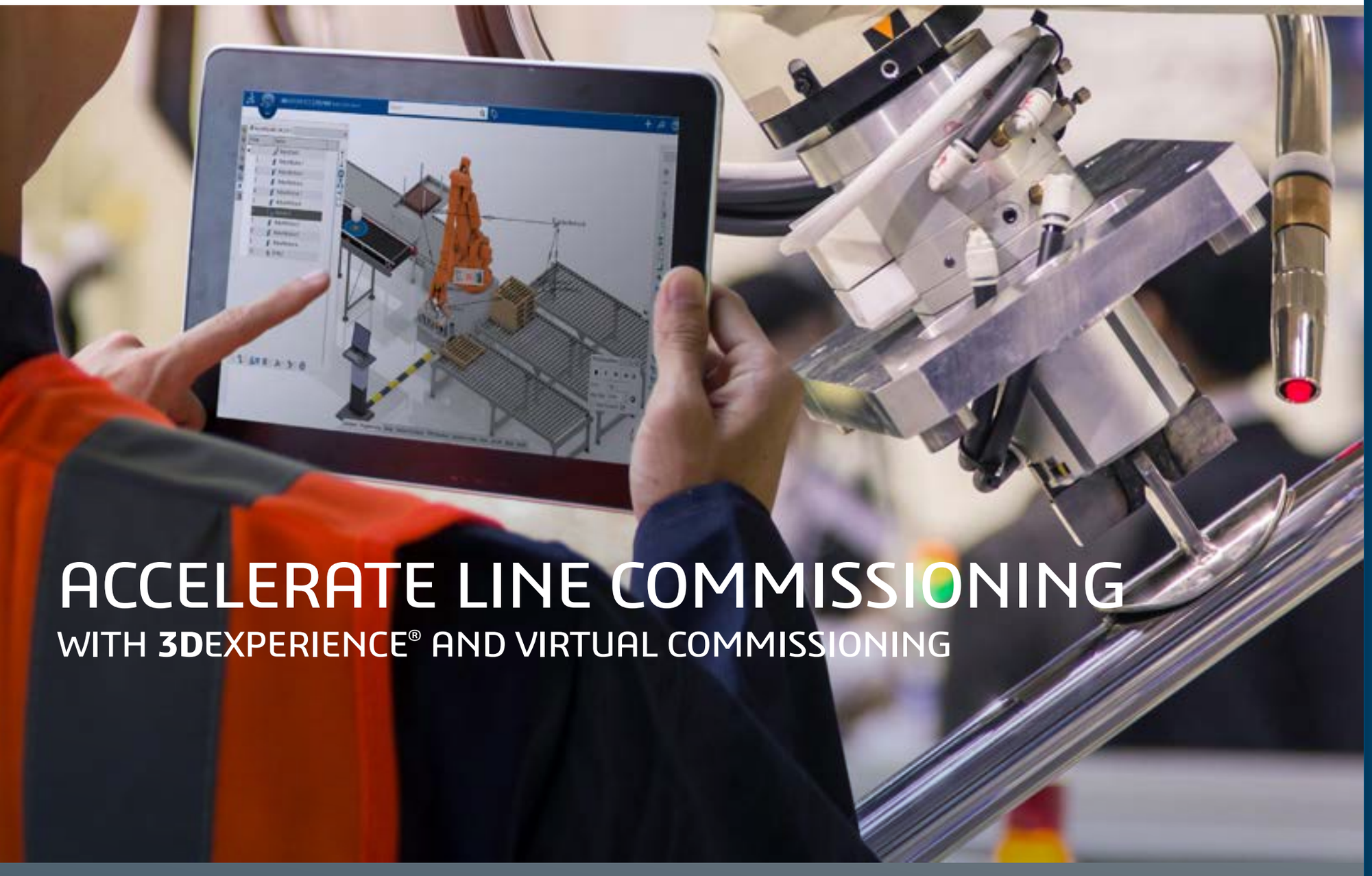


# ACCELERATE LINE COMMISSIONING

## WITH **3D**EXPERIENCE® AND VIRTUAL COMMISSIONING

# INTRODUCTION

In today's manufacturing market, the challenge for engineers, manufacturers, line builders and system integrators is to move efficiently from ideas to implementation. The aim is to take all steps possible to facilitate innovation and avoid unnecessary delays and rework. After all, time is money.

