TCS
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Solutions Introduction

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Chalenge 2024

TCS has developed core technology for an OpenGL-based real-time 3D engine through years of R&D, providing industry-specific high-capacity, high-performance APIs and customized services. We offer 100% Korean-developed core technology and DX-based collaboration solutions.

History

Growth 2024
Web/Mobile-based 3D simulation service Launch
Web/Mobile-based digital twin service Launch
Web/Mobile-based metaverse factory service Launch
Filed 2 metaverse patents

Prepare 2022 2021
'TW-2022' Web 3D Monitoring Solution Launch
Registered as a Tesla Solution Provider
T-Base' Digital Twin ICT Integrated Control Platform
Acquired patents related to digital twin

Advance 2023
T-XR, T-AR Meta Quest 3 based XR solution Launch
Meta/Blockchain convergence platform (T-Verse) Launch
Metaverse City & BIM Platform (K5D Enhance) Launch
AI facility automatic placement and simulation Launch
AI smart facility predictive DX digital twin solution Launch

Start 2020 2019 2017
'One-Click' Equipment Auto-Placement Tool Launch
AutoSim3D' 3D Simulation Tool Launch
K5D' Real-Time Collaborative Hook-Up Piping Design
Solution Launch & 3DMaker' 3D Modeling Tool Launch
Development of proprietary OpenGL-based 3D engine
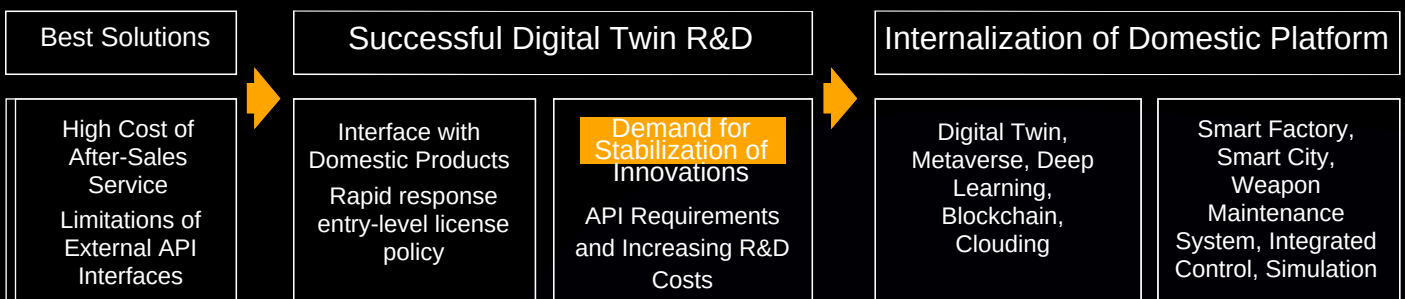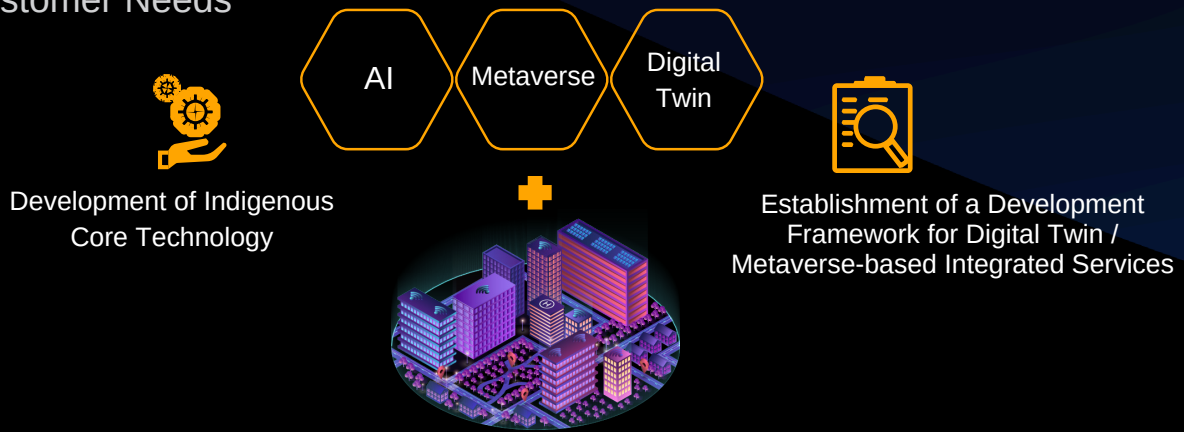technology. Acquired patents related to BIM

