



The digital evolution of industrial equipment commissioning



Contents

Introduction	02
What is asset commissioning?	03
Commissioning challenges and solutions	06
Planning and documentation	07
Developing a commissioning process	09
Commissioning and maintenance	12
Future trends in asset commissioning	13
Conclusion	14





Introduction

Imagine you're installing an expensive new piece of machinery meant to expand the production line at a key facility. You've made your purchase from a reputable vendor, planned for it, and made space on the factory floor. All that's left to do is bolt it down and get it running.

But just a few weeks after carefully bringing it through the cargo doors and completing the installation, the equipment continues to underperform, backing up production and putting an important customer order at risk. After months of troubleshooting, you finally identify the problem and production starts to improve. But you're dangerously behind on orders—a situation you might have been able to prevent, had all stakeholders been clearer in their expectations.

You know that there's a better way—one that sets your equipment up to operate optimally from the moment it's installed, for its entire operating lifecycle. But you're worried about the effect that commissioning downtime can have on production.

In this e-book, we'll explore how to get the most out of your machinery right from the start—and over the lifecycle of your investment—by starting with efficient commissioning.

71% of respondents stated a top area for increased investment over the next three years is tech to deliver project outcomes.

[2023 State of Design & Make report](#), Autodesk

What is asset commissioning?

Asset commissioning is the process of ensuring newly installed or upgraded assets—such as machinery, equipment, or production systems—are properly installed, integrated, and tested to meet desired performance and operational requirements.

It involves a systematic approach to verifying that the assets are functioning as intended and ready for operation. It's a broad category that typically includes activities such as installation, functional testing, performance verification, training, and documentation. The goal: to ensure that

your assets are reliable, safe, and capable of delivering their expected performance, thereby minimizing risks, optimizing productivity, and maximizing the return on investment for your factory.



The importance of asset commissioning

Commissioning plays a pivotal role in ensuring smooth integration and performance of equipment within your facility. Neglecting this process can have significant financial implications for your business—both during and after installation.

The cost of not accounting for a comprehensive commissioning process in your project schedule manifests in various ways:

- Underperforming machinery can disrupt production, slowing delivery time to market, opening a window for competitors, and jeopardizing existing client contracts.
- Without proper planning, project schedules and budgets can quickly spiral into overruns and expenses.
- Risk of equipment failure or malfunction can lead to costly downtime and production delays, and often requires substantial contingency budgets
- Unaddressed issues may result in increased maintenance and repair expenses, as well as the need for premature equipment replacement.
- Incorrectly commissioned assets may result in an inability to meet the designed production requirements from a time and quality standpoint, reducing operational efficiency.
- Safety hazards may arise if equipment is not commissioned correctly, potentially resulting in accidents, injuries, and subsequent legal liabilities.

In short, the cost of improper commissioning equals the cost of project delays, plus fixing defects late, plus inefficient operations.



The value of a strong commissioning process

Reduce defects and non-conformities

Unlike the world of mass production where products are designed to operate within a set of uniform conditions, industrial machinery is often made bespoke for your factory, making commissioning your opportunity to ensure everything is running as it should.

Improve the handover experience

Project engineering contractors hold valuable data you might not think to ask for as the project is completed—and they might not think to offer. Their detailed records about what occurred during machinery installation can bring about important insights later, when paired with equipment documentation and manufacturing performance metrics.

Improve time to market

Commissioning processes are not only the time to catch issues. It's also when you can fine-tune your new equipment to make sure it's operating at its best from the moment it's installed, leading to faster delivery of quality products.

Reduce defects at handover

Poor commissioning can lead to defects at handover that project engineering contractors have to litigate or correct at substantial overhead. These are costs that have not been accounted for—project contingency aside—and erode a project's profit margin, so it's in the best interest of all parties to mitigate issues during construction and installation.

Whether you have a commissioning process in place already or not, by following the best practices outlined in the following pages, you'll learn how to fine-tune a process toward these results.

