seamlessly.

Any disjoint between two key pieces of equipment—even by less than 5mm—can threaten the functionality of the entire facility and require costly rework.

When the success of these facilities relies entirely on equipment installed by traditional layout, often performed by multiple parties, there's simply greater room for errors that can set off a cascade of issues.

Delays and rework stemming from equipment misalignment, confusion, and miscommunication during the layout or installation process are time-consuming and expensive.

Pushing back a facility's go-live date by a week or more can mean losing out on hundreds of thousands or even millions of dollars in revenue.

Now, leaders are embracing automated layout so they can stay ahead of the curve and **deliver faster, higher-quality installation with expedited go-live dates**—allowing project managers to play offense instead of defense.

Meet Rugged Robotics

Our robot-powered layout solution covers every step of the layout process—from prepping your CAD/BIM files to printing ultra-precise lines and detailed instruction blocks directly on the concrete—to ensure ultimate efficiency, rapid execution, and uncompromising quality.



4 Key benefits of automated layout

Automated layout is the process of using digital technology and robotics to prepare and execute construction layouts, with minimal manual intervention.



ACCELERATED TIMELINES

Rugged cuts facility installation timelines by up to 60%—enabling facilities to get up and running faster.



PINPOINT PRECISION

Mark1 replicates even the most complex, intricate designs with 2-3mm accuracy.



MAXIMIZED EFFICIENCY

Saving time on layout and installation allows project managers to reallocate man-hours to other tasks, keeping budgets on track.



HIGH-QUALITY INSTALLATION

The level of detail in a Rugged layout empowers any crew to pull off a fast, hassle-free installation.

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The need for modernization of layout

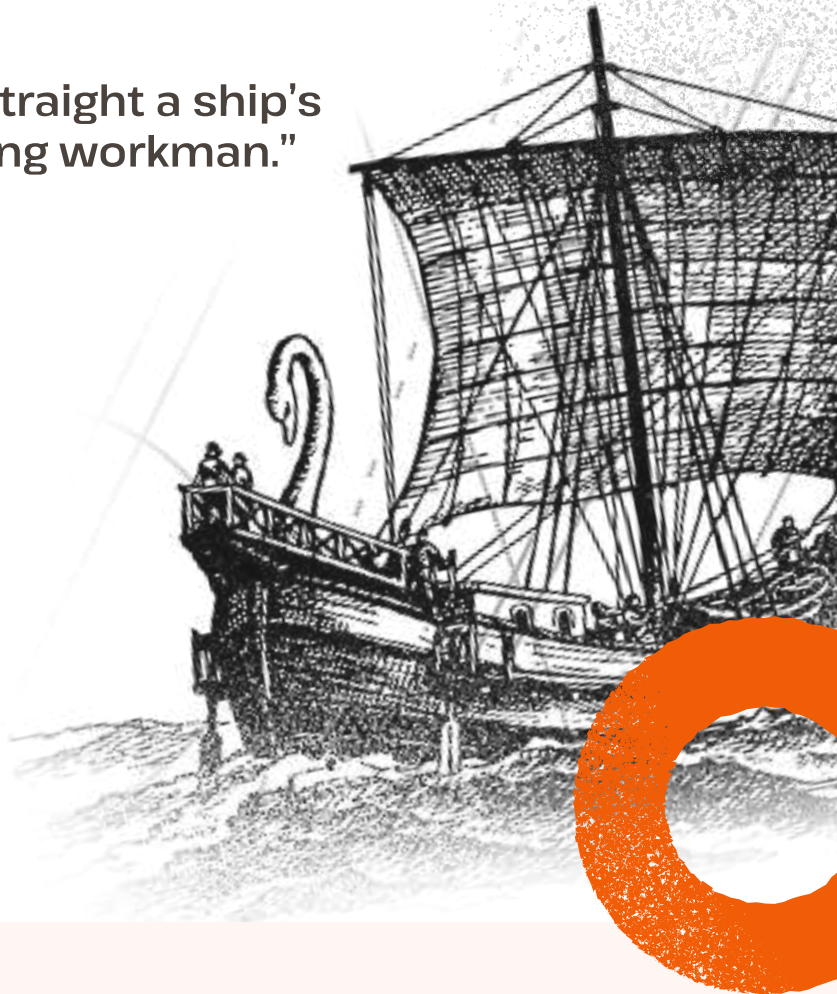
“The carpenter’s line maketh straight a ship’s timber in the hands of a cunning workman.”

The layout process used today is the same one mentioned in Homer’s Iliad circa 8th Century BCE. It’s been the standard for three thousand years. It ain’t broke... but it certainly ain’t perfect.

Human processes can always be improved, made safer, made smarter—modernized, then futurized.

The traditional layout process is labor intensive and time-consuming

In traditional layout, workers use a tape measure, lasers, and total stations to determine where they should mark “carpenter’s lines” in chalk or Sharpie®. Using these guidelines, they mark and label basic reference lines and points. The points are often manually labeled with a simple ID number (or not labeled at all), and the data is recorded in mountains of spreadsheets and documents which must be deciphered by installers at a later date.