To remain competitive, manufacturing businesses need to optimize everything from product architecture and engineering all the way through to installation and commissioning.

In this guide, we'll look at how line building is optimized through our **3DEXPERIENCE®** solution, with a particular focus on the area that often presents the biggest challenge – commissioning.

# WHAT IS COMMISSIONING?

Commissioning is the process of testing that a system that has been designed and installed is fit for its intended purpose before that system can be used in the real world. Traditionally, this involves testing work being done on the shop floor.

### PROJECT TIME

Typically, the commissioning stage takes up approximately 25% of the time in a line-building project.

### PROJECT DELAYS

Commissioning can be responsible for up to 70% of project delays, due to the consequence of errors in control software.

This disproportionate level of disruption can lead to expensive rework and can have a negative impact on communication and trust between internal and external stakeholders.

Can we make commissioning more efficient? Yes – through **virtual commissioning.**

# WHAT IS VIRTUAL COMMISSIONING?

Virtual commissioning improves on traditional shop floor commissioning by performing tests in a partial or full virtual environment. This speeds up the process and significantly reduces the potential for expensive delays due to errors and rework.

At Dassault Systèmes, we go far beyond virtual commissioning alone. Our **3D**EXPERIENCE® gives manufacturers and line builders capabilities to **design and virtually test** before any real line building or testing happens.

# THE 3DEXPERIENCE®

In the past, line modelling would be done in 2D CAD systems, recreated through separate 3D design tools, exported to Photoshop for demonstration and eventually commissioned on the shop floor.

This was time consuming, expensive and prone to error. Today's line builders need a faster, less fragmented approach.

**3DEXPERIENCE®** is a Platform as a Service (PaaS) cloud environment that enables end-to-end engineering, design and virtualization testing. This allows teams to collaborate and communicate around what an ideal factory line should look like before the system is built and tested for real. We go past normal product lifecycle management, giving teams a way of collaborating remotely on manufacturing projects, to convey how products are perceived and the way they are used.

One of the key features is our **3DEXPERIENCE®** twin – a virtual replica that is used to simulate factory lines so as to speed up development, reduce risk and costs, and to provide an immersive 3D model that offers more effective stakeholder engagement.

# BENEFITS OF 3DEXPERIENCE® AND VIRTUAL LINE COMMISSIONING

## SPEED

Up to 75% faster commissioning (Reinhart and Wünsch, 2007) – get to market quicker, with less expensive rework.

## UPTIME

Keep your lines running – test and commission through a virtual twin.

## CLOUD

Scalable and future proof – save money on expensive servers.

## UNITY

Single-source project resources – work on the latest designs and avoid miscommunication.

## CLARITY

Immersive 3D demonstrations – convince stakeholders by showing, not telling.

## INNOVATION

Develop quickly and test thoroughly – explore all the "what if" scenarios.

# TECHNICAL INNOVATION WITH 3DEXPERIENCE®

The **3DEXPERIENCE®** twin offers key technical differentiators that take the platform far beyond traditional digital mock-up or product lifecycle management tools.

# REDUCED COSTS

The **3D**EXPERIENCE® twin validates acceptance tests and reduces control program debug time at customer sites. It reduces errors during scaling and reduces the shutdown time of lines between modification, as changes can be simulated before being applied.

As a cloud solution, **3D**EXPERIENCE® allows teams to be located around the world, helping businesses save money and remain flexible as they operate an increasingly distributed workforce. Teams can collaborate and commission at a distance, with less need to go on location to check lines. It's possible to fully execute a commissioning phase across borders without ever leaving your office.

Collaborative design offers a huge benefit compared with consolidating and tailoring independent layout designs, which could consume up to 60% of the project time (Chen, 2017).

Virtual commissioning could save months versus traditional methods, with an up to 75% reduction in control debugging time (Reinhart and Wünsch, 2007). Factory downtime is reduced by avoiding bad design or unnecessary work, which could save large sums and could reduce total installation time by 15–25% (Makris, Michalos and Chryssolouris 2012).

