



Driving Innovation

The Power of Combining DMS and Digital Twins

Everybody on the same page

Introduction

You might consider acquiring Digital Twin Technology or creating a digital twin that offers powerful visualization capabilities, including 2D and 3D virtual representations of industrial assets, equipment, and vessels. Your visualization tool pairs with a powerful, intuitive user interface to accelerate and strengthen operational planning and information. What many people tend to forget is the document management system (DMS) that accompanies it.

A DMS plays a central role in organizing, storing, and retrieving critical information efficiently. Not only in the project phase but especially during operations.

Since 1996, Assai has been the trusted partner for those who shape the future. Our DMS solution enhances data accessibility, improves collaboration, and ensures that decision-making is driven by real-time, accurate information. Our software provides the infrastructure needed to manage, secure, and utilize the vast amount of data required to create an accurate virtual representation of physical assets. Without a DMS like Assai configured, data accuracy, collaboration, compliance, and scalability for a Digital Twin would be challenging.

In this e-book, we take a closer look at the power that integrating a DMS with Digital Twins can realize for your organization.

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The Digital Twin Revolution

The journey of the Digital Twin is a story of technological transformation. Although it seems like a modern marvel, its origins can be traced back over half a century to the Apollo missions, where NASA relied on physical duplication to monitor and troubleshoot space operations from Earth. This early mirroring technique laid the foundation for what would become a digital revolution. As the decades passed, the concept matured with the rise of computer-aided design (CAD) and simulation technologies, enabling engineers to create virtual models of products and processes.

In 2002, the Digital Twin was formalized as a conceptual model, marking a significant milestone in its evolution. The 2010s saw its transformation from static simulation to a dynamic, real-time model driven by data and integrated with modern systems like the Internet of Things (IoT). This change allowed industries to optimize processes, predict outcomes, and make better decisions. By the time the 2020s arrived, Digital Twins had reached unprecedented levels of sophistication. With the help of AI, 5G, and machine learning, they became integral to predictive and autonomous systems across numerous sectors, including energy, manufacturing, and construction.

Next big thing

Digital Twins have revolutionized industries by bridging the gap between the digital and physical worlds. They allow businesses to simulate, analyze, and optimize operations in real-time, providing a virtual mirror to real-world assets. In industries like energy and construction, the technology is regarded as the next big thing, unlocking new levels of efficiency and decision-making power. The real-time insights provided by Digital Twins help companies monitor performance, anticipate maintenance needs, and even test new strategies without risking physical assets.

The technology has evolved into varying levels of complexity, each designed for specific operational needs, but together, they form a comprehensive system that optimizes performance at every level. Whether tracking the health of a single asset or simulating entire processes, Digital Twins are shaping the future of industry, driving both technological and operational innovation across the globe.

Exploring the Types of Digital Twins

Digital twins come in a variety of forms, each serving a unique purpose. While you may already know what you need, it's worth taking a moment to explore the four main categories: component twins, asset twins, system twins, and process twins. Let's have a look.

Component Twins

Component twins, often referred to as parts twins, are the most basic form. They represent individual elements within a system, like sensors or valves. These digital replicas allow engineers to track performance, simulate real-time conditions, and predict maintenance needs. By monitoring small but crucial parts, businesses can prevent larger issues down the line. For example, a component twin of a machine's motor could help identify early signs of wear and tear, allowing for proactive repairs before failure occurs.

Asset Twins

Moving up a level, asset twins, or product twins, combine data from several component twins to create a digital model of a more complex asset, such as an engine or a piece of industrial equipment. Asset twins help companies analyze how parts work together, improving overall asset performance. With insights into efficiency, maintenance needs, and potential issues, businesses can optimize metrics like downtime and repair time, ultimately reducing costs and increasing productivity.

System Twins

System twins, also called unit twins, take things further by integrating multiple asset twins to represent an entire functional unit within a facility, like a production line or power grid. By modeling these systems digitally, managers can test different configurations, explore new operational strategies, and identify ways to boost efficiency. This level of insight helps ensure that different assets within a system are working together smoothly, reducing bottlenecks and improving output.

