



DIGITAL TWINS IN PRACTICE: CHALLENGES, TRUTHS, AND PROGRESS

Company Introduction



Holding group of 28 companies
and more than 3700 people,
expert in machineries across
many industries.



Leader in Italy for advanced
solutions and services for internal
logistics.



Europe-wide system integrator
specialized in intralogistics
automation and innovative
software solutions.

Consulting



Automation

Digitalization

8+

Years into
automation

50+

Multidisciplinary
specialized
engineers

70+

Active Plant
integrated and
actively monitored

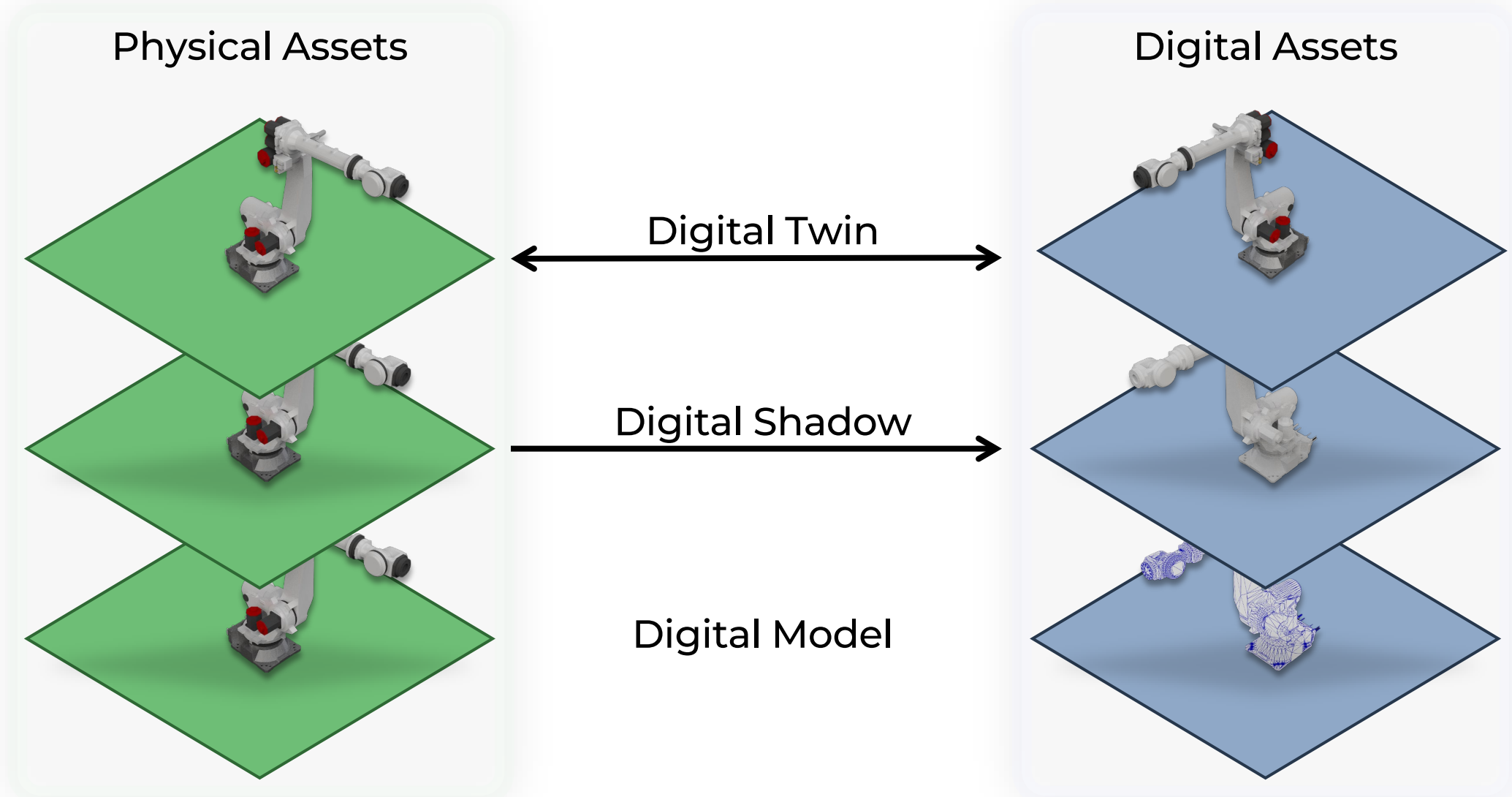
200+

Automatic
Solutions
installed

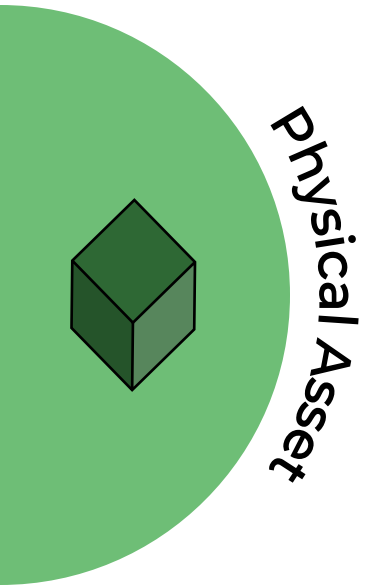
❖ Digital Transformation



❖ Digital Transformation Layers



Digital Model



❖ The need for the developments

OTTO Motors



AGILOX

ROCLA



OMRON

Digital Model: Development

Components

Create an asset library with useful component:

- Vehicles (AGVs, AMRs)
- Conveyors (infeed/outfeed systems)
- Buffers (intermediate storage, accumulation zones)

Workflows

Build an automated workflow parser that reads Excel files:

- Automatically link workflows to the correct stations
- Create workflows with configurable frequency and margin
- Define specific time windows with high activity ("peak hours")

Vehicle Logic

Implement key vehicle control logic:

- Dynamic vehicles job assignments
- Vehicles battery levels and recharge cycles management
- Define custom zones within the tracks using waypoints

KPIs

Use Emulate3D's Experiments Tool:

- Generate real-time KPIs such as Throughput, and Fleet saturation
- Create automatic heatmaps to visually identify bottlenecks in the system