# DIGITAL CONTINUITY

A unified, cloud-based design and testing platform allows the same data to be usable from inquiry to order through to order fulfilment. This ensures continuity and promotes collaboration between teams, as they work remotely on concurrent models and securely share those models with clients online. By working from a set of up-to-date files, teams reduce their chances of miscommunication and misunderstanding.

Fine control of how and when components are simplified in the system means that third parties can contribute to a project while their intellectual property is protected.

# IMMERSIVE ENGAGEMENT

Reusing design data means that immersive virtual reality demonstrations for marketing can be produced with no rework. Instead of showing stakeholders 2D designs in Photoshop, the **3D**EXPERIENCE® allows you to run an immersive 3D virtual demo of the design so that all parties can see exactly how the line will operate in the real world.

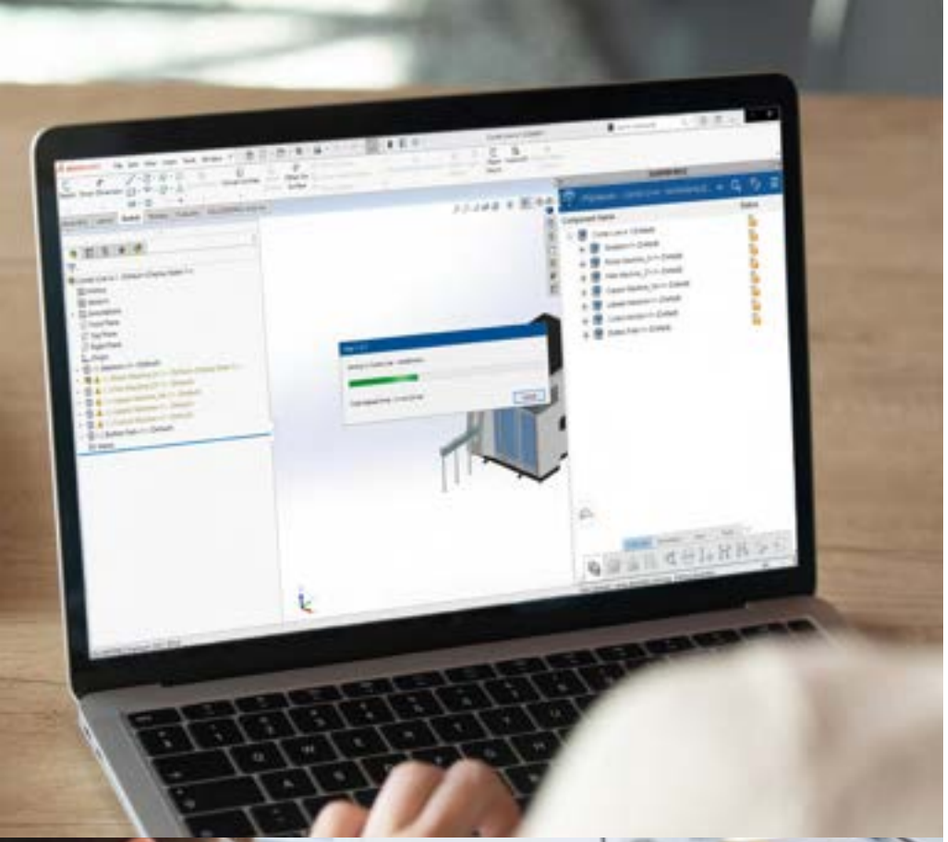
The use of 3D design instead of 2D for process design improves design quality, helps to proactively mitigate risk and reduces design validation and verification lead time (Sharma et al., 2013).

