

WAREHOUSE OPTIMIZATION SIMULATION TWIN



The next generation of digital twins is extending to a brave new frontier – *Distribution Centers*

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How companies can take advantage of the vast digital supply chain systems they have at their disposal along with the emergence of fast and more powerful simulation tools



THE DIGITAL TWIN BUZZWORD

Digital Twins have been a buzz word for the past few years. Everything from manufacturing to network modeling to city transportation networks have been utilizing digital twins to assist in Modeling, Predictive Analytics and What-If Analysis. Gartner's CIO Survey 2020 shows that currently only 6% of enterprises have implemented digital twins. However, 41% of enterprises expect to deploy digital twins within three years! In the next decade, digital twins will become the dominant design pattern for all digital solutions.

For those who have already begun their journey, digital twins have transformed the ways they plan and execute utilizing data driven analysis instead of guess work. With the myriad of decisions and choices combined with the pressure of outside forces (faster delivery, labor, technology) the next frontier for digital twins will be the distribution center.

For many years, the main usage for digital twins in the distribution center has been by vendors proving ROI for major projects (facility design, material handling, robotics). These digital twins are typically individual events utilized for a specific purpose and maintained by the vendor. In addition, they are typically not the entire warehouse but only a section of the warehouse.

These digital twins also have the limitations of not being validated against real world situations and measured against the actual results. They are what are typically referred to as "Conceptual" Digital Twins. They can simulate a digital twin of the distribution center but are not there for long term usage.

Agillitics is working on the next generation of digital twins called Warehouse Optimization Simulation Twins (WOST). These type of digital twins provide long term benefits for distribution centers as they can create an initial digital copy of the distribution center and then be constantly changed to adapt to the real world environment. This can include continuous modeling for changes in the following modeling parameters:

- ◆ **Order profiles (% of Single SKU Orders, Units per Order, % of Expedited).**
- ◆ **Order volumes (Daily, Hourly, Batching)**
- ◆ **Product slotting (SKU Location Assignment, Slotting Methodologies, Location Sizes.**
- ◆ **Workforce (Type, Quantity, Zone Assignments)**

These parameters can help determine labor forecasting, resource requirements, new constraints and bottlenecks, and expected throughput. In addition, distribution centers can model the continuous changes to the physical building such as:

- ◆ **Layout (Racking Types, Zones,Quantities, Mezzanines/ Expansion Options)**
- ◆ **Operational Processes (Picking Methodology, Goods to Man, Sorting and Staging Areas)**
- ◆ **Automation (Material Handling, Robotics)**



The Problem statement evolves into, “How can companies take advantage of the vast digital supply chain systems they have at their disposal along with the emergence of fast and more powerful simulation tools?”

WAREHOUSE OPTIMIZATION SIMULATION TWIN STEPS

BASELINE

In baseline phase, a baseline WOST twin is modeled into the simulation software. The twin consists of the physical building structure (including columns, racking, docks and material handling equipment), operation processes (flow paths, traffic patterns, expected usage) SKU layout assignment (pick zone, quantity, replenishment zone), vehicles (quantity, type, speed, battery drain) and labor (shifts, quantity, assignment areas, productivity). The baseline can be ascertained by utilizing either actual data from the warehouse (trallers, ASNs, orders) or through expected daily rates and percentages (trailers per day, breakdown of full pallet vs loose case, expected order profiles) based on provided data from the distribution center.

VALIDATION

In the validation phase, the simulation twin is runover a time period to ensure the baseline results match real world operations. Two key areas are being validated: first does the simulation capture the real-world baseline operation and second does the output metrics of the simulation match the real world. The baseline operations validation includes items such as bottlenecks, heat maps and throughput, while the output metrics validations include labor metrics such as productivity, utilization, distance traveled and cost and throughput metrics such as trailers received and shipped, dock to stock time and order lead time.

SCENARIO BUILDING

Once the simulation twin has been baselined and validated, the final phase is scenario building. In this phase, a various number of What-If analysis scenarios can be modeled and the results analyzed against the baseline simulation twin. Scenario results can be stored in the simulation run files or imported from the simulation twin to a data warehouse for long term storage. In either method, scenario results can be visualized through Self-Service Business Intelligence to provide predictive and prescriptive analytics.

JOURNEY

Agillitics provides different implementation models to Warehouse Optimization Simulation Twins. Agillitics can provide expertise and guidance to companies that want to understand the leading practices around simulation twins or turn-key solutions that model create, test and deliver a simulation twin in as little as 60 days utilizing best-of-breed commercial simulation and visualization software. Getting started is easy irrespective of your current warehousing technology. For on-going support, the simulation twin can be transferred over to internal support team or can be maintained by Agillitics through our G.A.I.N (Grow, Adapt, Improve, Nurture) services offering.





Agillitics is able to bring together cutting-edge technology (data foundation, data integration, advanced prediction and simulations, self-service visualization and streamlined process design) to create scalable solution for the supply chains of the future.

Contact Details:



Reed Stepleman

VP, Solutions



(843) 781-2985



rstepleman@agillitics.com



Tim Judge

CEO



(678) 469-1460



tjudge@agillitics.com