Common Challenges

➡ HIGH EFFORT, LOW PAYOFF

Despite taking a lot of time and man-hours, traditional layout only produces basic information such as chalk lines and small dots/crosses.

➡ LOW INFORMATION = SLOW INSTALLATION

Because only basic information is marked on the floor, installers are forced to rely on drawings and templates to complete the installation of sophisticated, heavy equipment. These added processes slow down installation rates, lead to mistakes, and impact time-to-value.

➡ QUALITY DEPENDS ON SKILL LEVEL

The efficiency and consistency of both layout and installation are affected by skill variance across trades and regions. This variance can cause communication breakdowns and gaps in documentation between crews and stakeholders, resulting in problems that propagate throughout the facility.



Altogether, this process is labor intensive and time-consuming, often taking weeks to complete—without any guarantee of a high-quality end result.

Revolutionizing the equipment layout process

Rugged brings your layout to the 21st century



When we say automated layout, the first image that comes to mind for most people is, well, a robot.

Though there is a robot involved (more on that robot later...), we want to emphasize that automated layout does not simply entail replicating the manual layout process using a robot.

When we meet with industry leaders, they often ask something along the lines of: “Can your robot give me a centerline for my conveyor belt?”

The answer is yes, we can replicate a chalk line. But that’s just the beginning of what we can do.

Automated layout has the ability to impact installation in a way that improves overall field performance.

Imagine instead that your centerline includes printed, easy-to-read instructions containing all the detailed information your installers need to do their job not just well, but better than ever—without the hassles and headaches of misaligned marks, unclear labeling systems, and missing or hard-to-find documentation.

For example, your layout can include labels for each mounted leg of a conveyor belt system, clearly indicating details like part numbers, drill or anchor sizes, conveyor elevations, feed rates, power drops, E-stop locations, and so much more.

With Rugged’s automated layout service, your teams can get all the information they need, when they need it, at the exact location where they need it.

The End Result

➡ FAST, DETAILED LAYOUT

Rugged can produce a high-quality layout in a single pass—allowing project managers to reallocate skilled onsite labor to other tasks.

Get detailed labels and instructions printed directly onto the floor to eliminate sources of confusion and error—and achieve great installations regardless of your team’s overall experience level.

➡ FAST, HIGH-QUALITY INSTALLATION

Workers no longer have to decipher tag numbers and dig through spreadsheets or drawings.

Our layout robots print directly onto the floor using layouts created from CAD data, eliminating the need for bulky, heavy templates.

➡ EARLY GO-LIVE

Traditional layout and installation can take months. Automated layout cuts weeks off that process—and reduces equipment installation time downstream by as much as 60%.

This enables facilities to get up and running—and generating revenue—faster than ever.

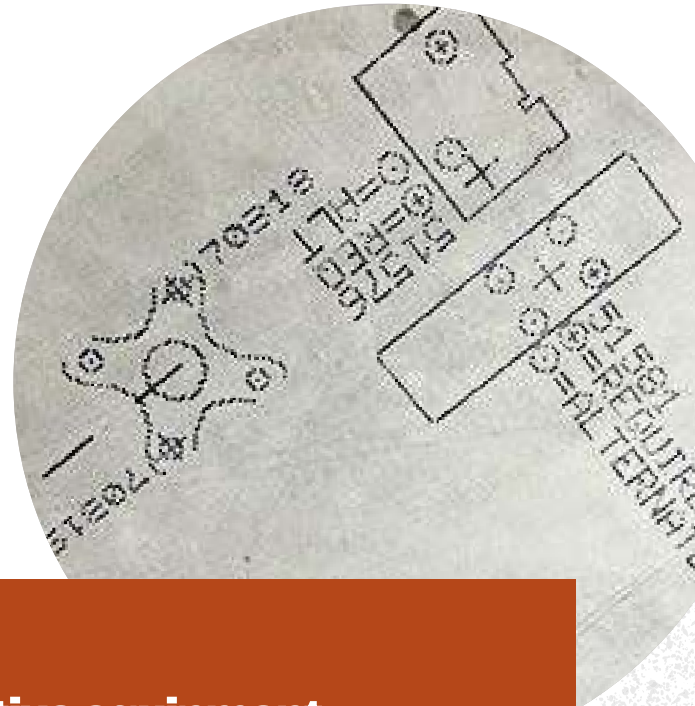


Automated layout improves layout performance quality and consistency, accelerates installation, and gets facilities online faster than ever.

Automated layout use-cases for automated facilities

Automated layout can be utilized for every aspect of facility layout—from demarcating large equipment, fencing, and work zones to printing thousands of tiny details.

Automated layout—from the fine print to the full floor:



Passive equipment

- Fencing and gating
- Racking
- Mats

Active equipment

- Workstations
- Conveyor belts
- Manufacturing and processing equipment

References

- Fiducials
- Floor taping
- Data server rack numbers and IP addresses
- Power feed labels

Installation details

- Base plates
- Flange outlines
- Drill holes
- Custom symbols
- Cell and part numbers

Mechanical & Electrical

- Electrical drops
- Data drops
- Wi-Fi access points
- Electrical cabinet clearance zones

Miscellaneous

- Keep-in zones
- Keep-out zones
- Walkways
- Door, gate, and cabinet swings

Build smarter, faster, and better with Mark1

Rugged's full-service automated layout platform, operated by our team of skilled experts, is engineered to speed up project timelines and modernize your layout process through robot-powered automation.

