

Digital Twin Market Assessment, By Level [Parts Twinning, Product Twinning, System Twinning, Process Twinning], By Company Size [Small & Medium Enterprises, Large Enterprises], By Application [System Prediction, System Simulation, Asset Interoperability, Maintenance, System Visualization, Product Simulation], By End-use Industry [Logistic & Supply Chain, Construction, Healthcare, Manufacturing, Retail, Others], By Region, Opportunities and Forecast, 2016-2030F

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# **Abstracts**

Global digital twin market has experienced significant growth in recent years and is expected to maintain a strong pace of expansion in the coming years. With projected revenue of approximately USD 11.62 billion in 2022, the market is forecasted to reach a value of USD 95.26 billion by 2030, displaying a robust CAGR of 30.1% from 2023 to 2030.

A digital twin is a virtual replica of a physical object, system, or process that digitally replicates its actual counterpart. It records physical and behavioral characteristics, enabling real-time monitoring, analysis, and simulation. Digital twins enable organizations to get essential insights, optimize operations, and improve decision-making across several sectors by utilizing IoT sensors, data analytics, and simulation technology.

The digital twin market's expansion is most visible in industries such as manufacturing,



where digital twins streamline production processes and enable predictive maintenance, resulting in less downtime and better asset utilization. Similarly, digital twins are used in healthcare, automotive, and energy industries to model complicated situations, develop product designs, and maximize resource allocation. The growth of IoT devices that capture real-time data from physical things and systems has aided in the acceptance of digital twins. These gadgets generate a constant stream of data that digital twins employ to develop realistic virtual representations, allowing enterprises to gain unprecedented insight into their operations. This data-driven strategy has created interest across industries, helping to propel the digital twin market forward.

Furthermore, advances in cloud computing technology have made it easier to store and handle the massive volumes of data necessary for digital twin modeling. Cloud-based solutions provide scalability and accessibility, allowing enterprises of all sizes to use the potential of digital twins without investing significant IT expenditures.

For example, in October 2022, Ansys Gateway, powered by AWS, provided on-demand access to apps and high-performance computing resources for efficient and cost-effective simulation software utilization.

The Vital Significance of Real-Time Monitoring in Modern Operations

Real-time monitoring emerges as a critical facilitator, supporting informed decisionmaking, predictive insights, and dynamic changes as companies face fast development. This critical approach uses digital twins to generate virtual representations of physical things, systems, and processes, allowing stakeholders to view, evaluate, and optimize operations in real time. This skill has far-reaching impacts, from improving industrial efficiency and predictive maintenance across various industries to assuring urban sustainability and customized healthcare. The combination of real-time monitoring and digital twins enable companies to adapt quickly to changing conditions, reduce interruptions, and achieve greater operational efficiency on a global basis.

For example, in June 2022, Visionaize and GE Digital collaborated to integrate 3D visualization into APM Mechanical Integrity<sup>™</sup> software. This facilitates data-driven choices in asset-intensive businesses by providing real-time asset insights on 3D models and improving operational efficiency and worker safety, notably in sectors such as oil and gas and power generation.

IoT's Rapid Rise Sparks Transformative Changes



The proliferation of IoT devices and sensors results in an overabundance of real-time data. This data serves as the foundation for digital twin technology, allowing it to produce complex virtual duplicates that imitate and optimize real-world operations. Digital twins, which is powered by IoT's data abundance, improve operational efficiency, predict maintenance needs, and deliver data-driven insights. The symbiotic link between IoT and digital twins promotes innovation across sectors, facilitating adoption and sustaining the market's development trajectory.

For example, in April 2022, AWS IoT TwinMaker is a service that creates digital twins of real-world systems, assisting in developing applications that use IoT and data to improve operational efficiency and minimize downtime. The service makes integrating data from many sources easier to generate a knowledge graph that models real-world situations. It provides interfaces for data sources such as Amazon S3, AWS IoT SiteWise, and Amazon Kinesis Video Streams, and it can generate 3D representations of physical systems while overlaying real-time data for improved insights.

#### Advancement of Manufacturing Industry

The manufacturing industry dominates the digital twin market, owing to its transformational influence. Manufacturers may use digital twins to build virtual versions of actual assets and processes, streamlining operations, forecasting maintenance requirements, and improving product design. These capabilities result in less downtime, more efficiency, and cost savings. As a result, manufacturers aggressively invest in digital twin technology to gain a competitive advantage and speed innovation, establishing them as dominating players in this expanding sector.