❖ Digital Model: Development Result

MONTHS

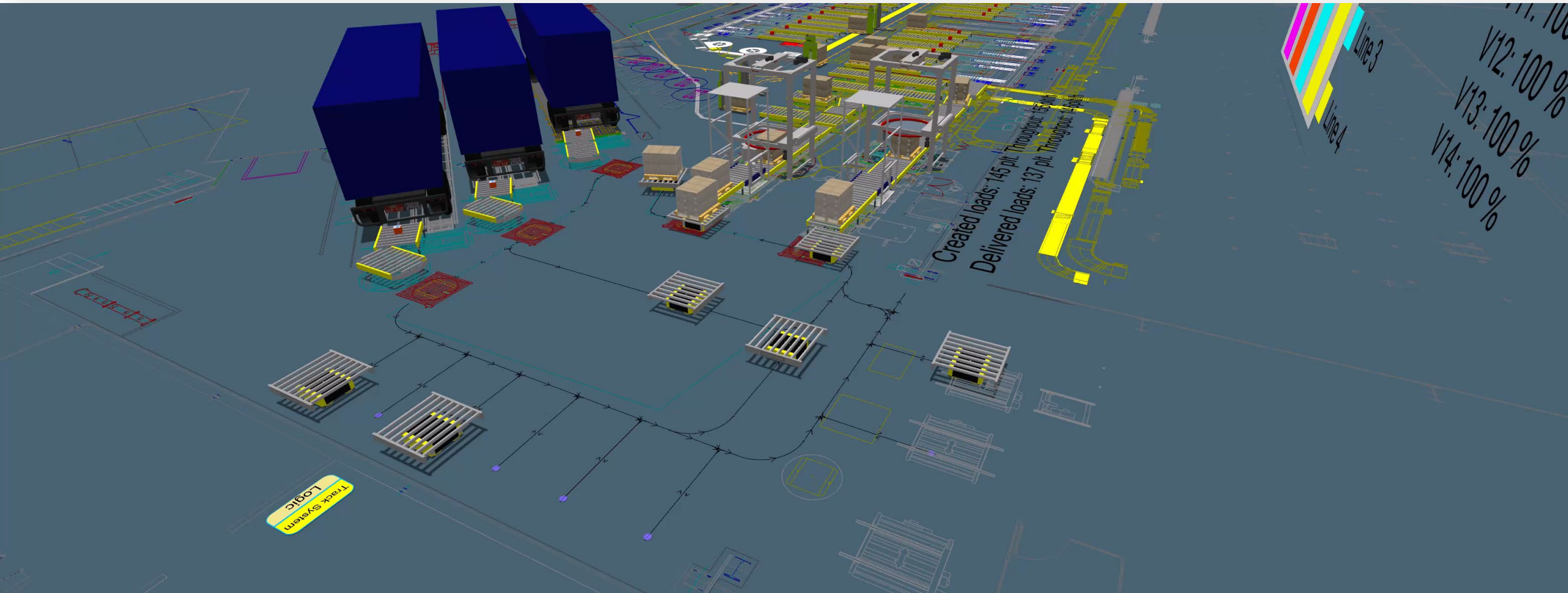


