Unleashing the benefits of virtual twins in rail

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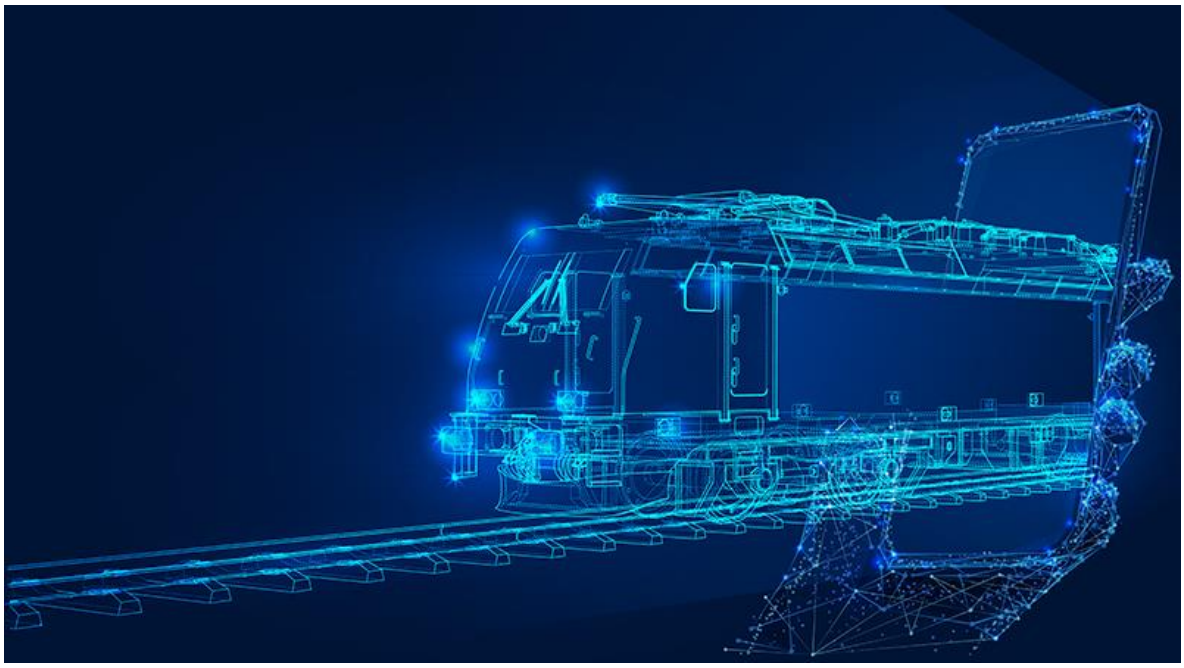

By Taherah Kuhl, Global Vice President, Business Services Industry, Dassault Systèmes

Sustainability lies at the heart of rail revitalization and resurgence. Dassault Systèmes' value proposition for enhancing rail efficiency and promoting sustainability is centered around the concept of the **virtual twin experiences**. Rail operators can consolidate documentation and operational data to **create an integrated view of rail operations** by leveraging this technology. This enables optimization and efficiency improvements in how railways are managed.

The virtual twin technology available through the **3DEXPERIENCE Platform** plays a crucial role in streamlining railway operations by assimilating data on predictive maintenance, traffic conditions, and track layouts. It optimizes operations and enables

simulations to monitor and enhance the **reliability of railway assets**. **The technology utilizes real-time data analysis to optimize rail schedules**, resulting in higher efficiency in end-to-end operations management.

Moreover, the virtual twin **immerses rail operators in realistic environments** to face potential operations disruptions by better anticipating risks through 360-degree operations visibility. From the initial design and construction phases to ongoing operations and end-of-life management, the **3DEXPERIENCE Platform** empowers rail operators to plan, visualize, and manage rail operations comprehensively.

Rail operators can build in all key business rules and constraints using Dassault Systèmes' optimized solution for rail freight operations. The software evaluates all options to solve disruptions and other challenges by ranking and weighing KPIs such as cost, punctuality, productivity and sustainability to provide the ideal solution.

Why choose virtual twins instead of digital twins?