For example, in February 2023, Ansys and Microsoft expanded their relationship to provide cloud-based access to simulation solutions, building a new Azure-based product, and improve go-to-market strategies for diverse applications.

#### North America Dominates the Market

North America dominates in the global digital twin market, owing to its technical superiority, innovation-driven landscape, and industrial strength. This region, known for its cutting-edge innovations, has pushed the broad use of digital twin technology across various industries. North America's strong research and development culture and significant expenditures in IoT and data analytics have driven it to the forefront. The region has leveraged the promise of digital twins to streamline operations, raise decision-making precision, and improve overall efficiency by leveraging modern



infrastructure, a developed startup environment, and seamless academia-industry cooperation. North America's established position in the global digital twin market is powerful evidence of its long-term technical strength in the face of the digital revolution.

For example, in January 2022, PTC and Schaeffler collaborated to standardize PTC solutions for integrated IT infrastructure, furthering Schaeffler's digital transformation agenda and driving innovation and efficiency in the automotive and manufacturing industries.

#### **Government Initiatives**

Governments support technological adoption by promoting innovation through financing, research collaborations, and regulatory frameworks. Investment in digital infrastructure, IoT integration, and smart city initiatives propels market growth. Furthermore, government initiatives promoting cybersecurity, data protection, and standards create confidence, encouraging companies to use digital twin technologies. These combined initiatives provide an enabling climate, encouraging business collaboration and realizing the full potential of digital twins across industries and economies.

For example, in March 2021, PTC introduced Vuforia Engine Area Targets to its AR enterprise platform, enabling immersive AR experiences in venues up to 300,000 square feet. Spatial computing enables digital twin representations, improving industrial processes and interactions via augmented reality.

#### Impact of COVID-19

The global digital twin market was considerably influenced by the COVID-19 pandemic, creating a distinct shift in its direction. Before the pandemic, the market was positioned for rapid expansion, fueled by rising digitization and Industry 4.0 trends. However, once the pandemic hit, industries experienced interruptions, requiring reevaluating operating methods. After COVID-19, the digital twin market saw faster adoption as organizations sought solutions to reduce supply chain interruptions, enable remote operations, and improve predictive maintenance. Digital twins' remote monitoring and simulation capabilities have become critical for business continuity in manufacturing, healthcare, and other industries. Companies recognized the importance of data-driven decision-making and the capacity to simulate real-world circumstances realistically. This exposure accelerates the adoption of digital twins across sectors, moving the market forward. COVID-19 sparked a paradigm change, establishing digital twins as cutting-edge instruments and critical components for fostering resilience and flexibility in an



increasingly unpredictable environment.

Impact of the Russia-Ukraine War

The Russia-Ukraine war significantly influenced the global digital twin market, adding new levels of uncertainty and instability. The war has disrupted supply networks and geopolitical stability, causing investors to be cautious in various industries. As industries struggled unpredictably, the digital twin adoption suffered from interrupted operations and fluctuating objectives. However, demand for digital twin systems that provide remote monitoring, risk assessment, and operational optimization increased. Organizations explored strategies to strengthen resilience in the face of geopolitical concerns, which fueled using digital twins for scenario planning and supply chain diversity. The war between Russia and Ukraine highlighted the need for adaptive technology such as digital twins in navigating complicated and changing global environments.

Key Players Landscape and Outlook

The global digital twin market is characterized by rapid technological development, cross-industry adoption, and revolutionary potential. Manufacturing, healthcare, and energy industries are using digital twins for operational improvement and predictive analytics. As IoT and AI grow, the possibilities of digital twins expand, providing real-time monitoring, data-driven decision-making, and increased efficiency. Going forward, the market is expected to expand, owing to the rising demand for remote monitoring, predictive maintenance, and resilient supply chain solutions, which provide companies with a powerful toolkit for navigating new problems and achieving operational excellence.

In June 2023, Siemens combined Supplyframe's Design-to-Source Intelligence platform with its Xpedition software for electronic system design. It provides real-time supply chain data, which improves design decisions, lowers costs, and increases agility. The partnership enables firms to respond to changing market dynamics and simplify the design of electronic systems.

In May 2023, Rockwell Automation presented FactoryTalk Twin Studio, a component of FactoryTalk Design Hub that enables end-to-end cloud-based automation design. It simplifies collaboration, virtual commissioning, and upgrades, resulting in higher design productivity, reduce time to market, and create cost-effective systems.



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