1 WEEK

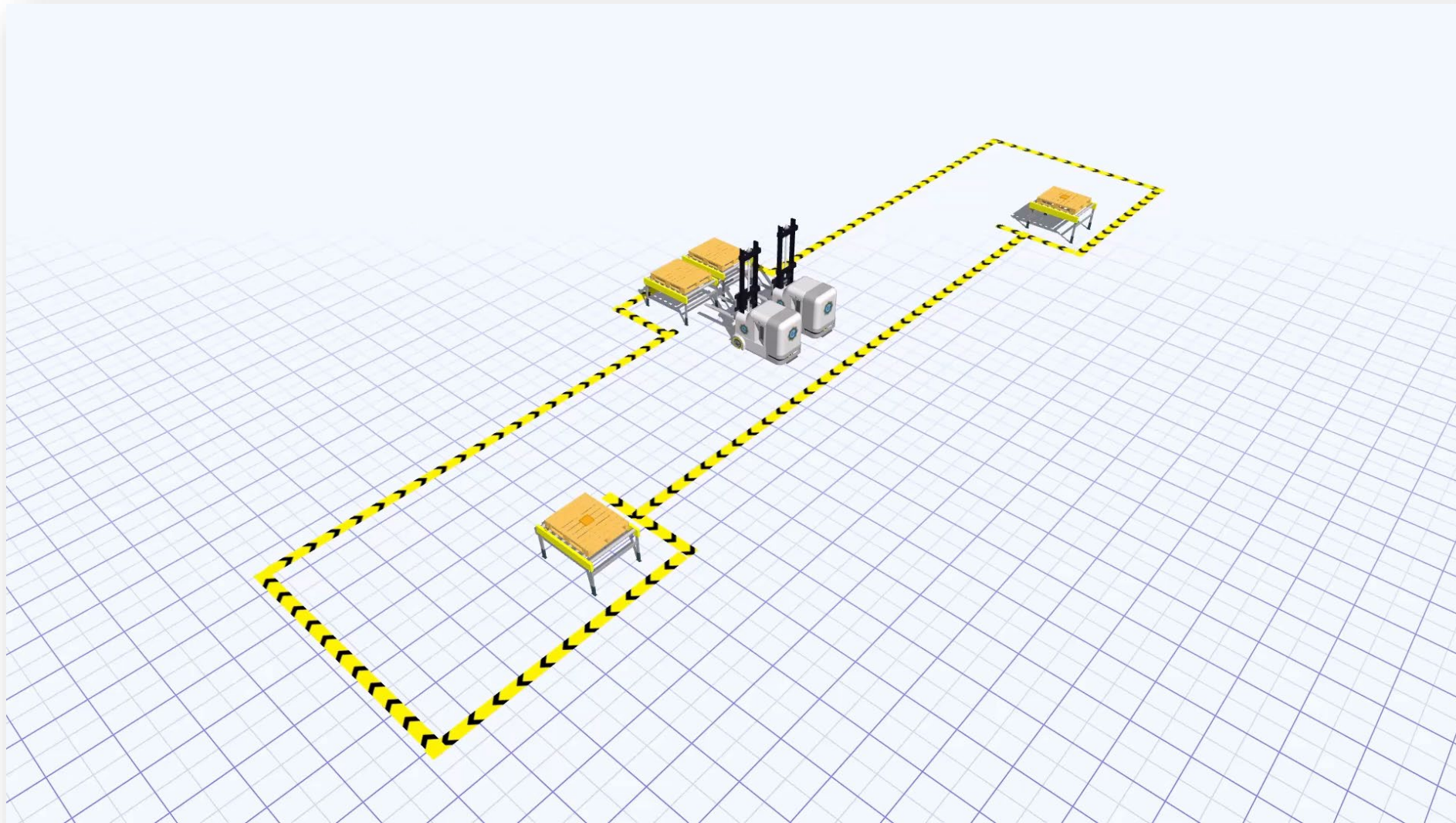
75%

Reduction in the simulation process.

