Layout & Productivity Improvement and Cost Reduction Simulation

AutoSim3D

August 2024

TCS Top Core System Co., Ltd.

01 The Necessity of Simulation

Existing computational method simulations may experience reliability degradation due to errors →
Guaranteed accuracy of digital twin-based physical environment simulation

Planning

Preparation for Predictive Simulation

- Selection Based on Companies with Extensive Expertise and Experience

Existing business method

Execution of Computational Simulation

- Prediction Based on Simulations Using Existing Computation/Formulas/ Algorithms

Performance?

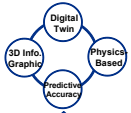
3 Consequences of Ignoring

Neglect of On-Site Conditions | Neglect of Conditions | Neglect of Errors

- Prediction Based on Simple Experience and Workforce
- Neglecting Conditions of Various Manufacturing Environments
- Biased Predictions Based on Computations or Algorithms

Need for Next-Generation Solution Implementation

Digital Twin



Simulation Solution Based on Conditions Identical to the Manufacturing Environment

- Requirement for Introduction During Construction/Expansion of Manufacturing Lines
- Rapid Diagnosis for Efficiency in Automated Logistics
- Prediction of Expected Investment and Production Volume

02 Establishment of Next-Generation Simulation Platform

Conducting Realistic Simulations in a Digital Equipment Environment Based on Digital Twin Technology

Phase 1

Establishment of a Digital Twin Database

- Selection of Companies with Extensive Expertise and Experienced Personnel

Phase 2

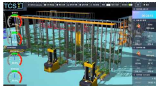
Performing Physics-Based Simulation

- Prediction Based on Simulations Using Existing Computations/Formulas/ Algorithms

Phase 3

Accuracy of Digital Real Equipment

Digital Factory + Digital Real Equipment + Physical Reality



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- Biased Predictions Based on Computations or Algorithms

Achieving Goals

Domestic Simulation Solution Based on Digital Twin Technology

Domestic Simulation Solution Based on Digital Twin Technology

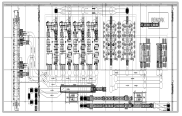
- Establishment of Digital Twin Manufacturing Sites
- Simulation of Digital Real Product Production
- Detection of Breakthrough Cost Reduc. Points
- Integration of Systems Based on Digital Twin Technology

03 Simulation Platform Construction Procedure

Creation of a Digital Twin Factory Database | **Digital Real Equipment Modeling** | **Simulation Environment Configuration** | **Simulation Execution** | **Analysis and Yield Improvement**

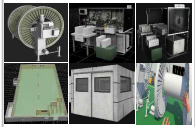
BIM Shape/Data Integration AutoCAD Automation

- ✓ Integration of BIM 3D Models and Attribute Data
- ✓ Automation of AutoCAD 2D Drawing
- ✓ Integration of 3D Scanned Data



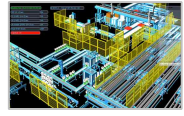
Establishment of a Digital Twin Database

- ✓ Establishment of a 3D Database
- ✓ Integration of Customer Legacy Data
- ✓ Design and Creation of Layout



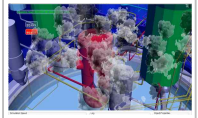
Digital Simulation Service System

- ✓ Production Planning & Scheduling
- ✓ Application of Simulation Conditions & Environment
- ✓ Definition of KPIs & Application of Knowledge