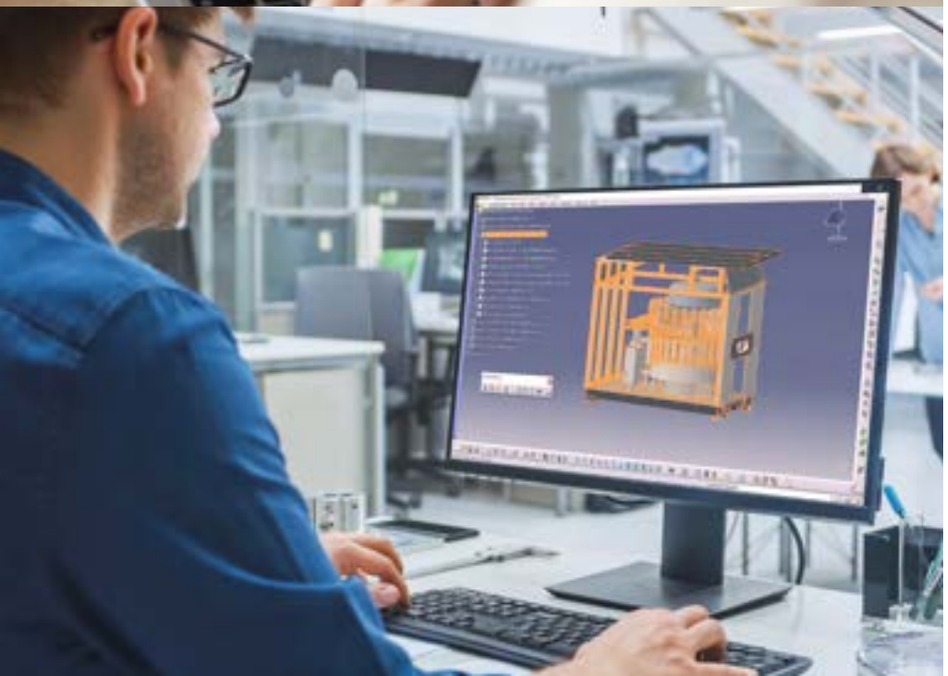
# TESTING AND QUALITY

Machine and line simulation together mean you can simulate a complete line – machines, conveyors and robots – via a single environment.

Virtual line commissioning offers a faster, more accurate and more flexible way to conduct commissioning. It removes the constraints imposed by traditional line simulators, allowing for the testing of "what if" scenarios to drive value generation for line builders.

Better testing with virtual commissioning leads to quality improvement measures, with quality scores going from 37% to 84% (M. Schamp et al., 2018).





# INDEPENDENCE

Equipment and machines designed with different CAD tools can be used to for building and line models in the same session. This makes **3D**EXPERIENCE® flexible and responsive to the existing skills within development teams. Design work done in SOLIDWORKS and CATIA can be combined on the **3D**EXPERIENCE® platform, allowing seamless collaboration across teams.

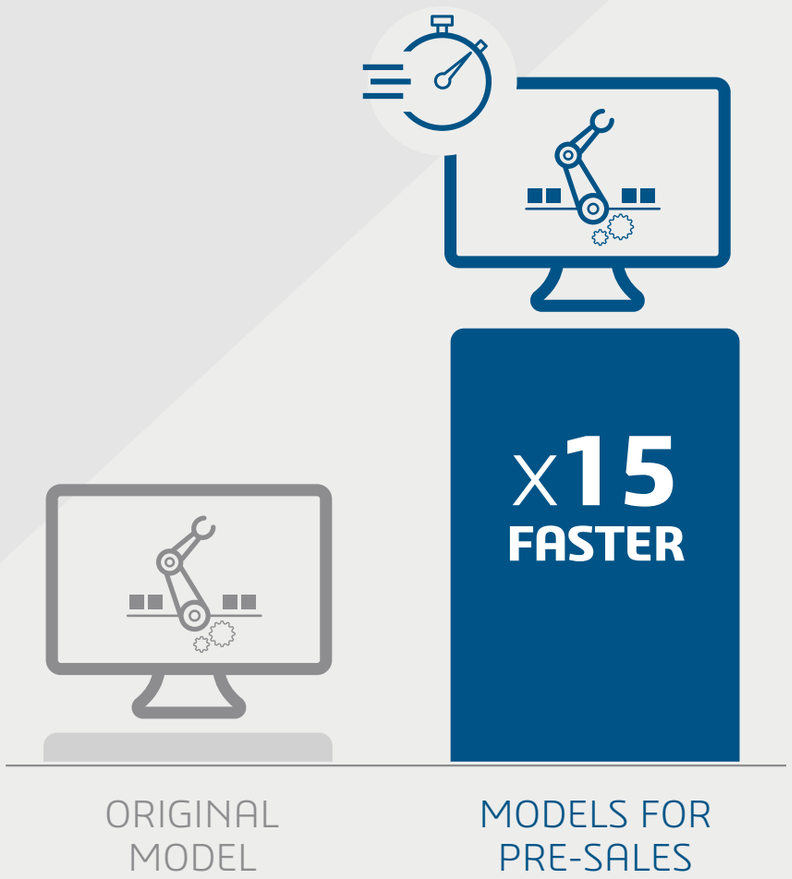
While other suppliers may struggle to integrate with some CAD packages, we support all major tools and can work in 3D.