Commissioning challenges and solutions

Commissioning industrial equipment or production systems in factories can present various challenges.

One common issue is the complexity of the equipment or systems being commissioned. Industrial equipment often consists of intricate components and interconnections, adding complexity to the commissioning process. Another challenge is coordinating multiple stakeholders involved in the commissioning process, including equipment manufacturers, installation teams, system integrators, and the factory.

Effective communication and collaboration among these parties are crucial to ensure a smooth commissioning process. Additionally, unforeseen technical issues or compatibility problems may arise during commissioning, requiring troubleshooting and adjustments.

These challenges can be addressed with thorough planning. This includes conducting an early assessment of assets to identify potential challenges and develop mitigation strategies. Clear communication and coordination among all stakeholders should be established from the outset, ensuring everyone is aligned on goals, timelines, and responsibilities.

Adequate training and support for factory workers involved in the commissioning process can help them understand the equipment better and facilitate smoother operations. Regular progress monitoring and feedback loops can help identify and address issues promptly. Lastly, involving experienced commissioning experts or consultants can provide valuable expertise and guidance throughout the process.





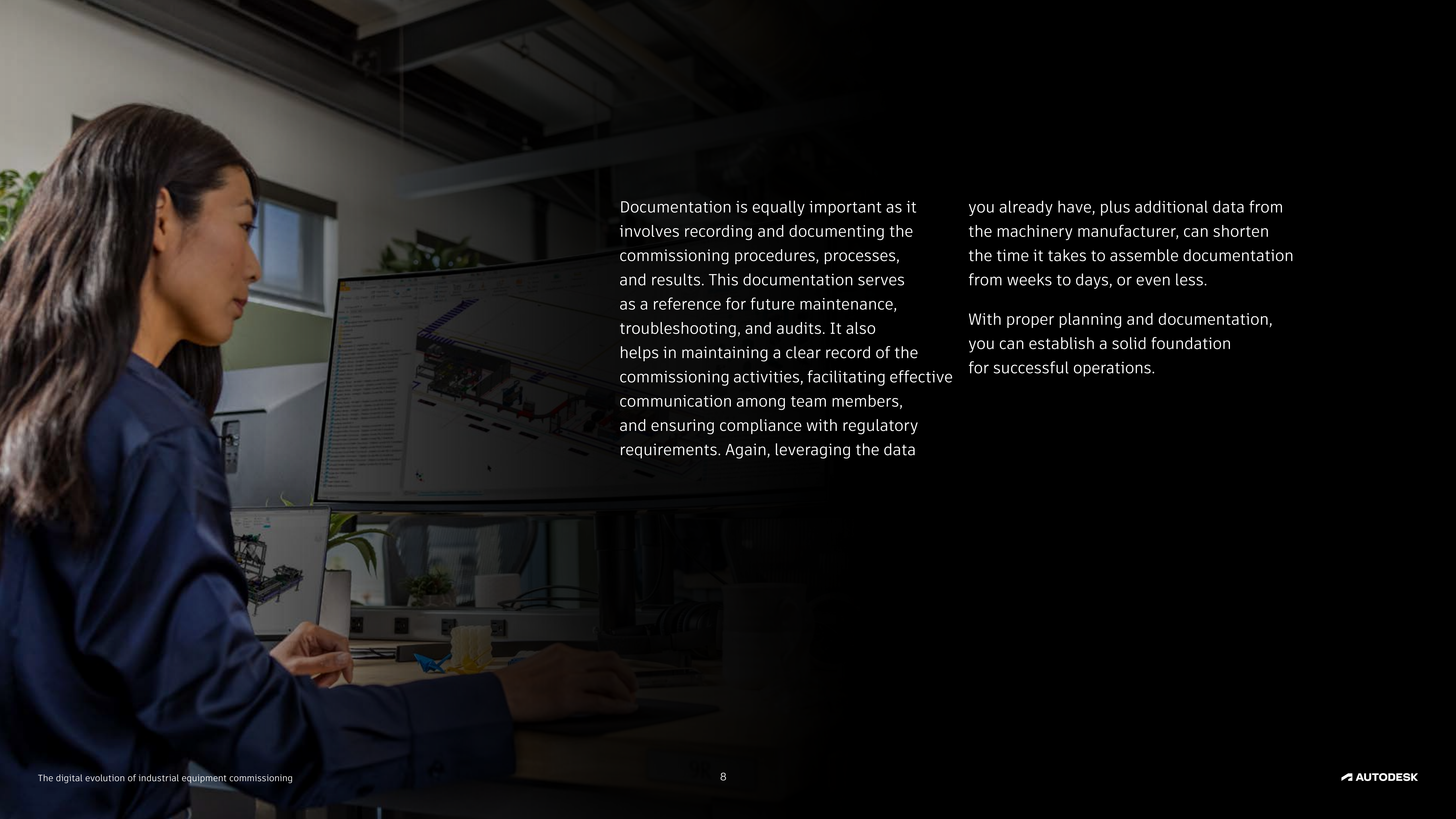
Planning and documentation

As you get started, planning and documentation play a crucial role during asset commissioning. The best planning relies on good data to outline the objectives, scope, and timeline of the commissioning process.

Using data—from sources like the machinery manufacturer and your own Autodesk factory and production line models—can make changeovers smoother, downtimes shorter, and production runs faster. Good data can even help you reduce the size of any contingency budget you need to hold.

To start the planning process:

- Identify key assets to be commissioned
- Determine necessary resources
- Align design and intent across multiple teams
- Agree on a central technology platform to create, manage and store data throughout the commissioning process
- Assign responsibilities to the relevant stakeholders
- Create asset commissioning checklists to ensure all necessary steps and tasks are accounted for and completed



