

Steel Structures 2.0 powered by Digital Twins

As a major player in the bridge construction industry, you need to make informed decisions to ensure the success of your projects.

This comparison guide will explore how traditional bridge construction processes differ from those enhanced by digital twins.

Additionally, we will focus on how digital twins revolutionize factory floor operations in the design, manufacturing, and installation of frame structures for bridges.

By understanding the benefits and advantages of digital twins, you can make more efficient, cost-effective, and data-driven choices for your bridge projects.

1. Design and Planning

Traditional

In the traditional approach, bridge designs are primarily based on static drawings and calculations. Collaboration between stakeholders may be limited, leading to potential inefficiencies and misunderstandings.

Enhanced with Digital Twins

On the factory floor, digital twins streamline collaborative design and planning processes. Engineers, manufacturers, and installation teams have access to real-time data and simulations, enabling them to comprehensively analyze the bridge structure. Through iterative improvements and design optimizations based on accurate data and feedback, digital twins ensure seamless coordination between factory operations.

2. Manufacturing and Production

Traditional

Traditional manufacturing processes may involve manual measurements and production methods, leading to potential variations and quality issues.

Enhanced with Digital Twins

Through seamless integration with Computer-Aided Manufacturing (CAM) systems, digital twins enhance the production of bridge frame structures, ensuring high precision and efficiency. Real-time data collected from sensors on the factory floor facilitates continuous monitoring of the manufacturing process, enabling real-time quality control and timely adjustments for optimal outcomes.



3. Real-Time Monitoring and Quality Control

Traditional

Traditional quality control relies on post-production inspections, which may lead to delays in identifying defects or inefficiencies.

Enhanced with Digital Twins

Digital twins enable real-time monitoring and quality control on the factory floor. By leveraging IoT sensors, digital twins collect data during the manufacturing process, allowing for immediate detection of defects or deviations. This proactive approach ensures higher quality products and reduces the need for rework.

4. Inventory Management and Resource Allocation

Traditional

Inventory management in traditional processes may be based on manual tracking, leading to inventory shortages or excess stock.

Enhanced with Digital Twins

Digital twins optimize inventory management and resource allocation on the factory floor. By analyzing real-time data on material usage, supply chain integration, and demand forecasting, the company can minimize waste and optimize resource utilization.



5. Supply Chain Visibility

Traditional

Traditional supply chain management may lack real-time visibility, leading to potential delays and uncertainties.

Enhanced with Digital Twins

Digital twins provide end-to-end supply chain visibility, enabling the company to monitor material availability, delivery status, and potential bottlenecks. This transparency ensures a seamless flow of materials and timely project completion.

6. Construction and Monitoring

Traditional

During construction, manual inspections and periodic checks are used to monitor the progress and identify potential issues. These inspections can be time-consuming and may not detect subtle structural changes.

Enhanced with Digital Twins

Digital twins enable continuous monitoring throughout the construction process. Sensors integrated into the bridge provide real-time data on structural integrity, stress distribution, and environmental conditions. This data-driven approach allows for early detection of anomalies and proactive maintenance, ensuring safety and minimizing downtime.



7. Predictive Maintenance

Traditional

Traditional methods often rely on scheduled maintenance or reactive repairs after structural issues are detected. This can lead to higher maintenance costs and unexpected downtime.

Enhanced with Digital Twins

Digital twins enable predictive maintenance by analyzing real-time data and identifying potential failure points before they become critical issues. This proactive approach reduces maintenance costs, extends the bridge's lifespan, and enhances overall reliability.

8. Risk Assessment and Safety

Traditional

Risk assessment in traditional processes may be limited to standard safety regulations and historical data. Identifying potential risks or unknown hazards can be challenging.

Enhanced with Digital Twins

Digital twins facilitate comprehensive risk assessments by simulating various scenarios and their potential impacts on the bridge structure. Real-time data collection helps identify safety hazards, assess structural integrity, and develop effective risk mitigation strategies.





9. Performance Optimization

Traditional

Performance optimization in traditional construction is often based on theoretical calculations and post-construction evaluations. It may be challenging to identify the most efficient solutions.

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Enhanced with Digital Twins

Digital twins enable performance optimization through continuous data analysis and real-time simulations. By monitoring the bridge's performance throughout its lifecycle, adjustments can be made to optimize efficiency, reduce energy consumption, and enhance overall performance. Embracing digital twins in bridge construction offers a transformative shift from traditional approaches. By harnessing real-time data, simulation capabilities, and predictive analytics, digital twins empower you to make data-driven decisions, improve safety, optimize performance, and achieve cost-effective construction and maintenance.

Investing in digital twin technology opens up new possibilities for seamless collaboration, better project outcomes, and increased ROI. Embrace the power of digital twins to elevate your bridge construction projects and stay ahead in an ever-evolving industry.

Basen

Let's make your digital twins happen <u>NOW</u>



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