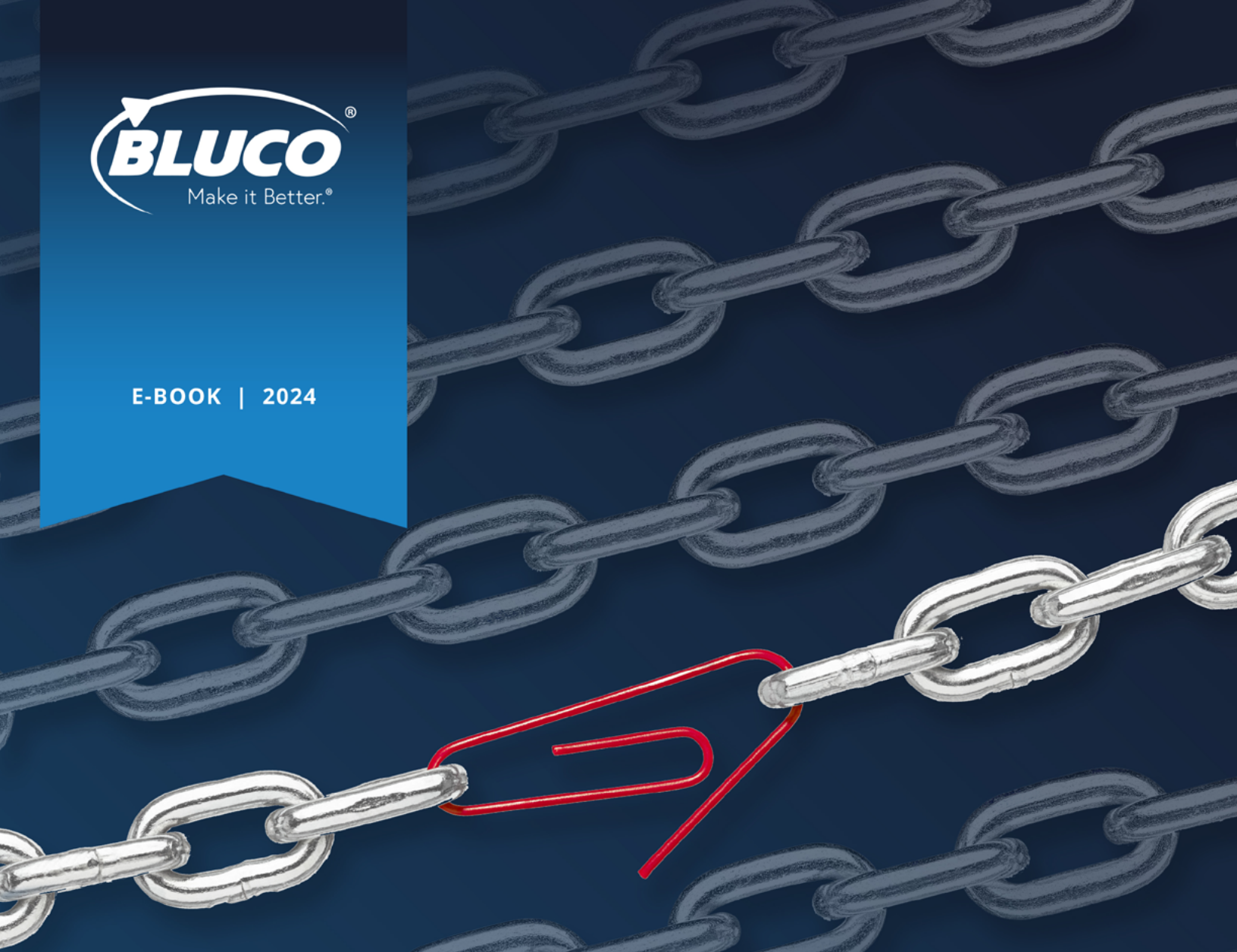
BLUCO®
Make it Better.®

E-BOOK | 2024



BLUCO® MODULAR FIXTURING SOLUTIONS

BRIDGE THE ENGINEERING GAP

MOVE QUICKLY | ADAPT SEAMLESSLY | DECIDE CONFIDENTLY

BRIDGE THE GAP

Building A Roadmap to Manufacturing Success

Shrinking lead times

NOT ENOUGH TIME

Tighter profit margins

NOT ENOUGH MONEY

Shortage of skilled labor

NOT ENOUGH PEOPLE

It's a scenario that's all too familiar to manufacturers. Lead times are getting shorter, labor & raw materials are getting more expensive. Every day, you're being asked to do more work with less resources. Efficiency and productivity have never been more vital to your success, but you've already optimized your entire production process... or have you? Many manufacturers have a gap in their process. A gap where workholding should be - or should be working better than it is. Bridge that gap, and unlock the power to bring higher quality products to market faster. Inside, we'll show you why it works, how to do it, and what kind of results to expect.

Let's get started...