Process Twins

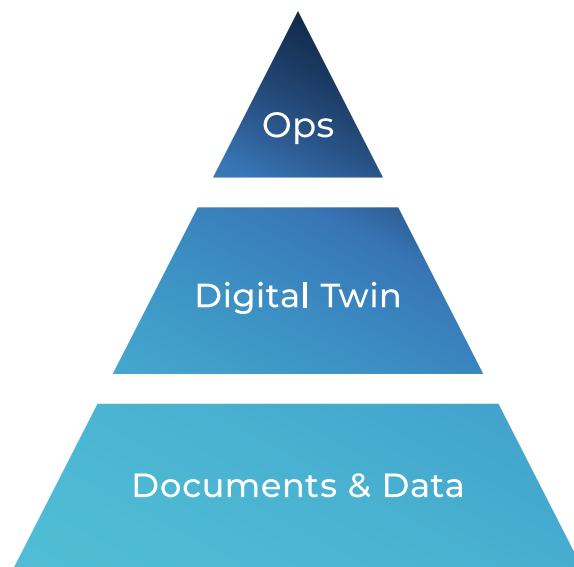
At the highest level are process twins, which pull together multiple system twins to provide a full view of operations across a facility or even an entire organization. Process twins allow companies to track and optimize workflows, ensuring that all systems are synchronized and working in harmony. With this technology, businesses can model the impact of changes — such as adjusting inputs or introducing new processes — without disrupting real-world operations. This makes process twins especially valuable for long-term strategic planning and process optimization.

Whether monitoring a single part or an entire process, digital twins are transforming how businesses operate. By creating virtual counterparts to real-world systems, companies can predict maintenance needs, streamline operations, and test new strategies in a risk-free digital environment. This dynamic technology is helping organizations become safer, smarter, and greener, driving efficiency, profitability, and sustainability in ways that were previously unimaginable.



Why DMS Is Necessary for Digital Twin Construction

A DMS forms an important foundation for any successful projects and operations. Documents and data are the sources of information, the ingredients for any Digital Twin. Effectively combining live, recent and historical information creates powerful advantages.



Digital Twins rely on vast amounts of structured and unstructured data, such as blueprints, sensor data, and operational records. A Document Management System (DMS) serves as a centralized repository for the latest documents and drawings, ensuring they are controlled, well-organized and easily retrievable. Real-time data accessibility is essential to ensure that the Digital Twin accurately reflects the current state of physical assets.

Revision control

Version control is critical for maintaining up-to-date documents like maintenance records or design specifications, ensuring simulation accuracy and consistency across teams. Integration with tools like Power BI helps automatically update documents, supporting real-time insights from the Digital Twin with the most current data.

Enhanced collaboration

A DMS also enhances collaboration and workflow automation by ensuring efficient document routing for review, approval, or updates. In complex projects, it keeps all stakeholders aligned. Additionally, a DMS ensures compliance and security for sensitive documents, crucial in regulated industries like energy, chemicals, mining, and construction.

Information retrieval

Effective information retrieval is another key advantage. Teams can quickly access the right documents, enabling prompt responses to real-time events. A DMS also supports the long-term storage of historical data, vital for predictive maintenance and lifecycle management of the Digital Twin.

Cloud-based

Cloud-based DMS platforms have further revolutionized data management by offering flexibility and scalability. Companies using Digital Twin technology benefit from cloud-based solutions, gaining the ability to store and access files from any location, facilitating real-time collaboration, synchronization, and significant IT cost savings. Cloud-based systems are key to ensuring that Digital Twin models are continuously updated with the latest information.

In summary

Modern DMS systems often integrate AI and machine learning, providing advanced analytics and improving the Digital Twin's predictive capabilities. Integrating an unparalleled DMS with your Digital Twin ensures accuracy, reduces errors, and saves time and costs. Perhaps it sounds a bit boring, but if the devil is in the details, you'd better rule him out. When everybody is on the same page, your document and asset management processes become simpler and effective. Since team members are fully aligned, it just makes it easier and more enjoyable to get things done and achieve great results.

Key Benefits of an Advanced DMS

1. Enhanced Document Management

- **Seamless Metadata Retrieval**

Automatically extract and populate document metadata from your DMS into your Digital Twin for effortless data consistency.

- **Efficient Document Revisions**

Manage and update document revisions directly. The Digital Twin can retrieve the latest file, specific metadata, and document-to-tag relations to stay fully synchronized.