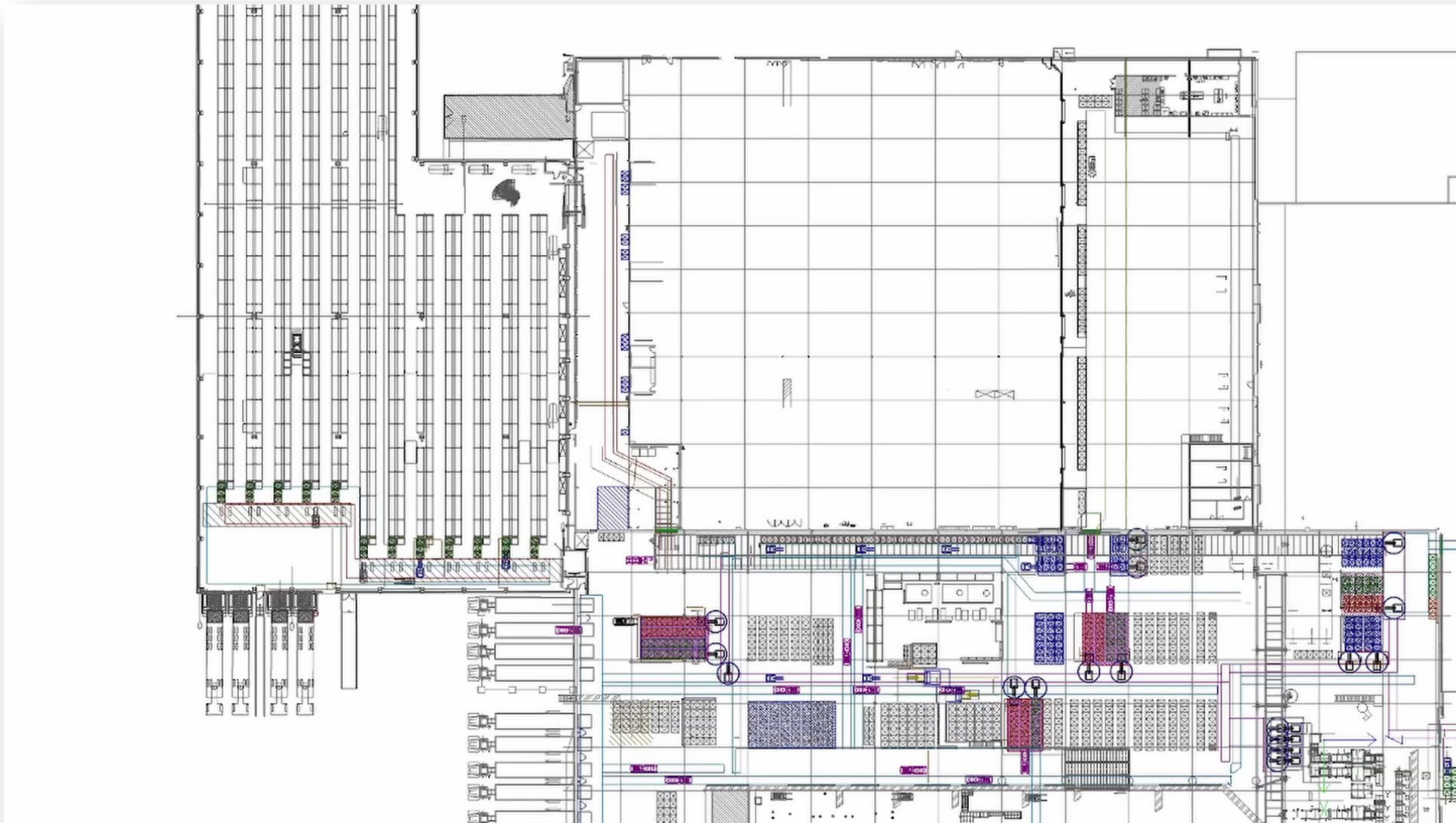
❖ Digital Model: Development Result



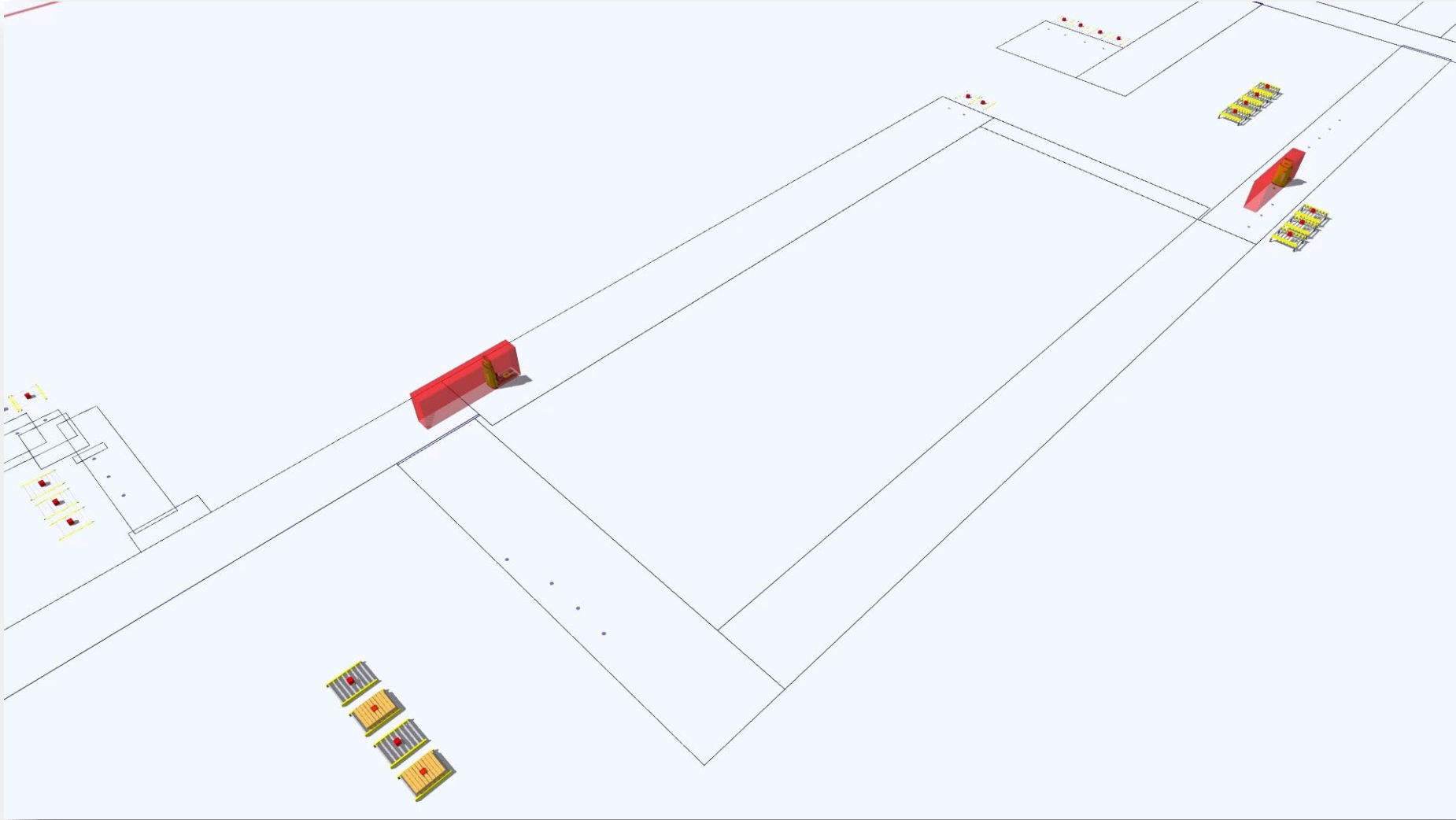
❖ Digital Model: Development (II)



❖ Digital Model: Development (II)



❖ Digital Model: Development (II)



❖ Digital Model: Development Result

1 WEEK



1 DAY

75%

Reduction in the simulation process.