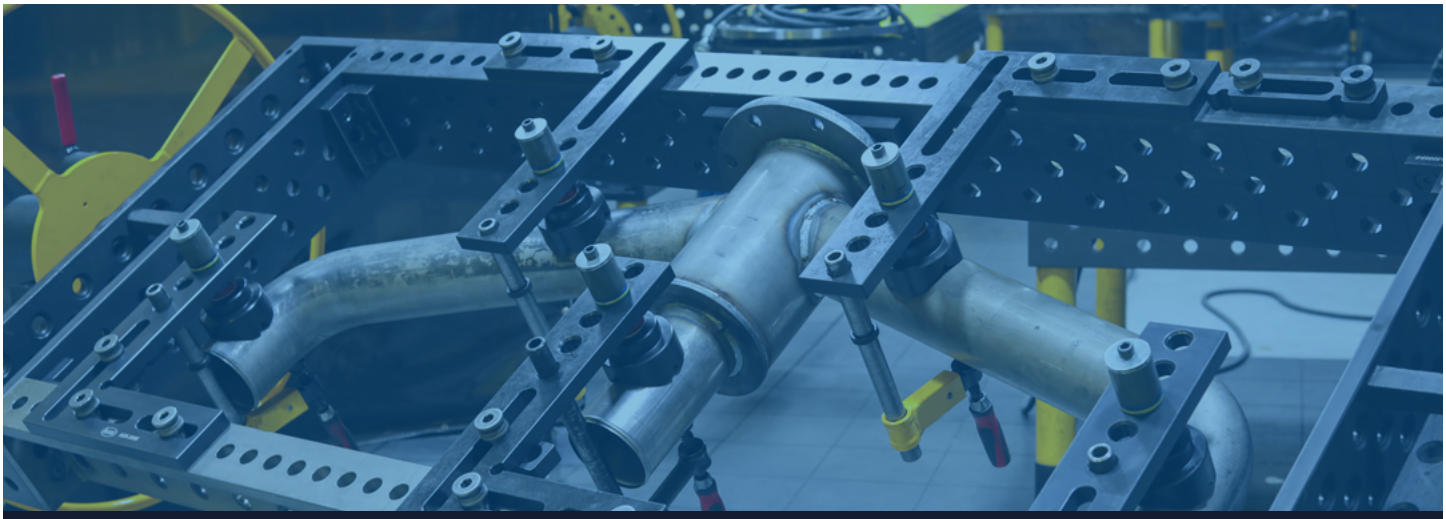
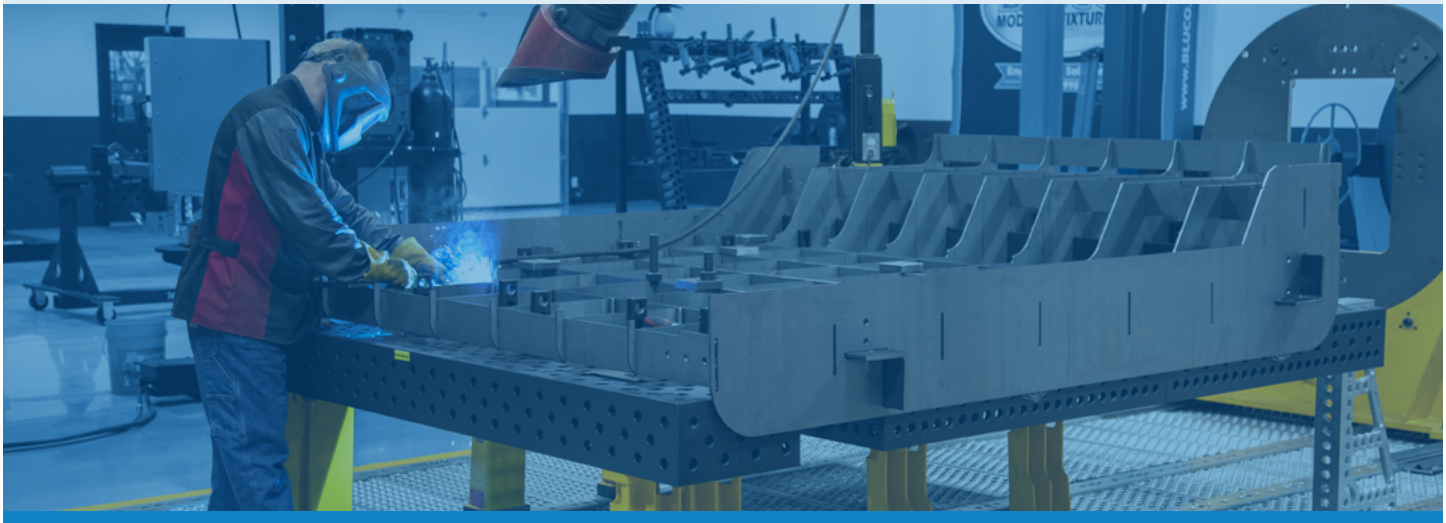


TABLE OF CONTENTS



THE MANUFACTURING PROCESS
ROOM FOR IMPROVEMENT

Your production process is the backbone of your entire operation. Because of that, it's one of the most often scrutinized, highly optimized, and repeatedly re-engineered pieces of your gameplan. Whether you need to boost overall productivity or troubleshoot a specific bottleneck, your production process contains all the levers and dials you look to adjust when things aren't going to plan.

That's a perfectly reasonable line of thinking. The problem is, most manufacturers are working with an outdated view of the production process. It looks something like this:

That said, while this narrowed view of the production process is common, what's also common is the industry's dissatisfaction with it. In fact, a recent survey indicated that a scant 7% of manufacturers are comfortable with their current production process. And over half said that improving that process was a top priority.

Even more interesting, the top driver behind manufacturers' desire to improve their process was the desire to manage time, cost, and product pressure in an increasingly competitive environment. ***In other words, the need to do more with less, and to bring higher quality products to market faster is top of mind across the industry.***

7%

Are comfortable with their current process

60%

Say improvement is a top priority

Source: Lifecycle Insights. 2023. "Why Manufacturers Are Pushing To Improve Performance." Lifecycle Insights. https://www.lifecycleinsights.com/why-manufacturers-are-pushing-to-improve-performance/

THE MANUFACTURING PROCESS

RETHINKING THE STATUS QUO

Given the importance of the production process in maintaining your speed to market, along with the industry's dissatisfaction with the status quo, it makes sense to investigate change. There are two ways to approach potential adjustments to your production process:

Option A: MAKE MINOR ADJUSTMENTS

PROS: Path of least resistance
CONS: Incremental improvement
MYTH: Easier is better

Starting from where you're at is a logical first step. But most manufacturers have already been engineering & optimizing these steps for years. So chances are there's very little wiggle room left.

In other words, the more you turn the same knobs and pull the same levers, the less able you're to affect major improvements. While it may feel easier because it's familiar, the *results* are also familar — small incremental improvements that don't move the needle enough to reach your goals.

MINOR ADJUSTMENTS:

- **SIMPLIFY DESIGNS** to reduce manufacturing complexity
- **RETAIN LOCAL SUPPLIERS** to reduce delivery time
- **IMPLEMENT MAINTENANCE PROGRAMS** to reduce downtime
- **REORGANIZE TOOLS** to minimize worker movements

INCREMENTAL IMPROVEMENTS

Option B: MAKE A PIVOTAL CHANGE

PROS: Exponential improvement
CONS: You can't fix what you don't see
MYTH: Pivotal change requires major interruption

It stands to reason that the bigger the change, the greater the potential impact on your speed to market. The question is, will it be a ***positive*** impact? In fact, this aprehension is one of two things that hold manufacturers back when it comes to considering a big change in the production process.