Documentation is equally important as it involves recording and documenting the commissioning procedures, processes, and results. This documentation serves as a reference for future maintenance, troubleshooting, and audits. It also helps in maintaining a clear record of the commissioning activities, facilitating effective communication among team members, and ensuring compliance with regulatory requirements. Again, leveraging the data

you already have, plus additional data from the machinery manufacturer, can shorten the time it takes to assemble documentation from weeks to days, or even less.

With proper planning and documentation, you can establish a solid foundation for successful operations.

Developing a commissioning process

It's likely you already have a process for installing and commissioning equipment, and it's likely rich data around your equipment is already being recorded somewhere during that process. But traditionally, much of this work and the value of the data is lost in siloed workflows and static, paper-based formats.

Take, for example, a safety inspection checklist stuck on the side of a CNC machine. It might be useful for the machine operator, maintenance manager, or service technician responsible for its performance. But for manufacturing leaders looking at the bigger picture of what's going on in the factory—particularly when they can't physically be there—that piece of paper doesn't do them much good.



Key questions to ask yourself about commissioning

When commissioning industrial equipment in factories, it's important to include several key elements in the process.

01

Is all relevant information documented centrally? Centralized documentation should be established to ensure that all relevant information, such as equipment specifications, operating procedures, warranty documents, and maintenance schedules is easily accessible to all stakeholders. With all your asset related information organized in a central location, teams can quickly access relevant documents, flag and respond to defects, and initiate faster inspections and testing.

02

Can asset status be tracked easily? Asset tracking tools can link directly to documents, issues, checklists, and locations—and extract it all at once for handover—making the transition into operations smooth and installation history traceable.

03

Do you have a full picture of what's happening during the process? Apply checklists across multiple phases of delivery to better manage what's happening in reality against what's happening in your records.

04

Can you easily find information about your assets? With basic hardware and software capabilities, like barcodes or QR code scanning, you can carry out relevant inspections and ongoing maintenance with a simple scan from your mobile device.