Ready to meet the robot behind it all?

Mark1 Gets It Done:



Precision performance

Mark1's holonomic drive system replicates even the most complex, intricate designs within 2-3mm accuracy—delivering next-level fidelity and ensuring installation success.



Data-rich details

Mark1's layouts are packed with details, bold symbols, and multi-line text for build-by-number clarity—eliminating guesswork, reducing errors, and providing crews with everything they need to install flawlessly.



Ultimate flexibility

No need for a cumbersome total station or multiple rounds of setup and takedown—Rugged's team transforms 3D models to precise layouts using only Mark1 and a network of passive targets.

Specialty designs and complex curves. Precision equipment layouts with **custom symbology, alignment marks, and instruction blocks** printed in a single pass to enable intuitive installation.

Mark1 is ready for everything.



Automated layout with Rugged Robotics—how it works

Say goodbye to missed deadlines and bulky, heavy install templates.

Our team and robot-powered platform handle the entire layout process, from processing design data to printing precise lines directly on the concrete—ensuring efficiency, speed, and quality at every step.

Experience end-to-end excellence with Rugged.



STEP 1: PREPARE

Send us your data—we'll take it from there.

We don't need highly sophisticated, cutting-edge models designed in "big name" software programs. In fact, we consider ourselves software-agnostic. **If you can export your CAD into a standard format, we can work with it.**

We know many OEMs and systems integrators work with proprietary or legacy software—so we've adapted to utilize whatever data we're given. We do the heavy-lifting to process your CAD and generate a version optimized for Mark1.



STEP 2: MOBILIZE

We'll come to the facility, prepped and ready to roll.

We don't want to be yet another moving part to track—we'll sync with the on-site team, fit into the existing schedule, and bring our layout platform to your jobsite. Once we check control reference coordinates and set up our network of targets, we get right to work. We can even work off-hours or scale up robots to meet your desired schedule or help you recover lost time from other delays.



STEP 3: DELIVER

And that's it. Your layout is done.

Mark1's 140mm wide printhead—the biggest and boldest in the business—inks a hypervisible layout directly onto the facility floor.

Our VDC and operations teams can work with you to create custom symbols, alignment marks, and instruction blocks—empowering any crew to execute a fast and flawless installation.

Case Study

THE DELIVERY

Rugged's team recently worked with a Confidential Client to print a layout across 120,000 square feet for fiducial placement, robotic workstations, and auxiliary equipment (fencing, power drops, equipment labels, etc.)—including over 7,000 fiducial placement outlines with position and orientation.



THE OUTCOME

Our layout accelerated the installation process in all areas, enabling:

- Fast, efficient sticker placement within our printed outlines
- Pre-drilled anchor holes for equipment and fencing
- Easy-to-read references and instructions printed on the ground
- Elimination of bulky, heavy installation templates
- Zero rework

The client audited a selection of approximately 500 individual prints with a total station and showed a **standard deviation of 2mm** across the entire 120,000 square feet.

Time studies and onsite interviews showed dramatic acceleration of the installation, including a 60% reduction on key systems, and enabled an overall product delivery weeks ahead of schedule.

Get started today: automated layouts with Rugged Robotics

Experience expert-driven layout automation from start to finish with Rugged.

Faster, higher quality installation

- Rugged prepares CAD/BIM files and consolidates design data before arriving at the site, enabling rapid execution
- Digital measurements are accurate within 2-3mm
- Lines executed precisely—even curves, complex geometries, and hundreds of tiny markings such as spatially oriented fiducials

Reduced project timelines & resources

- Save on labor and resource costs by completing layout in days—not weeks
- Working off a highly accurate, detailed layout smooths downstream installation and reduces risk of costly rework
- No need for single-use plywood templates or other manual layout resources

Earlier go-live date

- Not only does layout happen faster, but installation does as well due to highly precise silhouettes and detailed instruction blocks
- By cutting the installation timeline at both ends, Rugged helps get automated facilities up and running (and generating revenue) days or even weeks earlier than planned

Questions about Rugged's full-service layout?

Reach out with any questions you have about how we can bring your layout process into the 21st century—allowing your team to stay upright and focused on what they do best, while our robot-powered technology takes your automated facility to new heights.

CONTACT US TODAY:

210-617-3706

sales@rugged-robotics.com

Or, drop us a message.

Rugged is ready to roll when you are:

Start a Pilot Project

Curious about giving our full-service layout a try? Start with a pilot project. We'll come to your jobsite and give you a taste of the Rugged experience, so you can understand how Rugged works into your processes and see the results for yourself.

Need layout done ASAP?

In need of layout right away? Once we get your model, we'll bring our robot-powered platform to your jobsite and get started on your layout right away.