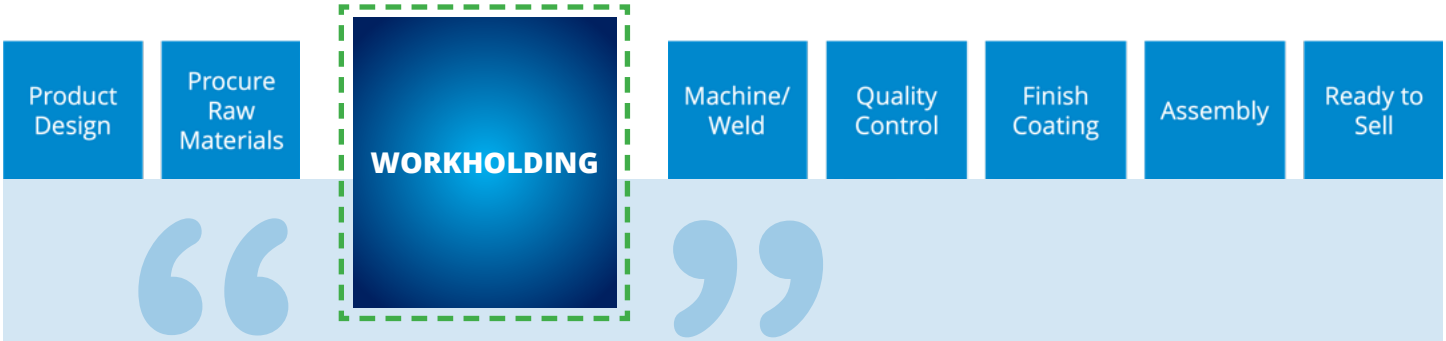
But the notion that making a major change implies major interruption is actually outdated. Technology like reality capture and simulation, and even hands-on testing facilities significantly mitigate the risk of such a change by allowing for testing of a solution before it goes to live production.

PIVOTAL CHANGES:

- **ADOPT AUTOMATION** to improve productivity
- **ADD CAPABILITIES** to reduce reliance on outside vendors
- **EXPAND FACILITY** to accomodate growth
- **INVEST IN NEW ASSETS** to streamline production

EXPONENTIAL IMPROVEMENTS

Another limiting factor is a traditional, narrow view of the production process. It's a view that leads manufacturers to think they've already engineered every step of the process. In reality, they're overlooking a reserve of untapped potential by leaving a crucial step in their production process unengineered. That step is workholding.



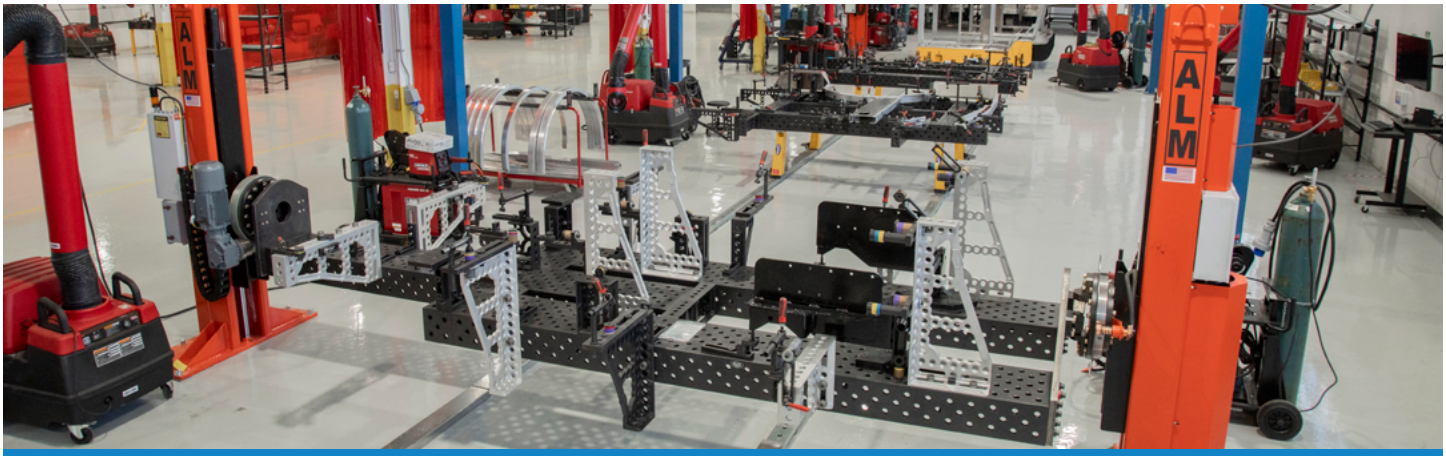
Workholding is not just a secondary consideration but a foundational element that influences the quality, efficiency, and economic viability of the entire production process.

UPDATING AN OUTDATED VIEW OF WORKHOLDING

If the idea that workholding could unlock exponential change seems outlandish, it's likely because for too long, the definition of workholding was limited to just hardware. And it would be a stretch to imagine that an off-the-shelf table and jig could be the key to success.

But today's most sought after workholding solutions enable a much broader range of capabilities. They are end-to-end solutions that integrate welding, fabricating and assembly technology. The result is a far-reaching range of benefits that can be seen and measured both up- and down-stream in the production process.

This revised view of workholding allows us to begin to understand ***the pivotal role of workholding as the bridge over which every product design has to pass in order to become a saleable asset.*** Get it right, and your process flows. Get it wrong — or worse, ignore it — and you could lose valuable momentum.



The role of workholding is pivotal to production efficiency and final part quality, and impacts every other phase of production.

THE ROLE OF WORKHOLDING

WHY ENGINEERING IS KEY

Understanding that workholding is a foundational step in the production process is vital to unlocking exponential improvement. But realizing the importance of engineering that step is equally important. A true workholding solution is more than hardware that holds parts — it impacts your entire production process. It can eliminate bottlenecks, improve product quality, and improve safety. In fact, when engineered with foresight, the entire goal of workholding shifts. ***The goal of an engineered workholding solution is not to maintain, but to elevate the production process.***

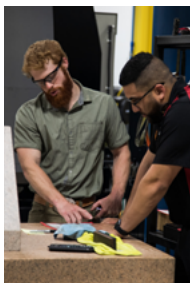
Engineering the workholding step of your process addresses the root causes of production inefficiencies, and delivers improvements that resonate throughout the production cycle:

PRECISION

Guarantees tight tolerances, and ensures final assembly is never thrown off by out of spec subs.

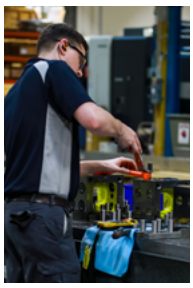
CONSISTENCY

Optimizes automation by ensuring identical part delivery every time so the robot never has to guess.



TRAINABILITY

Eliminates need for tribal knowledge by standardizing procedures so that even newer staff can manage.

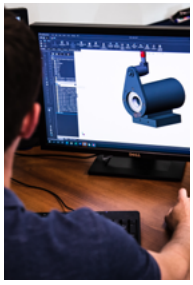


REPEATABILITY

Streamlines high mix, low volume manfufacturing. Easy to setup and/or changeover between builds.