Simulation Service Analysis and Yield Improvement

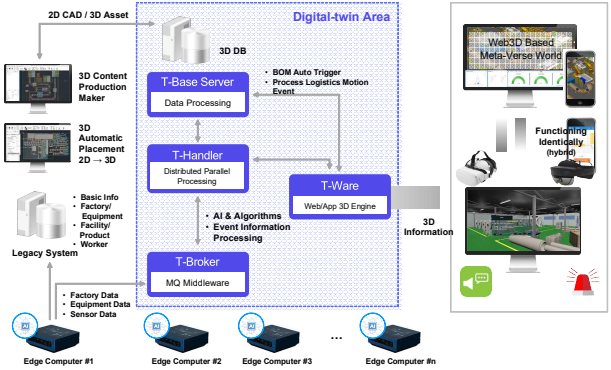
- ✓ Efficiency Simulation Service Execution
- ✓ Real-Time 3D Infographics
- ✓ Data Analysis & Yield Improvement
- ✓ Metaverse System Establishment
- ✓ Operation Training, Collaboration/Sharing, Remote Control



04 Distinctiveness of Domestic 3D Engine

Providing Optimized and Customized Solutions for Manufacturing Environment Using a 3D Physics Engine

Simulation Solution Based on Digital Real Equipment in a Digital Twin Factory



Key Features and Advantages

1 Cost savings based on proprietary 3D construction tool technology

- Customized service based on domestic 3D engine (Open API)
- Simulation service based on digital twin

2 Accurate implementation of all infrastructure equipment in industrial sites

- 2D CAD Layout→ 3D Automatic Conversion
- Manage entire factory BOM by building 3D DB

3 Digital twin-based integrated management transition support (DX strategy)

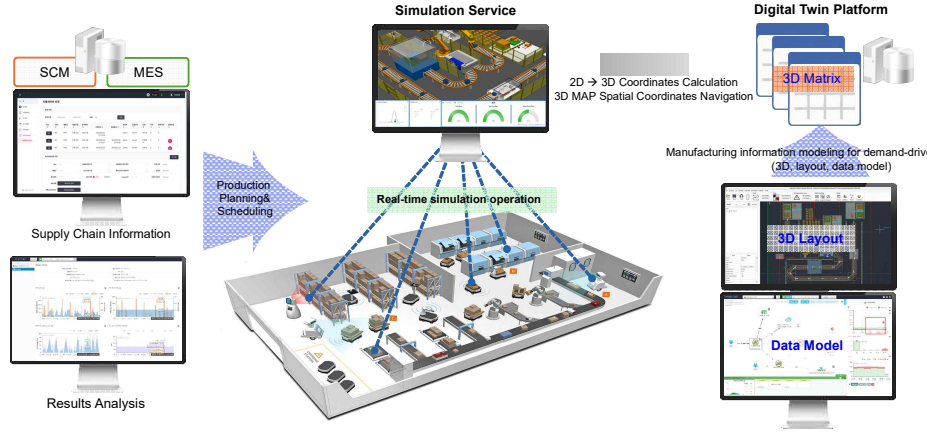
- Supports conversion of factory manag. system to DX
- Intuitive information visualization 3D monitoring (Web/mobile/XR, etc.)

4 Web/mobile 3D-based company-wide utilization support

- Web/Mob platform support with enterprise-wide system without time and space obstacles
- Supports a platform that is easily and quickly shared by all employees

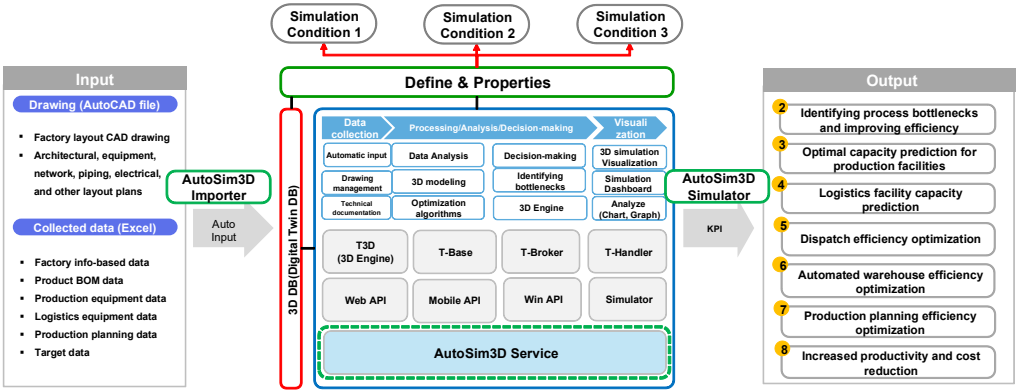
05 Simulation solution role

Simulation service for streamline the efficiency of all manufacturing activities using digital actual equipment (equipment, AMR, OHT, Conveyor, Robot, Human, BOM, etc.) in the digital twin factory