Production efficiency with digital twin simulation

Strategic Planning Department

Company-affiliated research institute

TCS
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Sales Department

External technical consultation

Metaverse Solutions (Factory, CBT)	Integrated System (AI IoT, Simulation)	Deep Learning Blockchain (P2P, NFT)	Portal Services	Training and Development
• OpenGL 3D Core Engine • Real-time AI/IoT/Big Data digital twin platform interface • High-performance simulators • Real-time meta-world collaboration/sharing/control • Simultaneous planning/design/creation/change • Real-time collaborative 3D design • XR-based immersive simulators	• Digital twin integrated system • AI-based layout automatic design and optimization simulation • Productivity optimization simulation • Resource efficiency optimization simulation for manufacturing equipment, AMR, robots, stockers, and workers • Predictive maintenance systems for digital twin, AI, IoT equipment	• Deep learning CCTV autonomous control • Smart city infrastructure (smart poles, smart canopies, smart safety, etc.) • Urban digital twin simulations (weather, traffic, roads, water supply, etc.) • Blockchain-based distributed processing, data certification, and security systems	• MRO Portal Service • MES/WMS/QMS Portal Service • 3D Monitoring Portal Service • Brokerage Platform Portal Service • Web/Mobile Service • OPC Service	• Next-generation 3D CBT development • 3D BOM database construction • Training/education program planning • Development of electronic manuals and educational materials • Digital twin-based autonomous illustration and operational modeling

Research & Development

Utilizing Domestic Real-time 3D Engine to Overcome the Limits of Customization and Meet Customer Needs

AI | Metaverse | Digital Twin

Development of Indigenous Core Technology

Establishment of a Development Framework for Digital Twin / Metaverse-based Integrated Services

Best Solutions	Successful Digital Twin R&D		Internalization of Domestic Platform	
High Cost of After-Sales Service Limitations of External API Interfaces	Interface with Domestic Products Rapid response entry-level license policy	Demand for Stabilization of Innovations API Requirements and Increasing R&D Costs	Digital Twin, Metaverse, Deep Learning, Blockchain, Clouding	Smart Factory, Smart City, Weapon Maintenance System, Integrated Control, Simulation

Solutions for Building DX Strategy

Holding Patents for Digital Twin, Metaverse, and BIM Solutions

Digital Twin and Metaverse 3D Engine "TCS3D"

- Development and supply of domestic 3D engine and API (vs Unity)
- Support for 3D CAD & BIM (vs Autodesk)
- Support for 3D model creation tools (vs 3DMax)
- Digital twin communication libraries for Win, Web, Mobile
- High-capacity (up to 10 million objects) processing performance (validated by semiconductor 5D BMT)

Digital Twin and Metaverse Platform "T-Verse"

- Development and supply of domestic metaverse factory platform through national R&D projects
- Digital twin platform service
- XR-based immersive disaster safety training service
- XR and metaverse-based next-generation CBT

