



# THE VIRTUAL TWIN EXPERIENCE FOR SMART AND MORE SUSTAINABLE CONSTRUCTION

Achieving cost-efficient, on-time delivery through lean and efficient construction



# THE CHALLENGES OF COMPLEX CONSTRUCTION PROJECTS

Construction projects today are bigger and more complex than they have ever been. With each project requiring such large capital, construction companies face tremendous pressure to keep operation costs within budget and minimize disruptions so projects can be completed on time. However, cost and time overruns are extremely common in the construction industry, making it difficult for any construction company to achieve their business goals. The need for worksite safety as well as sustainability compliance also adds to the complexity of planning new construction projects.

To overcome the industry challenges that hinder efficient operations and profitability in every project, construction companies must consider six key questions:

- ✓ **How can we minimize environmental impact and achieve more sustainable operations?**
- ✓ **How do we eliminate material wastage, poor communication, errors and duplication of effort?**
- ✓ **How can we improve asset utilization and share best practices?**
- ✓ **How do we stay competitive with volatile raw material prices?**
- ✓ **How can we improve site productivity and drive operational efficiency across the value chain?**
- ✓ **How can we ensure and maintain the highest safety standards?**

Thankfully, advancements in construction technology have created new opportunities for companies to equip themselves with the latest digital solutions and drive efficient operations. Powered by the **3DEXPERIENCE®** platform, the **Virtual Twin Experience** enables construction companies to plan right down to the smallest details so they can minimize errors as well as material and operational waste. This level of planning and execution allows companies to **maximize productivity while creating safe work conditions and operations with minimal environmental impact.**

By leveraging the virtual world to extend and improve the real world, the Virtual Twin Experience provides capabilities for construction companies to **model, collaborate** and **optimize** processes and operations so that they can **perform** flawlessly.





## THE VIRTUAL TWIN EXPERIENCE FOR MORE SUSTAINABLE CONSTRUCTION



### MODEL

#### 1. Building Information Modeling (BIM)

Create a detailed 3D model of your project in the virtual world which is accessible on the cloud to all key stakeholders for easy collaboration from the start.

- Single source of information; no more confusion from having different versions of the BIM
- Early collaboration with stakeholders means quicker decision making
- Improve productivity while reducing waste, risk and cost

#### 2. Modular Construction: 5D Simulation

As 3D printing becomes more widely used in construction, you can design and customize complex parts for 3D printing in the virtual environment.

- Simplify the process of designing 3D-printed parts through the virtual environment
- Saves time and money compared to conventional construction methods
- Less material waste produced by 3D printing custom parts

##### BIM dimensions: 5D

Having more than three dimensions in BIM refers to the inclusion of additional factors beyond the 3D model.

- 4D includes time factors such as the sequence of construction activities
- 5D adds a layer of cost information such as cost of resources needed
- A higher number of dimensions adds more layers of information to the model such as safety and sustainability information

#### 3. Autonomous Construction

Plan automated processes and leverage simulation to ensure safe motion for robots and automated guided vehicles as well as optimize productivity.

- Fully automate activities such as welding, cutting, material handling, packing and dispensing
- Repetitive tasks can be completed more efficiently and with greater precision and quality
- Eliminate human error and consistency; free up human labor for more important tasks