- **Quick Access to Files**

Download and reference specific document revision files, reducing time spent searching for critical information.

- **Document-to-tag relations**

Effortlessly create, manage, and sync document-to-tag relations between your DMS and the Digital Twin solution. Users can search directly or via a visual asset hierarchy.

2. Optimized Asset Management

- **Precise Asset Item Updates**

Utilize your DMS to create or update asset items (like tags), maintaining data accuracy and completeness.

- **Streamlined Asset Hierarchies**

Efficiently manage parent-child relations between asset items for precise hierarchy representation and organization.

- **Automatic Syncing**

Establish document-to-tag relations in your DMS or allow the Digital Twin application to scrape and return these relations. Automatic syncing ensures seamless integration and data consistency

3. Streamlined Integration

- **Direct Access Links**

Create direct links to detailed information and files, ensuring you always have access to the latest information without duplication.

- **Secure Single Sign-On (SSO)**

Enhance security and the user experience by integrating your innovative DMS with SAML-based login systems, enabling direct access using your Windows credentials (for example).

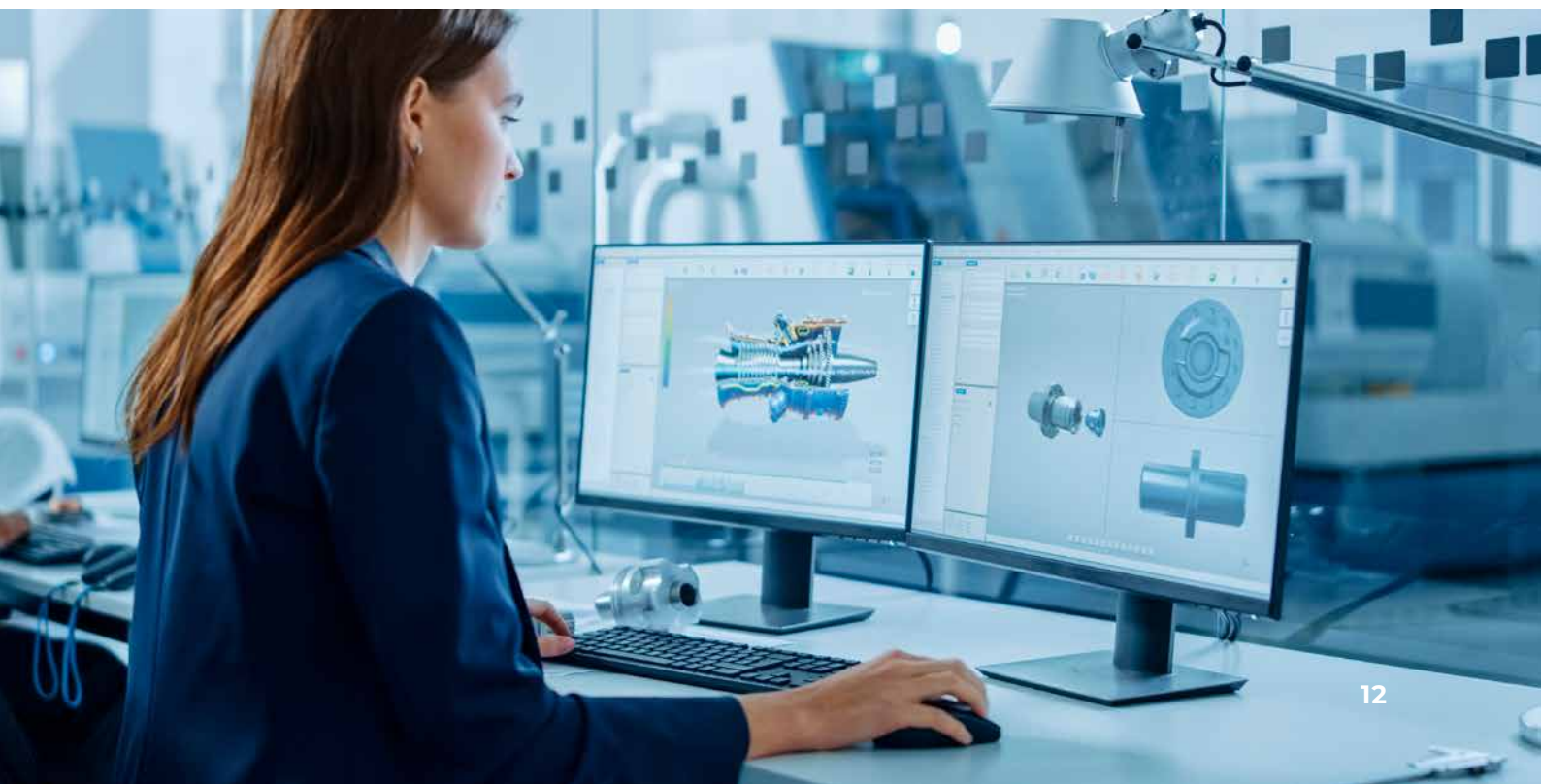


The Assai Model

There are many document management system providers, and it's important to compare them to make the right choice. Assai has worked alongside document controllers and project engineers for over 30 years. Their feedback has enabled us to set a new standard in document management and establish collaboration with leading companies like Kongsberg Digital and Aveva.

Assai's flexible integration model enables bi-directional data exchange, ensuring that the vital connection between documents and asset tags is always maintained. With a single click, users can access linked documents directly from the Digital Twin. The system displays only the most relevant metadata, offering essential context for documents associated with a tag. As new tags are identified within documents, they are automatically integrated into the system, ensuring data remains synchronized and up to date.

In addition, Assai's model optimizes project handovers and operational readiness, saving time and reducing costs by streamlining information management. When everyone works with accurate data and shared objectives, the impact is significant, improving not just efficiency but the entire work experience - shaping a smarter, more connected future.



CASE STUDY

Transforming LNG Operations with Digital Twin and Document Management Integration

Company Overview

LNG Canada, a joint venture of Shell, PETRONAS, PetroChina, Mitsubishi Corporation, and KOGAS, is constructing Canada's first large-scale liquefied natural gas (LNG) export terminal in Kitimat, British Columbia. This cutting-edge facility, expected to start exporting in 2025, will leverage digital twin technology combined with Assai's document management system to ensure 40 years of safe, sustainable, and efficient operations.