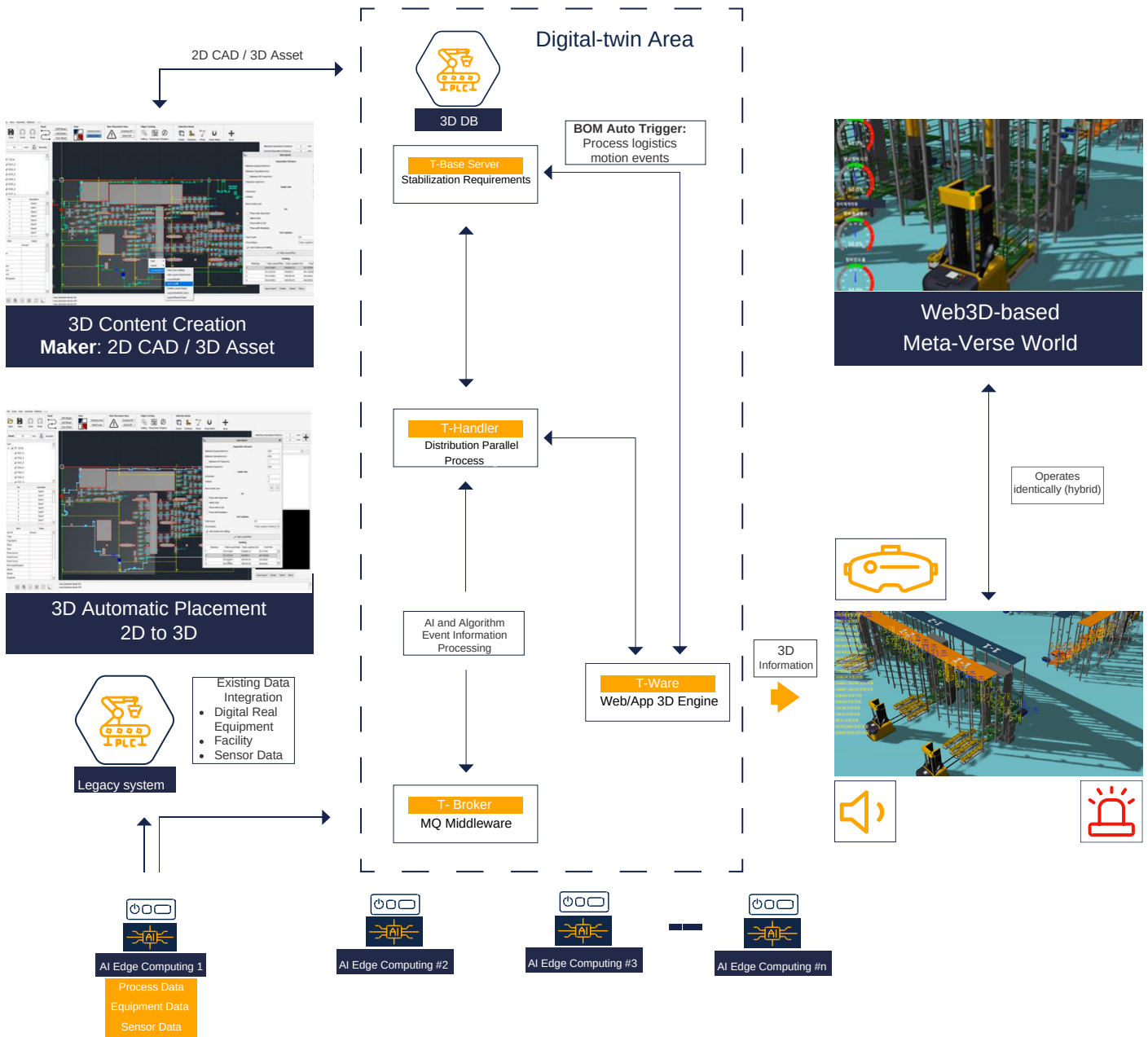### Smart Factory and Smart City Solutions "TMON"

- MES / WMS / SPC / OPC services
- 3D-based reality integrated control
- AI-based equipment prediction
- Logistics AI and algorithm-based optimal route search and dispatching

Simulation Solution "AutoSim3D"

- AI-based layout automatic placement service
- Production scheduling and LOB optimization simulation service
- AMR, Crane, OHT, Robot optimization simulation service
- Predictive, verification, and analysis simulation service
- Development of XR-based optimization algorithms, AI integration, and simulator through national R&D projects

ICT Convergence (IIoT, AI) Solution "TBASE"

- Smart city, smart factory, and smart construction ICT integration
- Control/processing technologies for SCADA, PLC, motors, IoT, lighting, MCU board, etc.
- Wired and wireless communication (TCP, UDP, Modbus, Serial) and database integration technologies

Blockchain-based Cloud Service "TR-Chain"

- Distributed computing, P2P, data certification, and other blockchain technologies
- High-capacity encrypted transmission compression technology
- Clouding services

Providing Optimized & Customized Solutions for Domestic Manufacturing Environments with Domestic 3D Physical Engine

Simulation Solutions Based on Digital Twin Factory's Digital Real Equipment

Digital-twin Area

2D CAD / 3D Asset

3D DB

T-Base Server
Stabilization Requirements

BOM Auto Trigger:
Process logistics
motion events

3D Content Creation
Maker: 2D CAD / 3D Asset

T-Handler
Distribution Parallel Process

Web3D-based
Meta-Verse World

3D Automatic Placement
2D to 3D

AI and Algorithm
Event Information
Processing

T-Ware
Web/App 3D Engine

3D
Information

Operates
identically (hybrid)

Existing Data Integration
- Digital Real Equipment
- Facility
- Sensor Data

Legacy system

T- Broker
MQ Middleware

AI Edge Computing 1
Process Data
Equipment Data
Sensor Data

AI Edge Computing #2

AI Edge Computing #3

AI Edge Computing #n

Key Features

1

Cost Reduction Based on Proprietary 3D Construction Tool Technology
- Customized services based on domestic 3D engine (Open API)
- Simulation services based on digital twin