SAFETY

Integration of powered or manual positioning eliminates climbing, lifting, reaching and crawling for both comfort and safety.



VERSATILITY

Allows for management of design changes and shifting market demand with less hassle and less lost time.

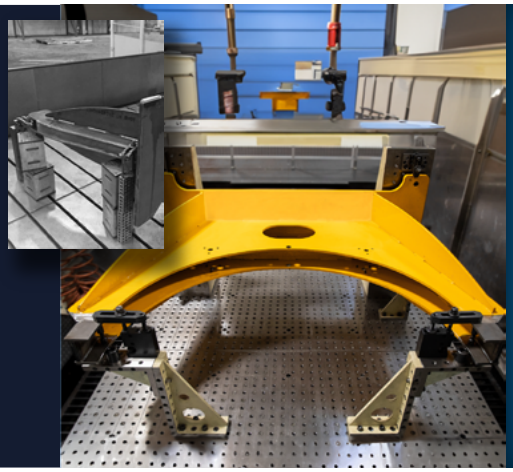
THE ROLE OF WORKHOLDING

FINDING THE "X-FACTOR"

Unlike the incremental changes manufacturers are used to chasing, engineering the workholding step of the production process can deliver exponential — or **X-factor** — results, as shown in the scenarios below.

REPEATABILITY

Switching from a temporary setup that lifted parts off the machine bed to a precise, modular system eliminated the need to dial in the part every time, and accelerated production of this bracket by 3X.



3X

PRECISION

The addition of a modular workholding solution eliminated bowing in the manufacture of these truck scale beds. The result was beds made 5X faster.

5X

VERSATILITY

Adjusting to accomodate custom sized equipment frames on a plain table eats up time. Modular workholding adjusts easily & sped up assembly by 12X.

12X

A CLOSER LOOK

BEFORE & AFTER

BEFORE **AFTER**

Before engineering the workholding step of their production process, the manufacturer was building side sub-assemblies and the frame for a chipper truck using a dedicated fixture (LEFT) that held only one variant. Welders had to navigate a long, cumbersome path around the fixture, and then move over to a separate final assembly fixture.

The new solution (RIGHT) features an open design for easier access, and consolidates the assembly process into a smaller footprint on the factory floor. The fixture is modular, so it can hold multiple variations and adapt easily to engineering change requests.

BEFORE **AFTER**

To weld their wide variety of air handling unit frames, this manufacturer was relying on home made tables (LEFT) with rollers on a V-groove track. A chain was used to hold the parts in place. There was no way to ensure consistency, as the position of both the part on the table and the chain on the part were variable. The result was a time-consuming process with unpredictable outcomes.

After engineering the workhlding gap, the result was five individual cells (RIGHT) connected by a common rail system. Because the rails make the system adjustable, each cell can accommodate any size small project, or multiple stations can be combined to hold one long part. The new process is faster and more accurate.

MAKING A CHANGE

STEP 1: ANALYSIS & PLANNING

Once you've identified workholding as a gap in your production process, the next step is to understand what it's costing you and what you could gain from bridging the gap.

1.1: DEFINE THE PROBLEM

When a production issue pops up, the objective is to put out the fire. But unless you identify the ***cause*** of the fire, it's likely to start smoldering again.

The accurate identification of engineering gaps is only possible when you can step back from day-to-day operations to focus on the bigger picture. But for manufacturers who are already stretched thin, that's often impossible. In these cases, it often makes more sense to bring in an outside perspective. The box on the right shows a few of the options available to manufacturers looking for expert insight into what's keeping them from getting to market as quickly as possible.

WHERE TO FIND HELP:

Manufacturing Consultants: Specialize in process improvement and efficiency.

Mechanical Engineering Firms: Offer custom design and engineering services.

Industrial Automation Companies: Provide integrated solutions for automating manufacturing processes.

Specialized Workholding Manufacturers: Gather data, provide process analysis & guidance, workholding design & implementation, and engineering support.

LOOK FOR A PARTNER WHO CAN ASSIST YOU WITH ALL FOUR STEPS OF THE PROCESS — ANALYSIS, DESIGN, VALIDATION & IMPLEMENTATION.

1.2: GATHER DATA

Identifying the issues allows you to then determine the impact of those issues. This requires data, some of which can be gathered by the manufacturer and some of which is best gathered and/or analyzed using specialized equipment and expertise. There are several types of data that can be used to pinpoint weak spots:

PRODUCTION FLOOR OBSERVATIONS
Direct observation and recording of the current workflow

BENCHMARKING
Comparison against industry standards or competitors

QUALITY CONTROL REPORTS
Analyses of defect rates & rework instances

SMART SENSORS
Real-time monitoring of performance and factors like vibration, temperature, force, pressure and other relevant indicators

HISTORICAL PERFORMANCE DATA
Identification of trends or recurring issues

CUSTOMER FEEDBACK
Listening to what customers have to say about the quality and precision of parts

REALITY CAPTURE
Creation of a digital twin to understand current space, workflow, and layout, and to create a virtual space to ttest & simulate modifications

1.3: SET GOALS

The old adage *if you don't know where you're going, any road will get you there* sums up why it's important to define your expectations before going any further. At a minimum, you'll need to set production goals.

Your production goals will define the scope and path of your project. For example, if your goal is to increase production by a factor of three, this will be the your starting point.

The number of sub-assemblies that make up a final product, the space and staff available for additional workstations or equipment, and the efficiencies that can be gained from new solutions will all factor into the equation. But the final sum of that equation must always be three or greater. **This "X-Factor" is your goal, and should be the standard by which all decisions and analysis are made.**

Regardless of the specific production targets that you set, there are three key capabilities that are on the list of goals for any successful manufacturer. It's important to make sure that as you analyze options and make plans, any improvement you consider contributes to these overarching goals:

EFFICIENCY:

Maximize the use of time, money and resources by eliminating downtime, bottlenecks, and outdated processes.

18%

Higher annual revenue growth rate (CAGR) for companies that get products to market faster than slower-moving competitors.[1]

AGILITY:

Improve your ability to adapt to changes in market demand, product design, desired capacity, and socioeconomic factors.

92%

Of executives believe the ability to rapidly respond to market conditions and external factors is critical to business success.[2]

CONFIDENCE:

Harness data to guide innovation that improves part quality, enabling your team to make decisive, quality-focused decisions.