Challenges

Operating in a remote location with high travel and operational costs, LNG Canada required a smarter, more efficient way to connect workers across multiple sites. They needed a solution that integrated end-to-end digital workflows and provided remote visibility. Digitalization was embedded from the outset to streamline operations, ensure document control, improve maintenance planning, and enhance decision-making with AI-powered models.

Solution

LNG Canada partnered with Kongsberg Digital to deploy a digital twin, enabling real-time insights, collaboration, and AI-augmented decision-making. The combined solution connects workers and stakeholders, providing a single interface for planning, managing, executing daily workflows, and maintaining rigorous document control. This technology allows remote support teams to assist on-site workers while ensuring that critical documents are accessible and updated efficiently.

Results

- The Digital Twin, enhanced with AI, simulation, and Assai's document management system, enables faster decision-making and reduces reliance on multiple systems by centralizing critical information.
- Technicians can easily access equipment information, latest documents and drawings in Assai, and visualize potential hazards during site evaluations, even during the construction phase.
- Remote planners can now collaborate seamlessly with on-site teams, streamlining work package preparation, ensuring document consistency, and improving efficiency.

LNG Canada's early adoption of Digital Twin technology combined with Assai's DMS is transforming how workers operate, fostering a safer, more efficient, and collaborative working environment, even before the facility is fully operational.



How to Integrate DMS with Digital Twin Processes

Integrating a Document Management System (DMS) with your Digital Twin is key for businesses that rely on real-time data and simulations to manage physical assets. By establishing a single source of truth, teams can work with up-to-date information, minimizing errors and boosting efficiency. But what should you consider? And more importantly: how do you do that?

Step 1: Real-Time Data Synchronization

The first step is to ensure real-time synchronization between physical assets and their digital counterparts. Any changes in design, performance, or components should be instantly mirrored in the Digital Twin, avoiding discrepancies and ensuring your virtual model aligns with real-world conditions.

How to do it. The easy integration between your Digital Twin and your DMS allows automatic updates of documents and data related to asset performance, ensuring that any real-world modifications are instantly reflected.

Step 2: Workflow Automation

Once data synchronization is in place, automating document workflows is crucial. This ensures that updates or new designs trigger alerts to the right teams and that documents pass through the necessary review and approval processes.