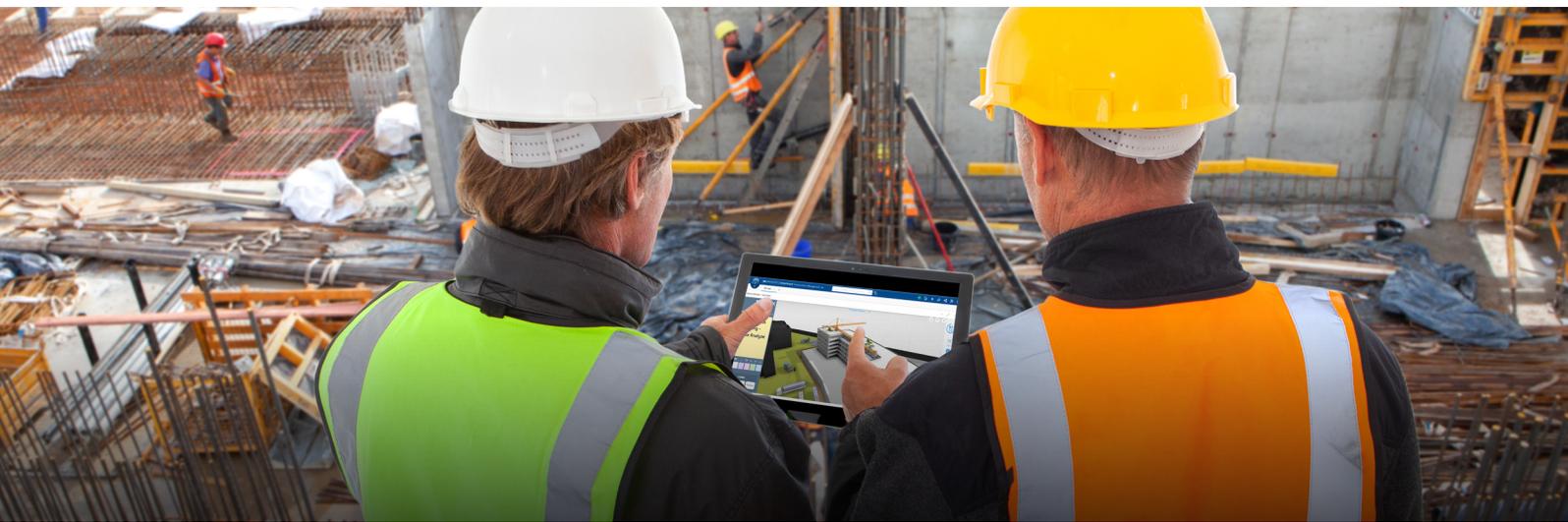


**COLLABORATE**

#### 4. Lean Work Management

Plan, execute and manage site operations digitally, using lean principles to maximize utilization and operational efficiency.

- Safety checklists and task signoffs to eliminate duplication of effort
- Improved operational visibility with real-time notifications between site workers and managers
- Digitize lean practices for teams with a modern, customizable and interactive touchscreen-enabled solution to capture, monitor and track operational meetings



**OPTIMIZE**

#### 5. Discrete event simulation for resource optimization

Decision-makers can leverage 3D simulations of multiple scenarios to evaluate construction execution possibilities with optimized sequences on scheduling data and choose the optimal plan.

- Optimized schedule and reduce risk with simulation
- Improved asset utilization
- Improved space planning



## PERFORM

### 6. Virtualization and Augmented Reality

With information supplied by real-world processes, visualize ongoing operations in the virtual world to continuously improve efficiency and workplace safety.

- Superimpose BIM models onto real-world images and accurately measure physical dimensions
- Quickly spot overlaps in piping and wiring to prevent any rework and solve issues remotely
- Easily access manuals and training documents to improve workplace safety

### 7. IIoT and Execution Monitoring

Leverage IIoT to collect data from all devices at the worksite for advanced monitoring; analyze and visualize this data to ensure smooth execution.

- Measure worksite conditions and detect leaks from assets such as HVAC systems
- Improve site activities across planning, material management, inventory management, safety management, quality management and task management
- Increase asset uptime, grow new revenue streams and enhance customer service

### 8. Big Data, AI and Predictive Analytics

Compile a high volume of varied data from multiple sources and leverage AI and machine learning systems to make quick, accurate and informed decisions at the business level.

- Make accurate predictions on everything from asset performance to asset maintenance
- Leverage the analyzed data to support decision-making at the operational level
- Create safer and more productive worksites based on data intelligence



# GAINING A COMPETITIVE EDGE THROUGH SMART CONSTRUCTION

Leading construction companies are realizing the benefits of transforming their operations through digitalization and technological innovation. Equipping companies with the Virtual Twin Experience enables **smart construction**, enhancing the effectiveness and efficiency of project delivery.