85%

Feel that fear acts as a barrier to innovation, yet fewer than 11% take action to address it. [3]

[1] *Ellsworth, S., & Sourges, J. (2022). Industrial Speedsters, How Advanced technologies can turbocharge your speed to market. Accenture.com. https://www.accenture.com/content/dam/accenture/final/industry/industrial/document/Accenture-Industrial-Speed-to-Market.pdf*

[2] *Draskovich, B., Fager, H., Hieronymi, F., Lee, L., Rowe, B., Stone-Stecklein, C., & Tait, D. (2017). Achieving Greater Agility, The essential influence of the C-suite. Project Management Institute. https://i.forbesimg.com/forbesinsights/pmi/achieving_greater_agility.pdf*

[3] *McKinsey & Company. Fear factor: Overcoming human barriers to innovation. McKinsey & Company. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/fear-factor-overcoming-human-barriers-to-innovation.*

MAKING A CHANGE

STEP 2: DESIGN

The design of a workholding solution — the kind of solution that can bridge the gaps — is a complex undertaking. If the partner you chose for analysis and planning has the capability to handle the rest of the process, that relationship will make the design phase easier, faster, and more likely to meet your specific needs.

2.1: COLLABORATION

A successful design requires a dialogue between you and the engineers designing your solution. Design is an iterative process, meaning the first design is not likely to be the final design. Your input will help guide the project to successful completion.

2.2: INTEGRATION

Another hallmark of successful design is a willingness on the part of your engineers to consider not only what they can do on their own, but what would be possible if they brought in trusted partners. This allows your engineers to build in any necessary integrations, and to involve the most knowledgeable experts.

Read more about integrations on pages 15-17

THE COLLABORATION CHECKLIST

There is nothing more predictive of project success than a successful collaboration. Here are the key ingredients:

- **STRATEGIC ALIGNMENT**
  Your challenges and goals have been clearly defined and understood, and that you're building the 3 key capabilities:

  EFFICIENCY | AGILITY | CONFIDENCE

- **STAKEHOLDER INVOLVEMENT**
  The same people who will make final decisions are involved in early discussions.

- **COMMITMENT TO QUALITY**
  Everyone is aware that shortcuts aren't allowed and attention to detail is required.

- **SHARING OF KNOWLEDGE**
  All parties are willing to share the knowledge needed to make the project a success.

- **OPENNESS TO FEEDBACK**
  There are ways to provide feedback and that feedback is heard & discussed.

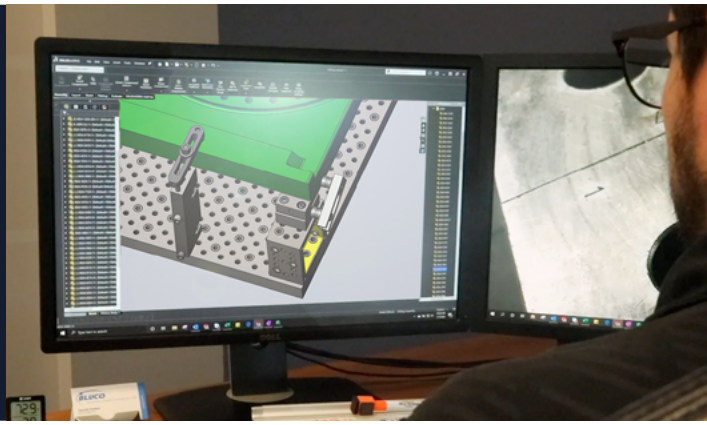
- **FLEXIBILITY**
  If circumstances change, plans may need to be revised to keep the project on track.

2.3: EXPLORATION

Application Engineers can help you visualize a proposed solution, and how your team might interact with it, in a variety of ways.

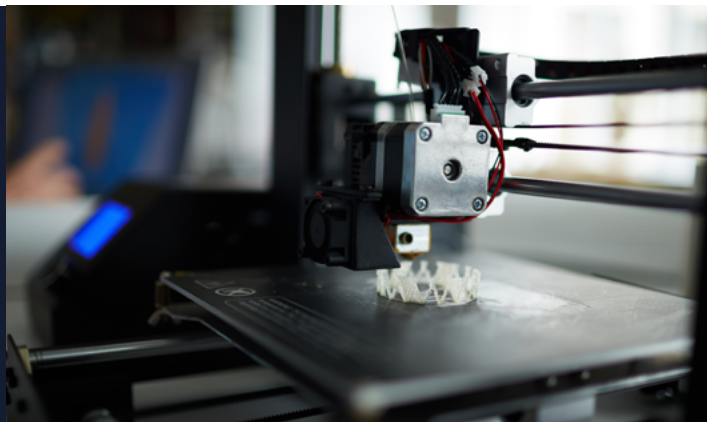
CAD MODELS

CAD models can be reviewed and revised in real-time, and new ideas can be quickly added for discussion.



3D PRINTING

3D printing of custom parts make it possible to try innovative ideas without the time or cost needed for machining.



DIGITAL TWINS

Digital twins provide a virtual landscape where anything is possible. Solutions can be inserted, deleted, moved or altered nearly instantly.

Read more about digital twins on page 14

> **Scientists investigate that which already is;
> Engineers create that which has never been.**
> *- Albert Einstein*

A CLOSER LOOK
REALITY CAPTURE & SIMULATION

Virtual technologies are revolutionizing the way workholding solutions are designed & tested, and giving manufacturers a way to make major changes *without* major risk. Innovations like virtual reality, augmented reality, and digital twins provide both the safe space and the precision data needed to think bigger. Most of this game-changing tech is powered by reality capture technologies and the tools used to deploy it.

This image shows how exact a point cloud is - the real photograph of the space morphs into the point cloud as the image moves to the right.

WHAT IS REALITY CAPTURE?

Imagine you're taking photos of an object from every angle possible. Now, instead of photos, imagine capturing millions of points. That's reality capture. It works by using LiDAR scanners to collect data points from real-world objects or environments. These scanners can be mobile, static (tripod based) or mounted to UAV (Unmanned Aerial Vehicles or drones) or motorized vehicles.