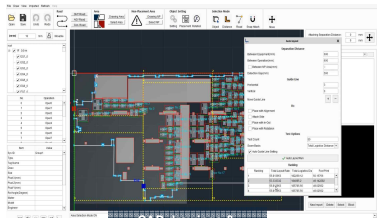
06 AutoSim3D

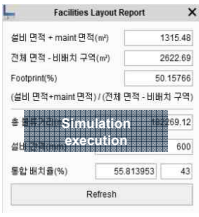
Simulation service for optimizing overall manufacturing activities of digital equipment (facility, AMR, OHT, conveyor, robot, human, BOM, etc.) in a digital twin factory



07 AutoSim3D

Automated equipment layout and KPI derivation through learning from CAD drawings and spatial data (footprint, integrated layout, efficiency verification of logistics time/distance, etc)





Digital Twin DB

Distinctive features

1 CAD drawings & automatic input of basic factory information

- Automatic 3D modeling from CAD drawings
- Legacy DB & Excel Basic Info interface automation

2 Proprietary 3D authoring tool development

- Providing various tools such as coordinates, vectors, scale, and time
- 3D infographics (event zoom-in/out & highlight features)

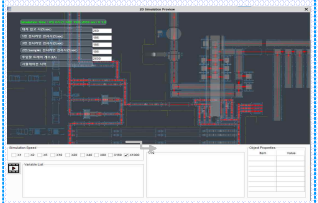
3 AI-based automatic equipment layout

- Automatic placement of buildings, facilities, equipment, etc., based on AI and drawings
- Automatic triggering of product BOM motions

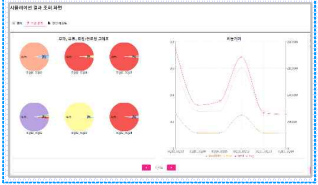
4 The digital twin platform supports standard 3D model compatibility

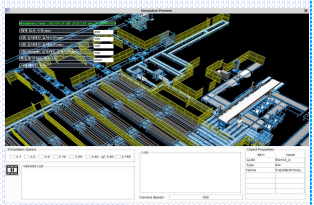
- Building a digital twin platform through our own developed 3D engine
- 100% compatibility with standard 3D model files

Learning CAD drawings and spatial data for automatic equipment placement and KPI derivation (Footprint and integrated layout, logistics time/distance efficiency verification)

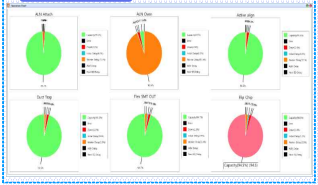


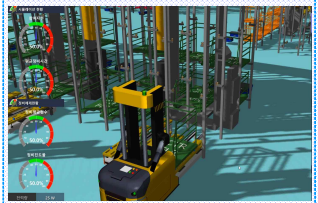
CAD 2D CAD Layout Design



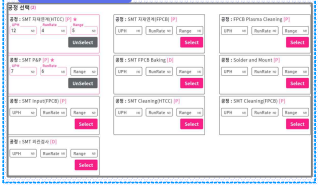


Digital Real Equipment
Real-Time Simulation
3D CAD Simulation





Ditital Twin
KPI/Analysis/Prediction
Digital Twin Dashboard



YouTube

TopCore System Project Execution Videos:

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Thank you.

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