Our system connects to real PLCs, with full support for every PLC, including SIEMENS, ROCKWELL Automation, SCHNEIDER and ABB.

# SECURITY

Intellectual property protection is guaranteed by simple and secure access rights management. You manage and customize access rights, deciding who can access which parts of the project, making it very easy to open your project to other collaborators by integrating them on the platform if you wish.

There is no risk of losing your data or unauthorized access to your intellectual property.




# MODEL SIMPLIFICATION

Quick resource loading time – Removing the kinematics, some components inside the machine, but maintain a detailed visual representation of the machine, pre-sales models can be loaded 15 times faster than the full model. Removing cosmetic components and keeping only the kinematics means that a model that's fit for virtual commissioning could be opened in only 4 time faster than than the full model.

The simplified models allows to simulation the 3D movements in real-time.

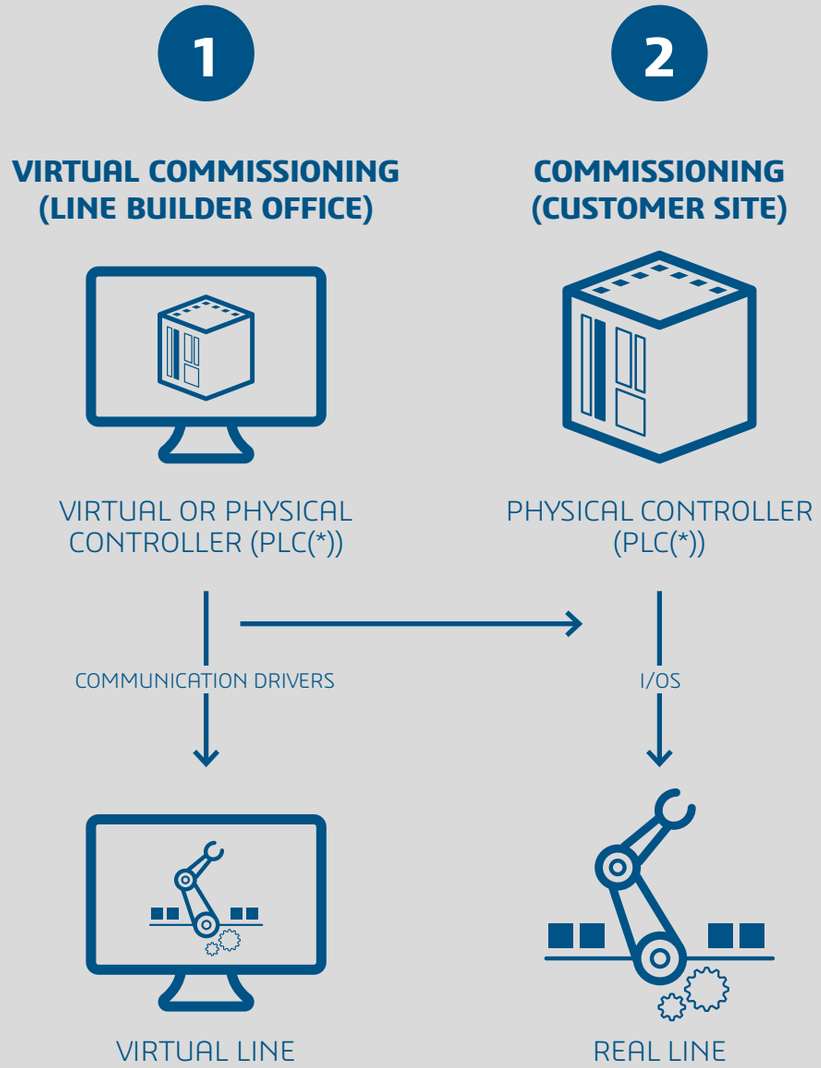
# VIRTUAL COMMISSIONING PRINCIPLE

The principle of the Virtual commissioning is to validate the same Control software prior commissioning on real line.

The final control software is run either in a Virtual PLC (Software-In-the-Loop) or in a Physical PLC (Hardware-In-the-Loop)

**In 1**, Virtual or Physical PLC is connected to the Virtual Line via communication drivers (OPC-UA or specific/standard industrial protocols).

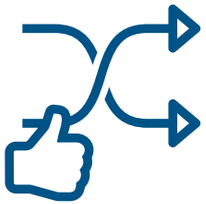
**In 2**, The physical PLC is connected to the real line via physical Ios.




*PLC : Programmable Logic Controller

# COMPETITIVE ADVANTAGES

The **3D**EXPERIENCE® with virtual line commissioning allows lines to be designed and tested with confidence. Here are even more benefits this approach offers to manufacturers and line builders in a competitive market.



## ADAPTABILITY

The virtual test environment allows you to test possible new product types and reorganize existing lines with minimum downtime.

## PRODUCT QUALITY

Robust testing leads to an optimized line with a lower fault rate and less rework.

## COMMISSIONING COST/TIME REDUCTION

Reduce total installation time by 15–25%, control debugging time by 75% and redesign costs.

## EARLIER START OF PRODUCTION

Accelerate **time to market by up to 40%.**

# THE BOTTOM LINE

**3D**EXPERIENCE® provides manufacturers and line builders with the optimal way of designing and testing lines. It allows designers to their work using the tools they're familiar with, providing a secure environment for communication, collaboration and continuity.

The system enables all parties to access the latest designs while protecting the intellectual property of project contributors. Immersive views and robust virtual testing give stakeholders clarity so that new lines can be implemented at speed and with confidence.

For line builders looking for speed, accuracy and cost effectiveness, **3D**EXPERIENCE® offers an unparalleled environment for designing and testing the lines that lead the future.