HOW LiDAR WORKS

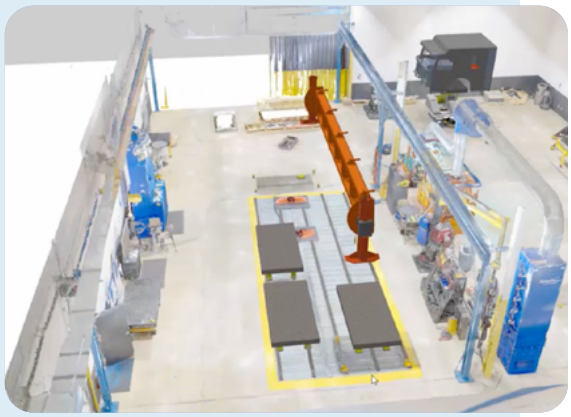
Light Detection and Ranging, or LiDAR, is a remote sensing method that uses light in the form of a pulsed laser to measure distances. When these pulses hit a target, some of the light is reflected back to the instrument, where it is detected & recorded. By calculating the time taken for each pulse to return to the sensor, LiDAR can accurately determine the distance between the sensor and the target object. The output of LiDAR is a series of points.

THE POINT CLOUD

Each point represents a precise location in space, and together they form a "point cloud." A point cloud is a detailed rendering representing an instance in time of the environment being captured. The point cloud can then be used to create 3D models, CAD drawings, simulations and other visualizations to help aid in the design process.

IMMERSIVE SOFTWARE

Point cloud data can then be fed into simulation software. The software uses the point cloud to simulate how objects behave in different scenarios. For instance, engineers can see how a new workholding solution will fit into an existing space, or how workers will move around and interact with it. They can simulate forces, movements, and actions, making it possible to refine the design, identify potential issues, and optimize performance before anything is built. Adjustments and improvements can then be made virtually, saving time, money, and materials.



Simulation software is also used to model integrations for workholding solutions, which unlock additional functionality and multiply the benefits.

EXPLORE WORKHOLDING INTEGRATIONS NEXT ▶

WORKHOLDING INTEGRATIONS
POSITIONING

The integration of positioning into your workholding solution eliminates the climbing, reaching, crawling and lifting that puts welders in harm's way, and delivers a host of other benefits:

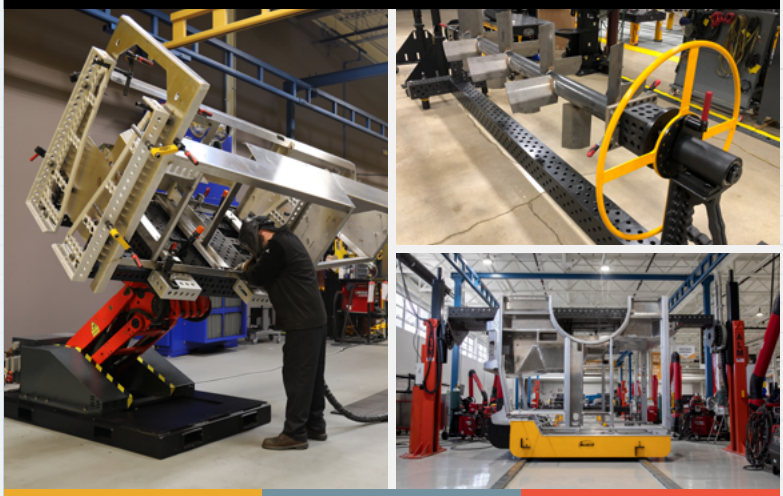
FASTER WELD TIMES
Positioners eliminate the need to repeatedly crane parts into positon, as well as the extra time needed to weld awkwaradly located seams.

ELIMINATION OF LADDERS & SAW HORSES
Moving your part instead of your welder eliminates the need for unsafe workholding work-arounds.

IMPROVED PART QUALITY
Positioners allows welders to weld flat, which improves deposition rates, and to work without contorting themselves, which improves not only comfort, but weld quality.

INCREASED PRODUCTIVITY
In addition to faster weld times, positioners also increase overall productivity by speeding up the loading and unloading of parts.

WORKHOLDING + POSITIONING



EFFICIENCY:	AGILITY:	CONFIDENCE:
Faster welds & Faster loading/unloading	Modular fixturing multiplies versatility	Proper positioning = better welds

CASE STUDY: TRUCK SCALES

CHALLENGE: This manufacturer had two main concerns: the comfort and safety of their welders, and the quality of their products. An outdated fixture was causing warping on their truck scale sub-assemblies, and welders had to use chain clamps to repeatedly move the part into position.

SOLUTION: A lift & rotate positioner was integrated into the workholding solution, which included a modular spine and precision spacers on adjustable posts. The spacers provided the flexibility needed to prevent warping issues.

X-FACTOR RESULT: 2X

Welded parts come together twice as fast. Because the new solution keeps them straight & flat, there's a seamless transition to the next production cell. No time wasted on chain clamps or torch work to make the parts fit, and workers are able to easily position the part for higher quality welds.

OLD SOLUTION

NEW CAD MODEL / POSITIONER INTEGRATION

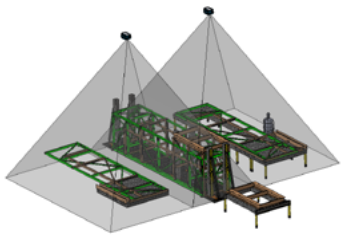
TRUCK SCALE

WORKHOLDING INTEGRATIONS

Laser Projection

Laser projection allows manufacturers to transfer complex designs directly onto the manufacturing floor in the form of precision templates that can be overlayed on parts or fixturing components.

WORKHOLDING + LASER PROJECTION



EFFICIENCY:	AGILITY:	CONFIDENCE:
Faster fixturing & Faster weld process	Faster training & supports high mix, low volume	Converts CAD models into on-the-spot QC

BUILT-IN QUALITY CONTROL

Laser projection catches potentially costly errors by illustrating exactly where parts and components should be located. ***RIGHT: Laser marking clearly shows when a piece part is located incorrectly (note misalignment of outline and hole on the first image), so the part can be flipped (second image) BEFORE expensive rework is ncecessary.***

FASTER FIXTURE ASSEMBLY

Translates CAD designs into projectable outlines. Eliminates the need to measure by hand to determine where fixturing components need to be placed.

MORE EFFICIENT WELD SEQUENCING

Gives welders a step-by-step guide to weld sequencing by highlighting each weld in the proper order, simplifying training and reducing the burden on senior mentors.

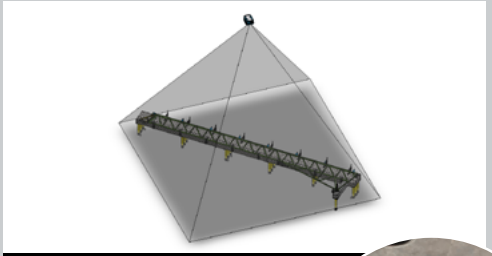
CASE STUDY: CONSTRUCTION

CHALLENGE: Engineers at this company wanted to take production to the next level by improving efficiency and final part quality. Their old fixtures had to be hand-welded for each project. And with the increasing need for customization, moving parts and components to the right location for assembly became too time-consuming.