Digital twins are merely digital representations of real-world entities or systems. In contrast, virtual twin technologies enable rail operators to create 3D models of their entire ecosystem that can then be tested and simulated to ensure accuracy and optimize the performance of end-to-end rail operations.

As the **3DEXPERIENCE Platform** company, Dassault Systèmes constructs virtual worlds that assist customers in devising real-world solutions to transportation challenges.

> *"Virtual twins are the ideal solution for the rail industry to achieve sustainability because they surpass the capabilities of digital twins."*

Digital twins lack integrated end-to-end systems to accelerate collaboration. Meanwhile, virtual twins offer a comprehensive solution by enabling key rail stakeholders to model and simulate disruptive scenarios based on market and data analysis. Virtual twins allow rail organizations to track and address all project requirements in one space by consolidating all aspects of a rail project within a single platform.

Dassault Systèmes has over 40 years of experience in enabling customers' **industrial transformations** and a strong background to support rail customers improve their **daily operations.** Finally**,** the virtual twin technology on the **3DEXPERIENCE Platform** can simulate and test rail operations using a constant stream of real-world data, surpassing the capabilities of digital twins.

Achieve automation with sustainability

*"In addition to its sustainability benefits, the deployment of the virtual twins on the **3DEXPERIENCE Platform** can help railway operators achieve a high degree of automation, which is a key priority for railways worldwide."*

Container cargo freight train displays a global business logistics concept, incorporating air, rail, and maritime shipping

Virtual twin technologies enable the visualization, design, testing, and simulation of rail infrastructure development. They also provide ongoing monitoring and support throughout the entire lifecycle, encompassing scheduling, planning, maintenance, and operations.

Considering that rail development projects often have extended project durations, the virtual twin — in conjunction with automation — accelerates **time to market for rail projects**, expediting the achievement of sustainability goals.

The prevailing global trend in rail operations is to replace diesel engines with electric engines, which rely on different technologies. This is where Dassault Systèmes can assist in coordinating interactions among participants in the railway ecosystem, ensuring seamless transitions and delivering reliable, positive outcomes.

Enabling deeper collaboration in the rail sector

The key value proposition of the **3DEXPERIENCE Platform** is that it breaks the silos between various disciplines and establishes seamless collaboration between railway stakeholders such as rolling stock manufacturers, train operators, and infrastructure managers. It helps them to **'imagine, design, simulate, deliver and operate'** the trains, the infrastructure and the network.

> *"The virtual twin plays a pivotal role in driving efficiency and standardization worldwide with the resurgence of rail that is currently underway."*

Ambitious projects like the China-Europe railway line rely on substantial standardization efforts that require time. Nonetheless, Dassault Systèmes is providing a means to help realize such projects.

railway track with a string of container trains, highlighting the importance of rail transport in the movement of goods and commerce across vast distances. The container trains are a symbol of the interconnectedness of global trade and the efficiency of rail transport in facilitating economic growth and development. Generative AI

Dassault Systèmes' portfolio of solutions facilitates discussions and consensus-building on operating standards, enabling their early adoption and quicker implementation. Theplatform

seamlessly facilitates interactions among various agencies and organizations responsible for managing rail standards worldwide.

Why virtual twins are essential to rail revitalization

Virtual twins capture end-to-end rail data, including maintenance, design, crew and fleet planning, and infrastructure management, promoting **deep visualization and seamless collaboration**. Dassault Systèmes supports an **integrated problem-solving approach** in the rail industry, encompassing above rail, below rail, and off-network operations.

Our technology is uniquely positioned to **unite stakeholders** involved in manufacturing trains, controlling infrastructure development and projects and managing rail networks. This **drives end-to-end digital transformation in the rail industry**.

Playing a pivotal role in the rail sector, Dassault Systèmes' **advanced capabilities and real-time monitoring** within a collaborative platform leads to increased efficiencies, cost savings, and sustainability in the rail sector. Similar to other industries such as transportation, aerospace, and defense, where unified platforms have been fostering collaboration and generating new value over the past 20 years, Dassault Systèmes is introducing the same value to the railway industry during this era of **rail revitalization**.