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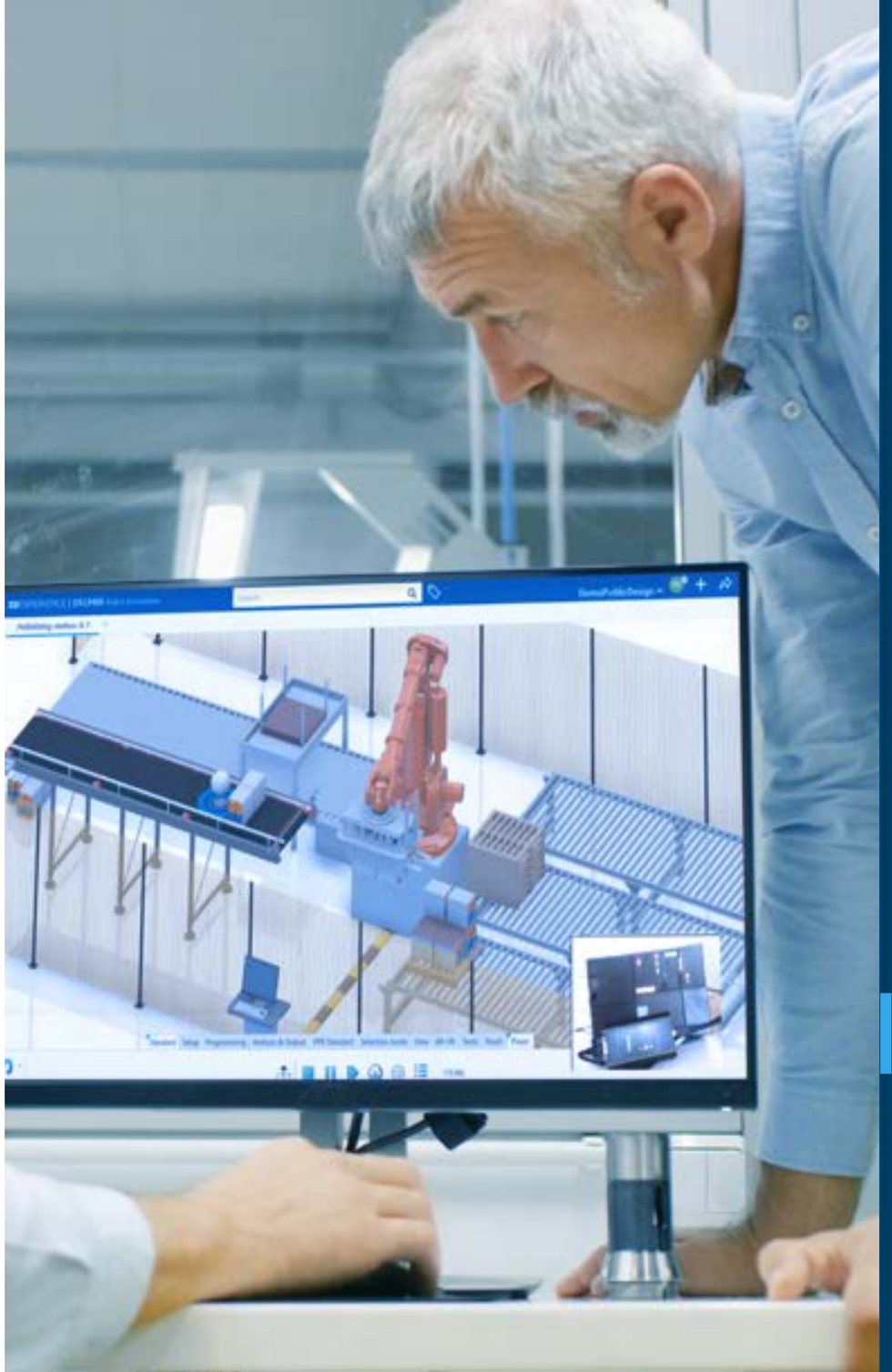
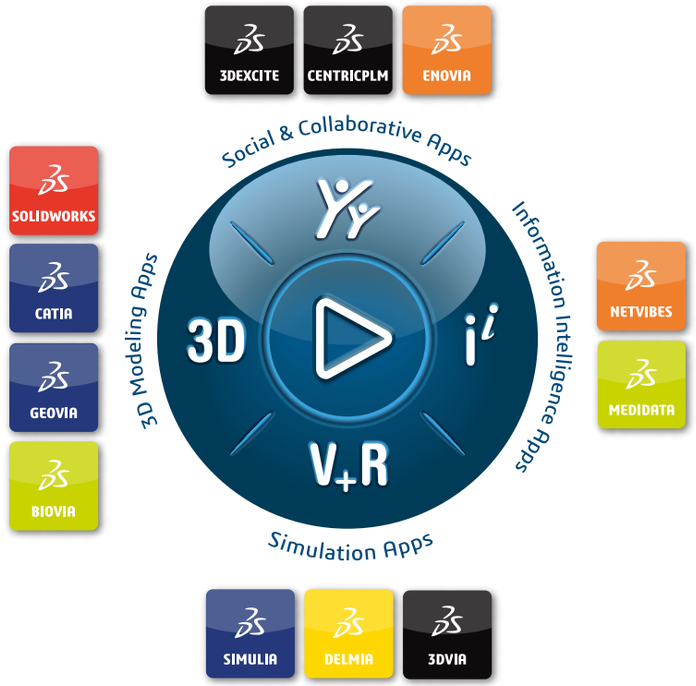


# READY TO EXPERIENCE IT FOR YOURSELF?

Request a tour of a live demo environment.
**Contact one of our solution consultants today.**

REQUEST A DEMO




Our **3D**EXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **www.3ds.com**.



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