3

Support for Management Transition Based on Digital Twin (DX Strategy)
- Supporting DX transition of factory management systems
- Intuitive information visualization with 3D monitoring (Web/Mobile/XR)

2

Accurate Implementation of All Infrastructure Equipment in the Industrial Field
- Automatic conversion from 2D CAD layout to 3D
- Factory-wide BOM management with 3D DB construction

4

Support for Enterprise-wide Utilization Based on 3D for Web/Mobile
- Overcoming spatial and temporal barriers with enterprise systems
- Supporting Web/Mobile platforms for easy and quick sharing among all employees

Simulation Services for Enhancing Manufacturing Activities of Digital Real Equipment (Facilities, AMR, OHT, Conveyor, Robot, Human, BOM, etc.) in Digital Twin Factories

Input

Drawings (AutoCAD)
- Factory layout CAD drawings
- Building, equipment, network, piping, electrical, and other flat plans

Collected Data (API)
- Factory info reference data
- Product BOM data
- Production equipment data
- Logistics equipment data
- Production planning data
- Target data

Auto Input →

AutoSim3D Importer API

3D DB (Digital Twin DB)

| Simulation Condition 1 | Simulation Condition 2 | Simulation Condition 3 |

Define & Properties (AutoSim3D Processor)

Data Collection	Processing/Analysis/Decision Making		Visualization
Auto Input	Data Analysis	Decision Making	3D Simulation Visualization
Drawings Management	3D Modeling	Bottleneck Detection	Simulation Visualization
Technical Documents	Optimization Algorithms	Bottleneck Detection	Simulation Visualization
T3D (3D Engine)	T-Base	T-Broker	T-Handler
Web API	Mobile API	Win API	Simulator

AutoSim3D Service

AutoSim3D Simulator KPI ①

자동 KPI →

Output

- ② Detect and improve process bottlenecks
- ③ Predict optimal capacity of production equipment
- ④ Predict capacity of logistics equipment
- ⑤ Optimize dispatching
- ⑥ Optimize warehouse automation
- ⑦ Enhance production planning efficiency
- ⑧ Increase productivity and reduce costs

Building digital twins with TCS K5D solution

| Creating Digital Twin Factory DB | Modeling Digital Real Equipment | Setting Simulation Environment | Executing Simulations | Analysis and Yield Improvement |

BIM Shape/Data Integration & AutoCAD Automation	Building Digital Twin DB	Digital Simulation Service Framework	Simulation Service Analysis and Yield Improvement
• Integrating BIM 3D shapes and attribute data • Automating AutoCAD 2D drawings • Integrating 3D scan data	• Constructing 3D DB • Integrating customer legacy data • Designing and creating layouts	• Production planning and scheduling • Applying simulation conditions and environments • Defining and applying KPIs and knowledge	• Performing optimization simulation services • Real-time 3D infographics • Analyzing data and improving yield • Establishing metaverse systems (operation training, collaboration/sharing, remote control)

Establishing BIM-based Digital Twin Factory DB

- Real-time simultaneous access for 200 people
- Rendering 300GB+ and BIM 100GB+ processing

- Providing big data DB for the entire factory P&ID full set, piping system diagram, quantities, BOM, costs, schedule, area, volume, etc.

- Built-in algorithms for load balancing, dispatching, authority, and space management

- Supporting BIM data compatibility and direct Open API integration
- Programmed for projects, designers, importers, viewers, and simulators