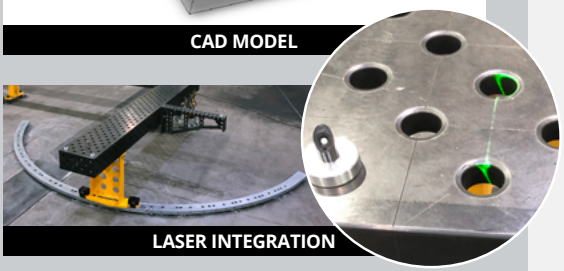
SOLUTION: The new design was a single solution to handle every joist, rafter and truss in the product line. It featured a curved floor rail to allow them to adjust the table's position to fit any part size. Laser projection also allowed them to place parts and components correctly every time. The laser highlights the correct placement of modular components for each setup.

X-FACTOR RESULT: 25% REDUCTION IN PRODUCTION TIME

The final solution brought a dramatic improvement in efficiency. Some of the larger set-ups that took two days were cut in half, and overall production time was reduced by 25%. In addition, final part quality was improved and training time was reduced from one year to one month.



CAD MODEL



LASER INTEGRATION

ROOF TRUSSES

WORKHOLDING INTEGRATIONS
AUTOMATION

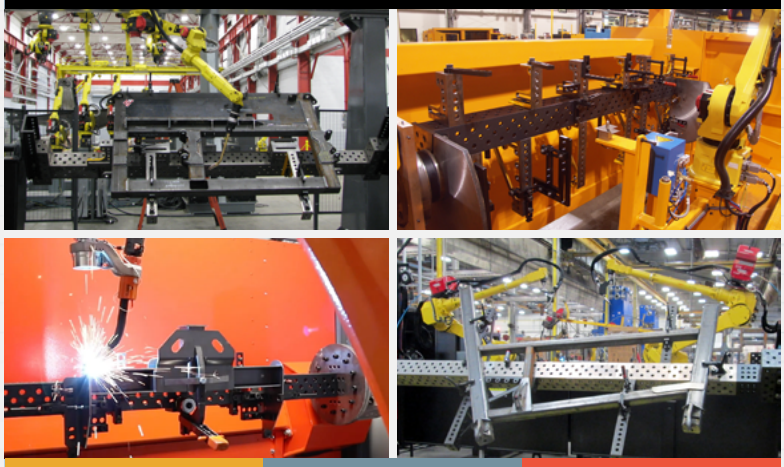
Automation is supposed to add efficiency. But without the proper workholding, that efficiency can be throttled. Pairing workholding & automation is often the unexpected key to the success of your automation investment.

PRE-TACKING: DECREASED DOWNTIME
Even the fastest robot can't buy you time if it has to wait for complex piece-parts to be loaded. Implementing a workholding solution for pre-tacking simplifies loading and means less fixturing for the robot to work around.

WELDING: REPEATABLE POSITIONING
Workholding solutions allow for repeatable precision when placing parts. This eliminates the need for time-consuming recalibration and enables the robot to operate at optimized speeds with minimal supervision.

BUILD A BRIDGE TO AUTOMATION
Workholding can also allow for an easier transition from manual processes to automation. The right solution is one that increases the efficiency of current production methods, and is versatile enough to be reconfigured for automation.

WORKHOLDING + AUTOMATION



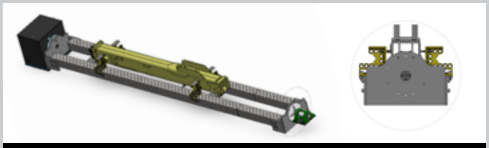
EFFICIENCY:	AGILITY:	CONFIDENCE:
Faster loading & run times + less recalibration	Eases transition to automated production	Can boost results of struggling automation

CASE STUDY: TELESCOPIC BOOMS

CHALLENGE: This manufacturer's new robotic system was not performing as planned. Changeover was taking too long and the included fixturing was clunky. Any solution would have to fit the robot's 7-meter span, small swing diameter, and limited 5,500 pound weight capacity.

SOLUTION: Given the long span and weight limitations, aluminum u-forms were the ideal choice for this solution, maintaining a low rotating mass and fitting within the limited swing diameter. Modularity allowed for easy adjustment to any size boom.

X-FACTOR RESULT: MAJOR BOOST IN ROBOTIC PERFORMANCE
The robot could now perform to its intended capacity. Modularity made changeover faster and easier, and could accommodate numerous smaller sub-assemblies shaving more time off of production.



CAD MODEL

AUTOMATION INTEGRATION

TRUCK BOOM

MAKING A CHANGE

STEP 3: VALIDATE

As noted earlier, contrary to popular belief, major change does NOT have to equal major interruption. The key to a smooth transition is validation, or proving that your new solution will work ***before*** you test it in live production. This can be accomplished in several ways.

VIRTUAL METHODS

The role of technology in manufacturing used to be limited to the use of CAD models. Although no longer the star of the show, these 3D models are also still useful as basic visual and spatial references of new workholding solutions.

Today, there's more to be gained by using CAD as an ingredient in newer immersive technologies like reality capture, VR and AR — all of which are playing a growing role in manufacturing. In fact, a recent report indicated that the global manufacturing market size of VR technology was $8 billion in 2022 and is projected to reach nearly $63 billion by 2030.[†] Understandable, since this tech provides a risk-free way to test and revise new concepts in the safety of a virtual environment.

PHYSICAL TESTING

Despite the growing use of technology-driven testing methods, there is still a very real place for hands-on testing, especially as a compliment to virtual methods. Testing out a prototype in real working conditions provides feedback on ergonomics and ease of use that's hard to assess otherwise.

One of the other important reasons to seek out hands-on testing of a prototype is to build stakeholder confidence. For welders, operators, managers and investors, seeing and experiencing the workholding solution in action provides a powerful preview.