How to do it. Set up automated workflows in your DMS. Document updates happen with controlled process flows, and if a review is needed, the process can be initiated by a professional document controller or automatically. Assai's DMS allows review cycles and notifications to be automated, minimizing human error and speeding up decision-making.

Step 3: Revision Control for Accuracy

Maintaining accurate revision control is essential for tracking document changes and ensuring that only the latest data feeds into your Digital Twin. This prevents outdated information from influencing decision-making.

How to do it. Implement robust version control settings that log every change to critical documents like blueprints, operational manuals, and maintenance records. Ensure that document updates are automatically reflected and that only the approved versions are used in the Digital Twin's operations.

Step 4: Enhancing Collaboration

A major benefit of integrating DMS with Digital Twin processes is improved collaboration. Teams across departments and locations can work together in real time, accessing shared documents within the DMS.

How to do it. Enable real-time document sharing and collaboration features in your DMS, with a focus on the review process. Ensure that engineers, based on specific permissions, can make edits where necessary.

Step 5: Ensuring Scalability and Flexibility

As your Digital Twin initiatives grow, so will your data. A well-integrated DMS should scale effortlessly with your business, making it easy to store and retrieve data without being overwhelmed.

How to do it. Choose a cloud-based DMS that can scale storage and processing power as needed. This will ensure that your system remains efficient as your data volume increases.

Step 6: Leveraging Predictive Maintenance

One of the most impactful benefits of integrating a DMS with a Digital Twin is its ability to automate predictive maintenance. By linking real-time monitoring data with historical maintenance records, the system can predict when maintenance is needed, reducing downtime and preventing failures.

How to do it. Your DMS stores documents, while the Digital Twin integrates real-time data from various sources. Assai's DMS links documents by tag numbers, so when performance thresholds are met, the system can alert the maintenance team automatically, with references to all relevant documentation.

Unlock the Full Potential of Your Digital Twin Integration

Integrating a DMS with Digital Twin processes goes beyond document storage. Assai is taking care of document information, while your digital twin provides asset information. You have two single sources of truth for different kinds of information, each with its own capabilities. By following the steps, you can integrate a DMS with your Digital Twin processes to ensure that documents and information are managed efficiently, and all data remains accurate, up-to-date, and accessible.

The integration not only helps streamline workflows and enhance collaboration but also unlocks the potential for predictive maintenance, better decision-making, and regulatory compliance. Whether you're operating in energy, chemicals, infrastructure, utilities, or any other asset-intensive industry, this integration is essential for driving operational efficiency and maximizing the power of your Digital Twin initiatives



About the author

Arno van Vulpen, with a background in information science and a specialization in user experience, draws inspiration from his scientific roots. Since joining Assai in 2013, Arno has advanced from consultant to product manager, leading innovations in document management software.

He has been instrumental in developing Assai Connect, setting new industry standards. Passionate about the role of software in engineering projects, Arno advocates for its early integration to enhance project outcomes. His philosophy emphasizes alignment between project teams and document controllers, ensuring everyone has quick access to crucial information.

Arno's journey began on the client side, where he firsthand experienced the challenges Assai could solve, leading him to join the company. He is driven by a desire to improve lives and contribute to a better, safer, and more sustainable world.

About Assai

At Assai, we believe that history is not just a record of the past but a foundation for the future. Since 1996, we've been dedicated to helping our clients — ranging from primary energy companies to construction giants — safeguard and manage their critical data. Our name, inspired by the Italian adjective 'assai' reflects our mission to amplify the impact of every detail, ensuring that no information is forgotten or overlooked.

Our software, trusted by leading industries worldwide, offers unparalleled flexibility and precision, providing over 300 functionalities designed to optimize data control and management. Whether you're in the oil and gas sector, renewable energy, transportation or mining, we ensure that everybody is on the same page, so that your projects are executed safely and efficiently. In a world where energy demands are rising and sustainability is paramount, Assai helps you navigate these challenges with confidence.

From building oil rigs to setting up wind farms, we understand that success lies in the details. Our software ensures that every decision is backed by accessible, secure data, making it possible to respond to any situation with certainty. With Assai, companies gain control over their complex project, their past and future, making sure their efforts are not just remembered, but assai memorable, achieving more than they thought possible.

Check it out on our site, and feel free to [book a demo!](#)

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