BIM-based Digital Twin Factory Built
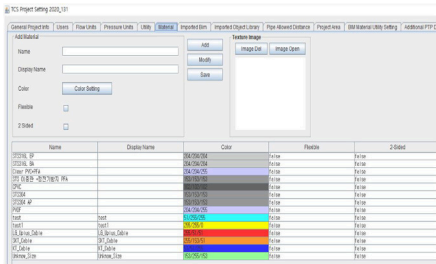
Setting up 5D projects
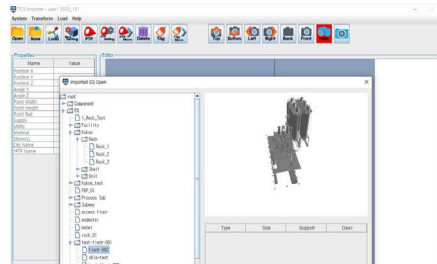
Creating and registering equipment libraries
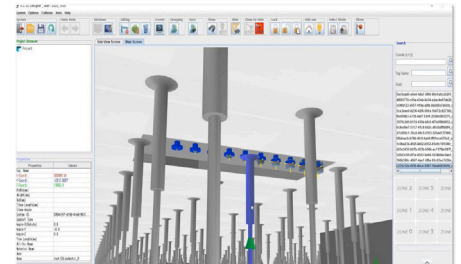
Importing BIM data
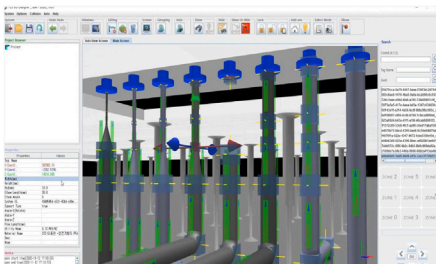
Collaborative design modeling with simultaneous access
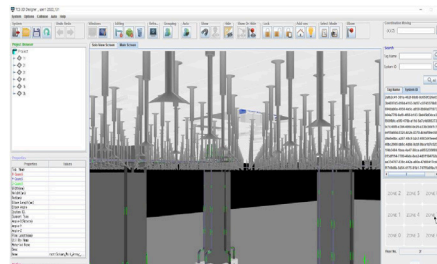
Registering and placing building and facility information
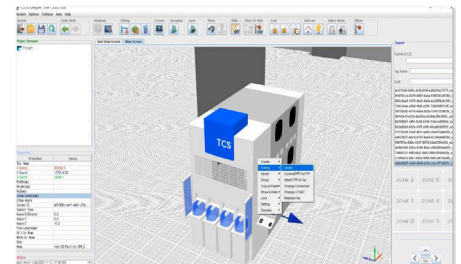
Registration and placement of production equip. reference info
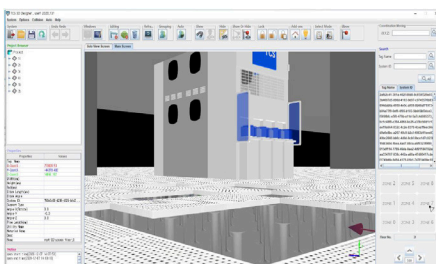
Registering and placing production equipment reference
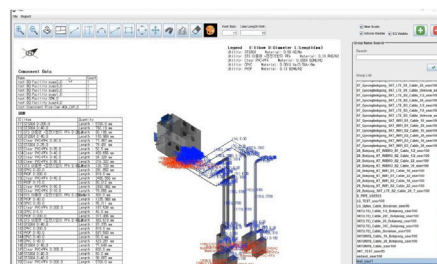
Managing process BOM and issuing construction drawings
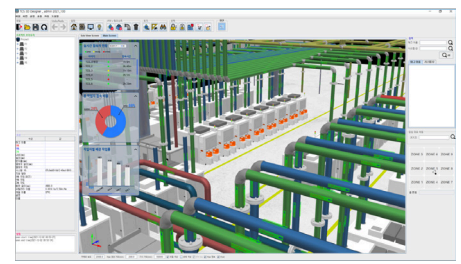
Real-time cost and performance management

Equipment & Utility group setup
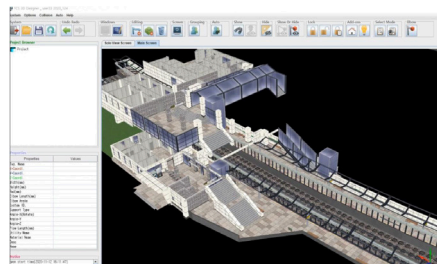
Constructing subway facilities
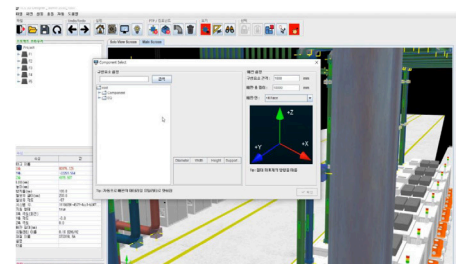
Design and surveying functions

