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FUELING THE FUTURE: DIGITAL TWIN IMPLEMENTATION AT WESTINGHOUSE

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ABSTRACT

Westinghouse Electric Company partnered with MOSIMTEC to implement Simio-based digital twins, replacing fragmented, Excel-driven planning across five nuclear fuel production sites. The solution integrates data from SAP, IMS, and Excel via ETL processes to enable dynamic, capacity-constrained scheduling and real-time scenario analysis. Developed through a structured methodology—including functional specification, phased modeling, validation, and integration, the model supports multi-site planning, throughput analysis, material flow visualization, and resource utilization reporting. Planning cycles were reduced from weeks to hours, improving responsiveness to customer requests, outages, and shifting priorities. The project revealed data inconsistencies across systems, prompting quality improvements. Westinghouse planners now independently run and modify plans without external support, enabling faster decisions and improved cross-site coordination. The digital twins have established a scalable, data-driven framework that supports ongoing optimization and future expansion into other business units. This case highlights how simulation can enable operational agility in complex, high-regulation manufacturing environments.

1 INTRODUCTION

Westinghouse Electric Company, a global leader in nuclear power technology, operates a complex and highly regulated manufacturing network for nuclear fuel. With operations spanning 21 countries and over 90 facilities, Westinghouse supplies nearly 50% of the world's nuclear power with its advanced reactor technologies and fuel products. Within this ecosystem, the company's nuclear fuel business unit handles the complete fuel lifecycle, from engineering and safety analysis to manufacturing and logistics, across multiple international production sites in the U.S., U.K., and Sweden.

Facing growing demands for operational agility and integrated planning, Westinghouse embarked on a digital transformation initiative aimed at improving visibility and responsiveness across its nuclear fuel supply chain. The company partnered with MOSIMTEC to implement digital twins using Simio software, a simulation-based platform capable of modeling complex, data-driven systems. This case study outlines the challenges Westinghouse faced, the implementation approach, and the transformative benefits realized through this digital twin solution.

2 CHALLENGE

Before implementing the digital twins, Westinghouse faced significant challenges in coordinating production planning across its five nuclear fuel manufacturing sites. Each location operated independently, relying heavily on manually updated Excel spreadsheets. This fragmented approach created major inefficiencies, including a lack of integration between sites, inconsistent data, and limited visibility into the global supply chain. Evaluating the impact of any change, whether due to customer requests, unplanned outages, or priority shifts, was a slow and cumbersome process. For localized changes, it could take up to a week to generate updated plans; for system-wide changes involving interdependent facilities, the impact assessment could take as long as a month. Additionally, data discrepancies across systems such as SAP,

IMS, Ariba, and Excel often produced conflicting information, further complicating planning efforts. The decentralized nature of operations also prevented timely synchronization of materials produced at one site and required at another. These inefficiencies hindered Westinghouse's ability to respond to dynamic market and operational demands.

3 SOLUTION

To address these challenges, Westinghouse partnered with MOSIMTEC to implement flexible, data-driven digital twins for five of their production sites, using Simio simulation software. Simio was selected for its adaptability to complex, vertically integrated operations and its ability to integrate with existing enterprise systems. The implementation followed a structured, iterative methodology beginning with the development of a detailed functional specification that clearly described system behavior, inputs, outputs, and modeling assumptions. This document served as a living reference throughout the project. Model development proceeded in phased increments, allowing Westinghouse stakeholders to review early prototypes and provide feedback, ensuring alignment with real-world processes.

Data integration was a critical component of the solution. MOSIMTEC designed an ETL (Extract, Transform, Load) framework to pull data from multiple sources including SAP (materials, routings, and inventory), IMS (equipment status and WIP), SAP Ariba (replenishment parameters), and Excel (labor and process data). Early integration was enabled through Excel Power Query to accelerate implementation timelines. Extensive data validation and error logging helped standardize inputs and improve overall data quality.

The resulting digital twins enabled dynamic, capacity-constrained planning and scheduling across all five sites. Users could simulate various scenarios and visualize system performance through interactive dashboards. Key outputs included resource Gantt charts, throughput metrics, material flow tracking, and resource utilization analytics. The model allowed planners to test and compare different planning strategies in real time, supporting faster, more informed decision-making. By building a fully data-driven and flexible simulation framework, Westinghouse established a scalable foundation for ongoing operational optimization and digital transformation.

4 BENEFITS

The implementation of the Simio digital twin delivered significant benefits to Westinghouse's production planning and supply chain management. Planning cycles that previously took up to two weeks were reduced to just a few hours, enabling much faster scenario analysis and decision-making. The digital twin provided an integrated, comprehensive view of operations across all five sites, eliminating the fragmented approach that had hindered visibility and coordination. This integration allowed planners to better anticipate bottlenecks, respond quickly to changing customer priorities, and manage unplanned outages more effectively. Additionally, the project exposed and helped resolve critical data quality issues, leading to improved consistency and reliability of planning inputs from multiple systems. Westinghouse planners gained autonomy, becoming capable of independently running simulations, updating data, and generating new plans without constant reliance on external consultants. This empowerment increased operational agility and ownership. Furthermore, the digital twin established a scalable framework that supports future growth, with plans underway to expand its use across other business units and incorporate advanced functionalities such as automated data feeds and broader organizational access.