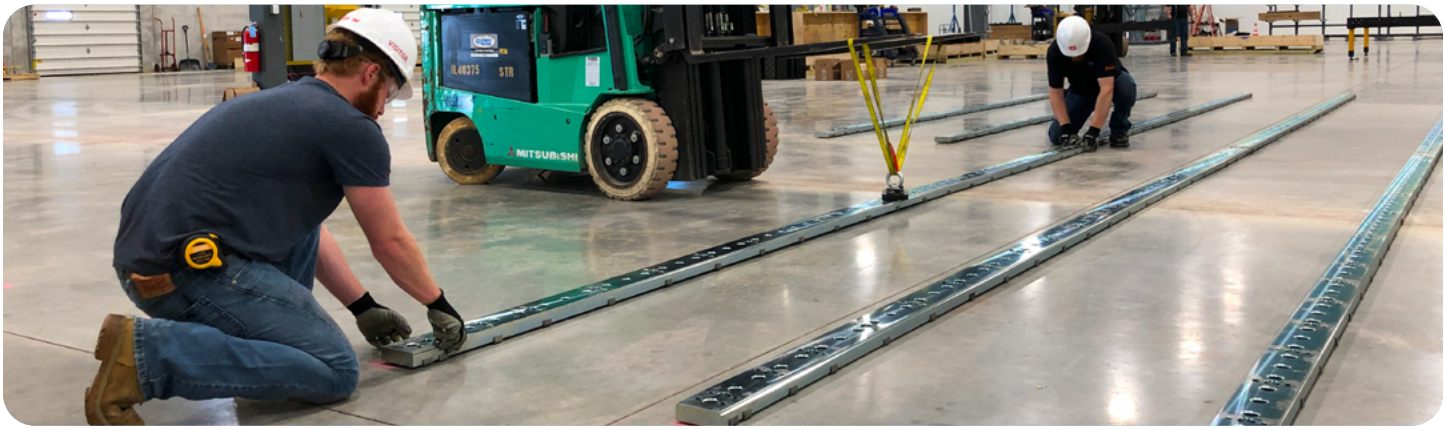
Validation facilities allow manufactures to work on prototypes off-line, without affecting live production.

[†] *Augmented Reality & Virtual Reality in Manufacturing Market Size, Share & Trends Analysis Report by Component, By Technology, By Device, By Application, By Region, And Segment Forecasts, 2023 - 2030. Grand View Research, September 2023, www.grandviewresearch.com/industry-analysis/augmented-reality-virtual-reality-manufacturing-market-report.*

MAKING A CHANGE

STEP 4: IMPLEMENT

Once you've successfully navigated analysis & planning, the design phase, and validation, you've done most of the heavy lifting to pave the way for successful implementation. You can now capitalize on that momentum by considering a few simple tips.



☑ INVOLVE STAKEHOLDERS

Keep operators, engineers, and management involved in the implementation process. Clear communication about the goals, benefits, and changes the new solution brings ensures buy-in and smooths the transition.

☑ PROVIDE TRAINING

One of the most impactful ways to ensure success is to provide training that includes operation, maintenance, and troubleshooting. This is best done by your solution provider. Ideally, they'll be on hand for installation and can provide training as well. The benefits of training include not only improved efficiency, but increased safety, better work quality and reduced errors.

☑ LEVERAGE TECHNOLOGY

If a digital twin was part of your planning and design phases, it's going to provide more value during implementation. A digital twin — on its own, or in combination with VR technology — can help in visualizing workflows, simulating changes, and providing remote assistance.

☑ GATHER FEEDBACK

Once the solution is in place, continuously monitor its performance and gather feedback from users. Use this information to make any necessary adjustments and improvements. Establishing a feedback loop is critical for ongoing optimization.

> **Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning and focused effort.**
>
> *- Paul J. Meyer, Author*

WRAPPING UP

REDEFINE YOUR FINISH LINE

It's easy to think of implementation as the finish line of your project. And it's true that implementation is a major milestone. However, ending the project here may leave you at a disadvantage, overlooking two critical components that are essential for truly capitalizing on your efforts: ***evaluation and innovation.***

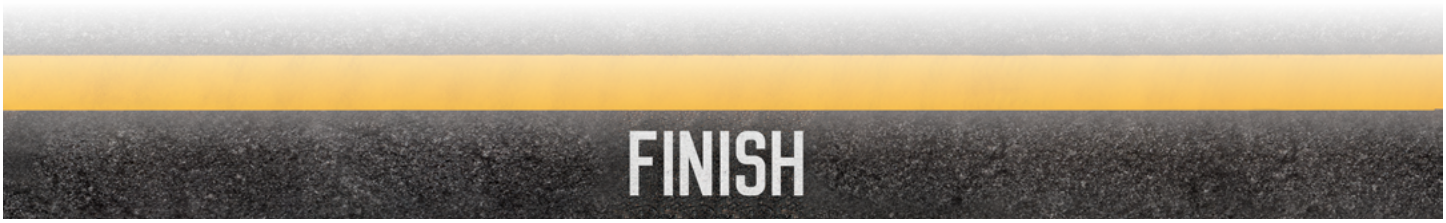
EVALUATION

Evaluation is essential for understanding the effectiveness of your solution. It's not just about confirming the system works; it's about measuring how well it meets your goals. Are you seeing improvements in efficiency, agility, and part quality? Is production where you need it to be? Ongoing assessment ensures you're not just hitting targets, but also identifying areas for further optimization. It's about continuous improvement, ensuring that your solution stays aligned with evolving objectives, and that your investment delivers maximum value.

INNOVATION

Just as important as making sure that your current goals are met is the ability to look beyond the horizon to areas of further growth and opportunity. Innovation is about asking ***where can we go from here?*** Whether it's scaling up operations, replicating successful solutions, or pioneering new approaches based on the insights gained, innovation is the key to staying ahead in a competitive landscape. It's about leveraging the success of your workholding solution for future advancements.

Adopting this mindset transforms the project from a finite task to a continuous cycle of improvement and growth. This is the path that positions you to bridge not only today's engineering gaps, but tomorrow's, ensuring that your organization is equipped to adapt and excel in the face of unexpected challenges.



BLUCO®
Make it Better.®

ADDITIONAL RESOURCES:

- ***The Modular Solutions Guide:*** Project galleries, case studies and real-world examples that detail how customers have relied on modular solutions to achieve success.
- ***Modular Case Studies:*** Challenges, solutions and results for projects from a variety of industries.
- ***Brent Slawnikowski:*** Application engineer and Business Development Manager, Bluco Corp. Specializing in reality capture, laser projection, surveying and modular solutions.

ABOUT BLUCO

Bluco's mission is to change the way the industry approaches workholding. The outdated notion that workholding is nothing more than tables and clamps has left a critical gap in the production process that has gone unengineered for too long.Bluco engineers modular solutions that bridge the gap so that manufacturers can bring higher quality products to market faster.

Since 1990, Bluco has been successfully transforming workholding into a strategic asset, helping thousands of manufacturers to Make it Better.

Bluco Corporation
1510 Frontenac Road, Naperville, IL 60563
1-800-535-0135 I Bluco.com I sales@bluco.com