XR / AI Solution

A 5D BIM platform for the design and operational management of buildings, factories, facilities, roads, ports, airports, etc., aiming to reduce costs by over 30% through collaborative design and quality management, with a goal of 0% construction errors through mutual verification
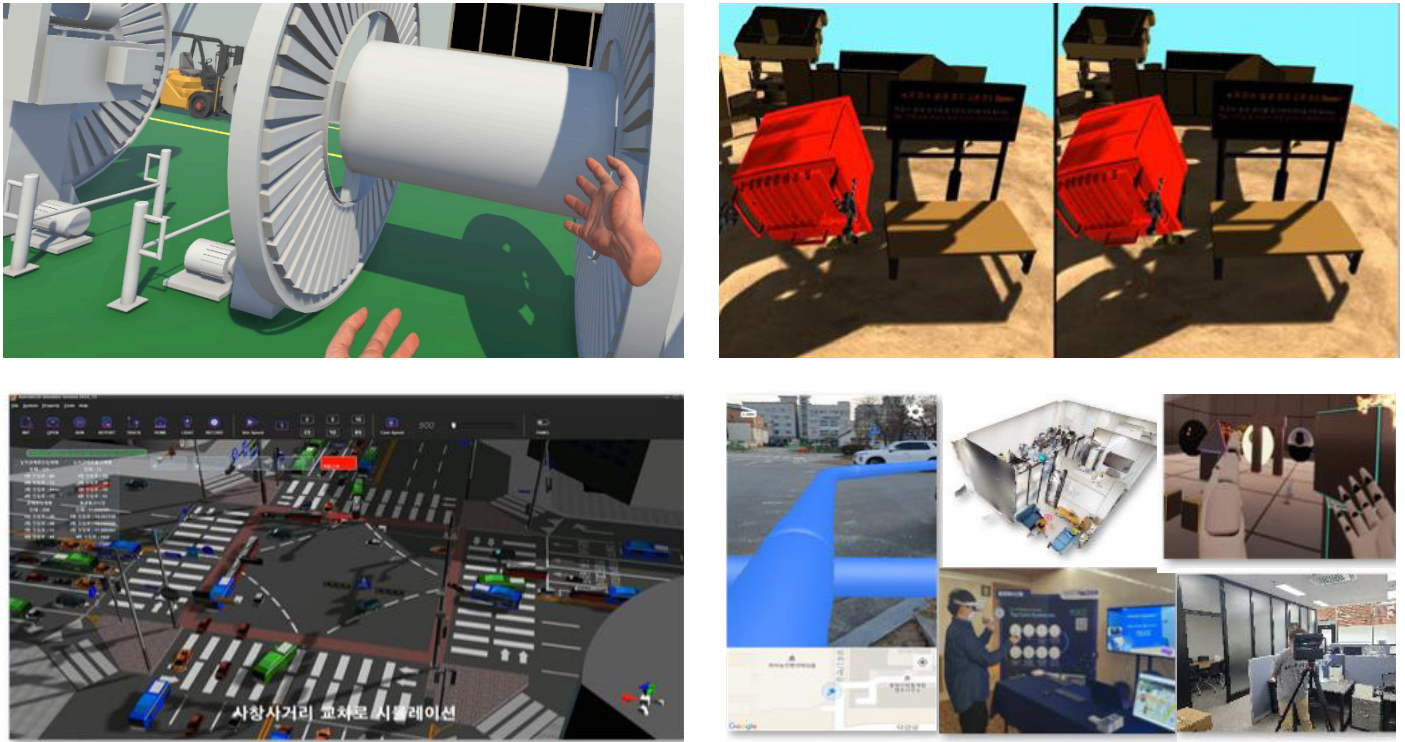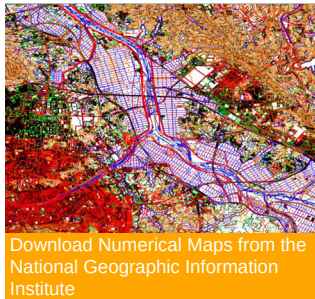

Enhancing domestic factory efficiency with Korean digital twin solutions to build smart factory systems (MES, FMS, QMS, OEE, MRO)