Digital capabilities such as supply chain integration, remote employee collaboration, asset optimization, inventory management, waste reduction, digital performance management and remote assistance allow construction companies to enjoy the following benefits:

-  Lower operating and project costs
-  Connectivity and data intelligence
-  Increased operational flexibility
-  Reduced need for raw materials
-  Less waste generated
-  Employee safety and reduced risk
-  Improved liquidity



Bouygues Construction made the decision to innovate by choosing Dassault Systèmes and the **3DEXPERIENCE** platform. After ensuring a smooth implementation process at their worksite in Pantin, Paris, the project saw **improved collaboration and productivity, more sustainable operations, as well as better employee health and safety.**



“ The **3DEXPERIENCE** platform brings together all stakeholders around a single source of truth. All data related to the construction project—from design to execution, operations and building maintenance—is located on the platform. Implementation involved integrating Dassault Systèmes employees so they could analyze how our teams worked. This was then factored into the tool settings to simplify and facilitate the worksite execution process.”

**Frédéric Gal,**  
Business Modernization Project Director, Bouygues Construction



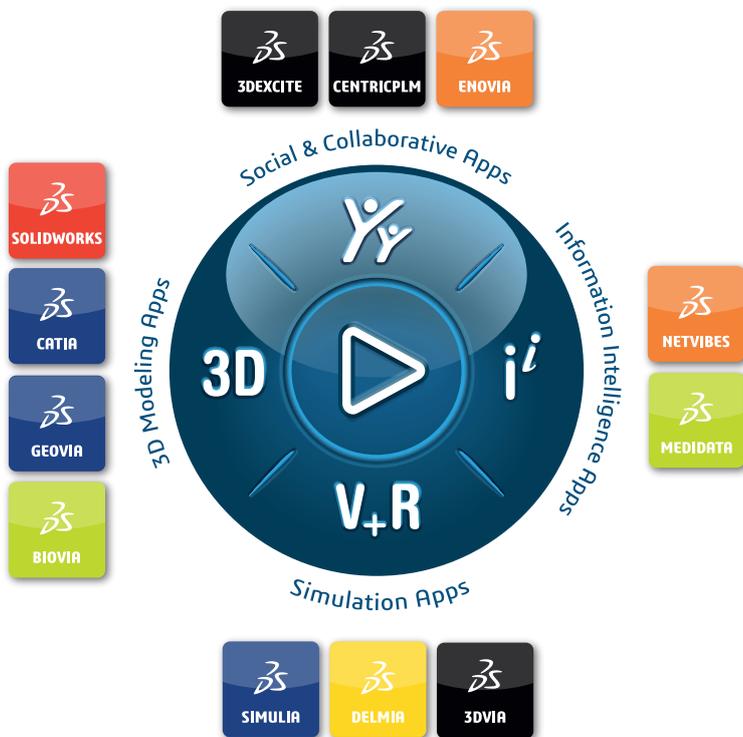
“ We manage a huge mass and flow of information, so it’s about how to centralize all this information and use the best collaborative tools so that we don’t miss any information—which could jeopardize the whole operation. Our experience with the platform created support for us to work more collaboratively with ease. The support provided by Dassault Systèmes was a real help in getting people on board.”

**Guilhem Bourgoïn,**  
Head of Works, Bouygues Construction



To construct infrastructure, buildings and smart cities of the future, companies need to take the first step with smart construction. With the global need for more sustainable industrial activity, the construction industry is expected to do its part by transforming their operations to be more environmentally friendly. This is made possible by embracing virtual twin technology and data in construction, laying the foundation for companies to enhance their operational performance, capture new business opportunities and stay ahead of the competition.

Discover **3DEXPERIENCE** and the Virtual Twin Experience by visiting our website: [Click here](#).



**Our 3DEXPERIENCE® 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](http://www.3ds.com).

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