05

How are defects captured? The quickest way to document defects is by capturing photos and attaching them directly to an asset digitally.



06

Are checklists digital? On-site inspections and testing should be connected to checklists digitally so up-to-date records are always at your fingertips.

07

Can information be accessed on mobile devices? This allows for onsite access to commissioning information—and quicker resolutions when problems arise.

08

Can my commissioning process be more transparent? Asset tracking software can import asset lists (from Excel, for example) to simplify the process of documenting and organizing equipment information.



Commissioning and maintenance

Asset commissioning plays a vital role in supporting maintenance activities in factories. By thoroughly commissioning assets before they are put into operation, potential issues and defects can be identified and addressed early. This proactive approach helps to minimize the likelihood of unexpected breakdowns or failures during regular production.

Additionally, commissioning ensures assets are installed and integrated correctly, reducing the risk of improper functioning or compatibility issues that could lead to maintenance challenges down the line.

Since commissioning can also include connecting machinery to your factory's control systems, you can set up a feedback process right from the start, to track and measure the operating state of your new machine—data which can be used

to shift from a traditional “scheduled maintenance” approach to one of less disruptive “predictive maintenance.”

Proper commissioning also involves training operators and maintenance personnel on the maintenance requirements and procedures specific to each asset. This knowledge equips maintenance teams with skills they need to effectively maintain and troubleshoot assets, improving their ability to identify and resolve issues promptly.

Finally, commissioning documentation can serve as the foundation for a **“digital twin”** of your factory, positively impacting operational awareness, cross-departmental collaboration, and process automation. All of which can deliver performance improvements and lead to a range of competitive advantages.

Future trends in asset commissioning

Trends in asset commissioning constantly evolve with new technologies and practices.

Digitalization

One notable trend is the integration of digital tools and automation in the commissioning process. This includes the use of advanced software for planning, documentation, and data analysis, as well as the implementation of Internet of Things (IoT) devices and sensors to monitor asset performance in real-time.

76% of respondents stated their future growth of their company will depend on digital tools.

[2023 State of Design & Make report](#), Autodesk

Sustainability

Another trend is the emphasis on sustainability and energy efficiency during commissioning. Manufacturers are increasingly focusing on optimizing asset performance to reduce energy consumption, minimize waste, and meet environmental regulations.

The factory lifecycle

Additionally, there is a growing recognition of the importance of commissioning in the context of asset lifecycle management. This involves considering commissioning as an ongoing process rather than a one-time event, with periodic re-commissioning and performance assessments to ensure continued optimal operation.



Making your next equipment installation a success

So, you're getting ready to install a new robot in your factory. The paperwork is all there, but you have a plan to make it work harder for you.

Creating a successful factory goes beyond good design. It also involves attaching relevant data to assets. From servicing schedules to operating training and more, this additional information plays a crucial role in bringing your vision to life. And when all this information is attached to 3D objects, it can form the basis of a comprehensive digital twin that accurately reflects the full lifecycle of the factory.





“

Lots of people underestimate **how forward-compatible the digital-coordination model is. It's not just the basis for planning; it will stay with us for the entire life of the building.”**

Till Moczarski, Project Manager, Porsche

[➔ Read story](#)

Next steps

Managing assets effectively comes down to bridging the gaps between design, construction, and operations. That's where Autodesk supports manufacturers. By leveraging your own product data, manufacturer data from the machines you're commissioning, and factory construction data, your teams can plan, document and execute a modern commissioning process that extends asset lifecycles, reduces unplanned downtime, and maximizes the effectiveness of your equipment investment.

Unlock the full potential of your assets. Explore features and capabilities for managing your next project.

➔ **Discover manufacturing solutions**





“

Not only can we highlight issues earlier during the build phase to resolve things quicker, but we can **learn from past mistakes and build these into our decision-making practices for the future.”**

Azza Nureldin, BIM Lead, Pure Salmon

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