5D Project Settings

Equipment library creation/registration

Import BIM data

Simultaneous access collaborative design modeling

Building and facility information registration and placement

Production equipment reference information registration and
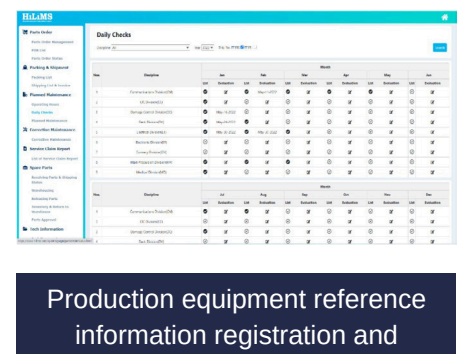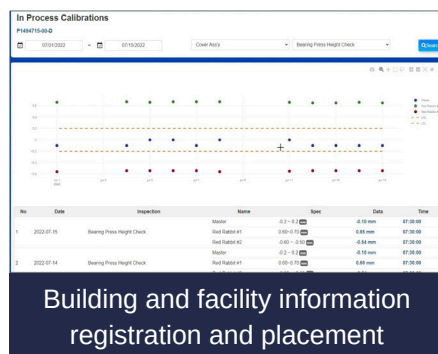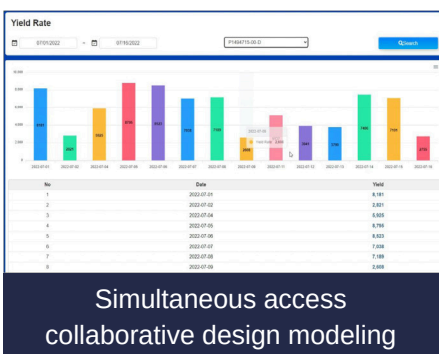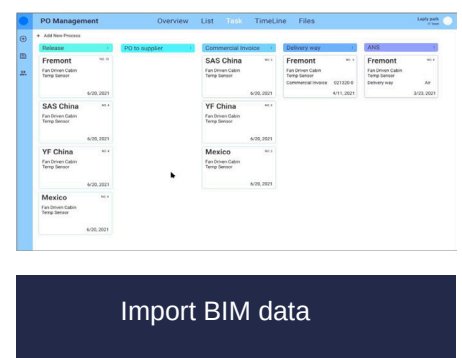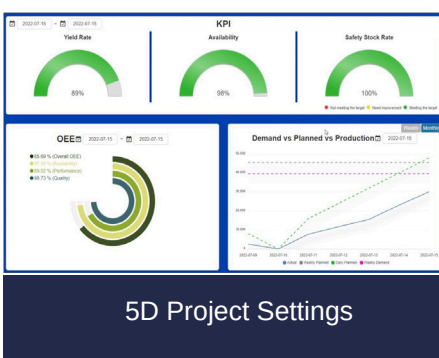
2D Drawing to 3D Map Auto Conversion Service

Automatic Conversion Service from GIS Numeric Drawings to 3D Maps

Provides automatic conversion of 2D CAD-based GIS drawings to 3D maps within seconds using our proprietary 3DMaker. Offers digital twin with the accuracy of underground common network and underground water and sewage 3D BIM design standards (supports real-time collaborative creation, ISO drawing output, etc.)
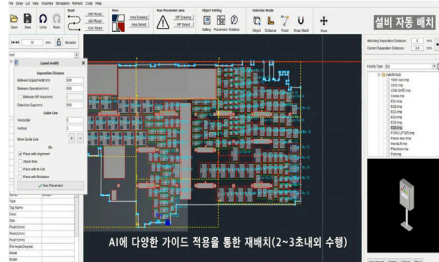

Download Numerical Maps from the National Geographic Information Institute

Terrain Information Extraction

Automatic 3D Terrain Conversion (within 5 seconds)

Automatic 3D Building Conversion

Drone Photography

Drone Orthophotos/ Images

Drawing Conversion

Automatic 3D Map Conversion (within 1 minute)
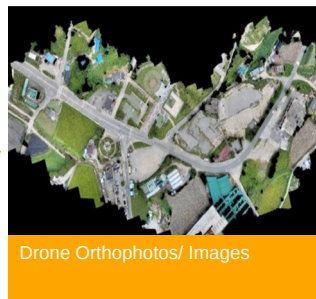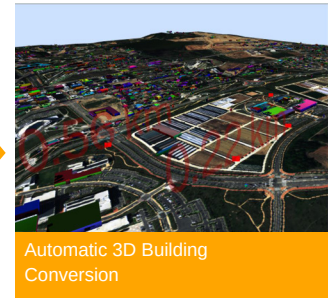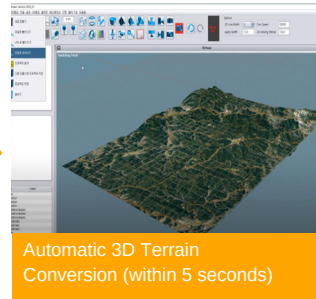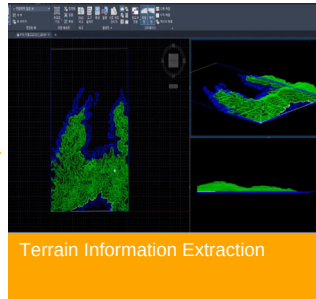
Digital twin and metaverse content (simulation, monitoring, AI disaster safety prevention, education/training, remote control)
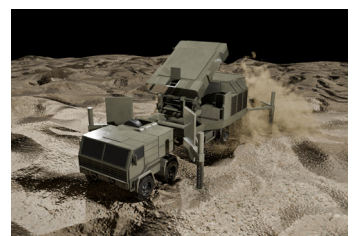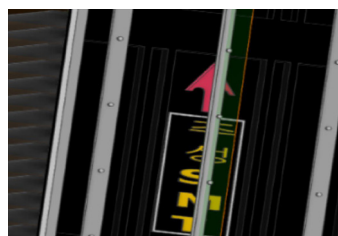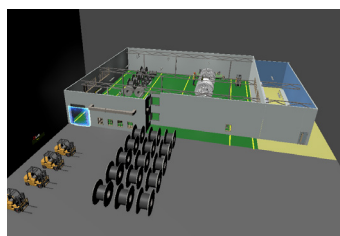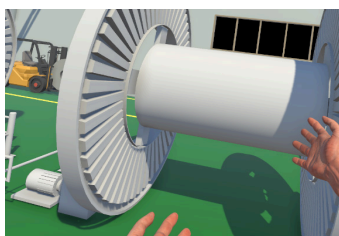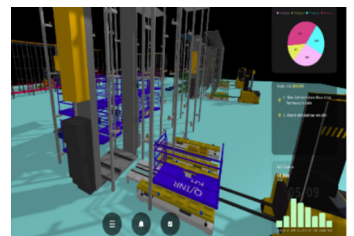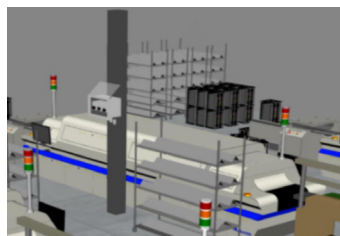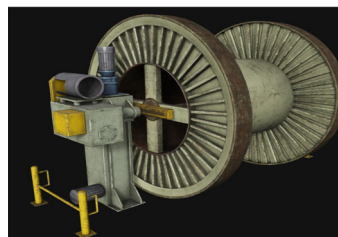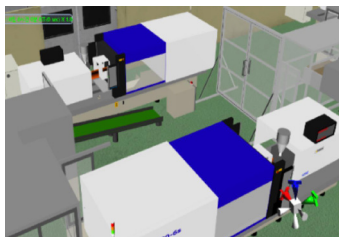
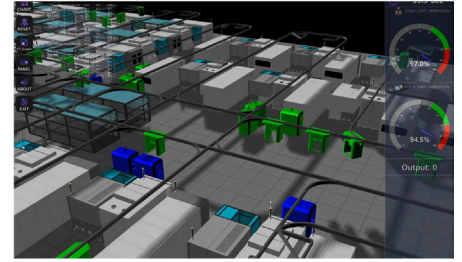# Cases of Digital Twin, Metaverse, and AI Construction
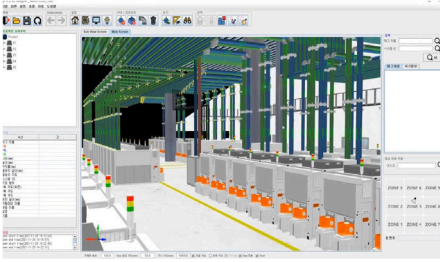
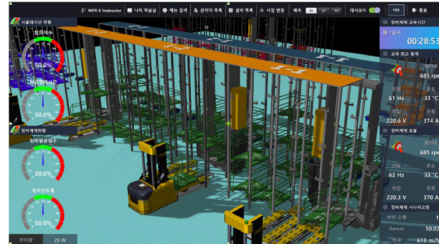|		
AI-based BIM design and construction tools	Digital twin design and construction tools	Semiconductor logistics 3D simulation
Electric vehicle assembly/robot equipment monitoring	Digital twin 3D-based monitoring of automated warehouses	Smart city traffic simulation based on traffic light control

Top Core Systems Co., Ltd.

🌐 www.topcore.co.kr

Company Project Execution Videos:
▶ https://www.youtube.com/@tcs5805/videos

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