Digital Shadow



❖ Digital Shadow : Continuous improvement



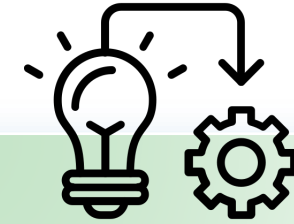
Data Collection
& Analysis



Simulation &
Validation



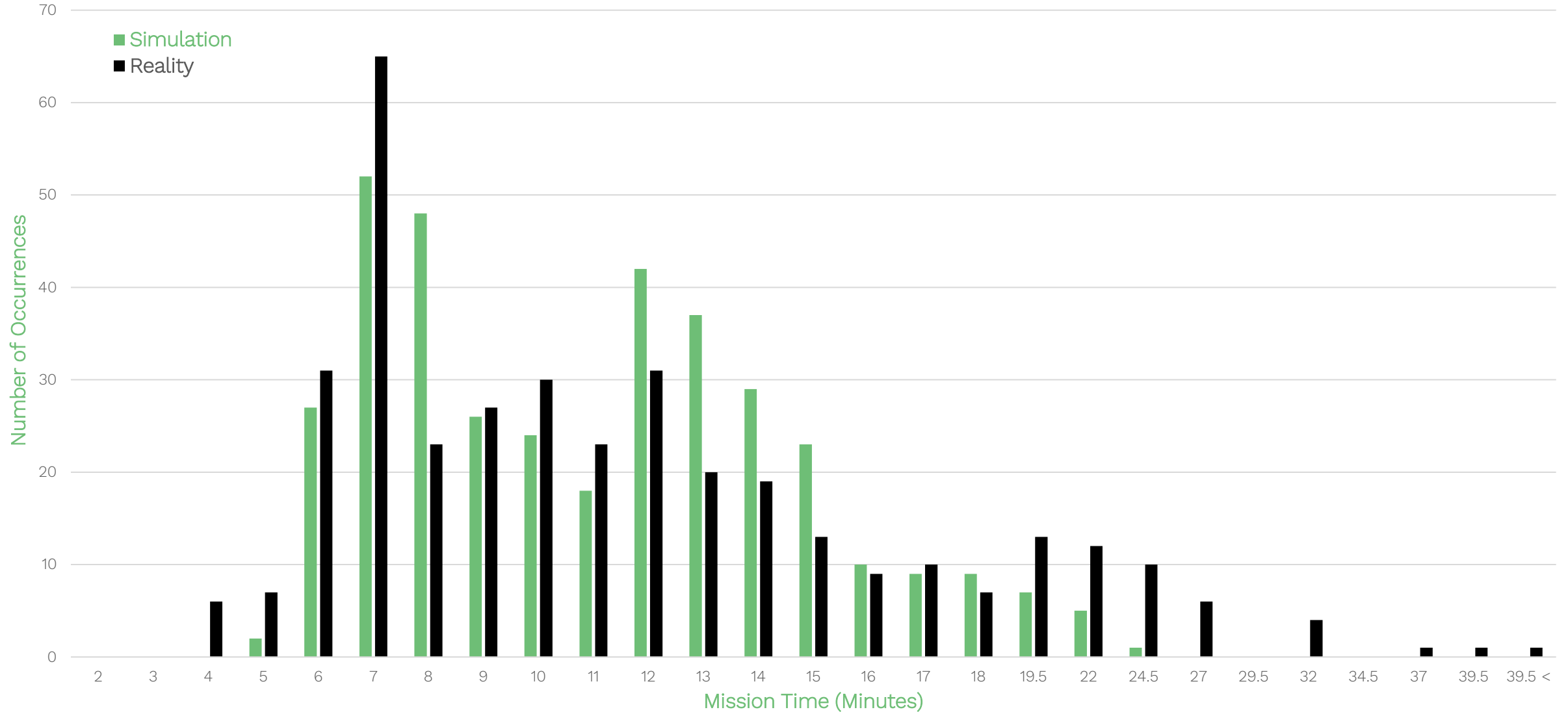
Problem
Identification &
Solution Design



Implementation
& Execution



Digital Shadow: Case Study



❖ Digital Shadow: Case Study



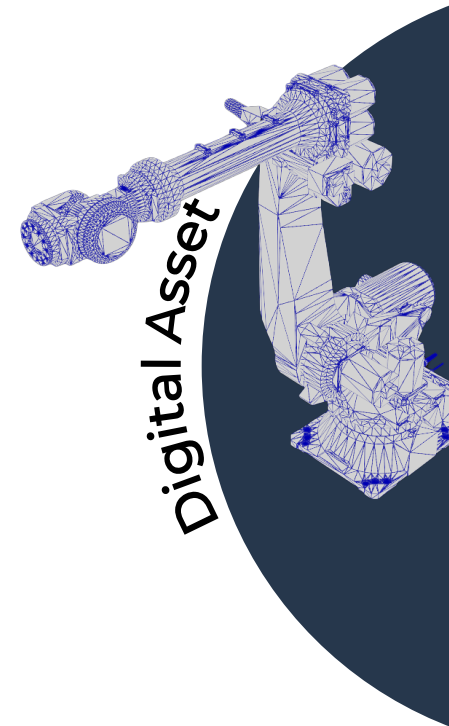
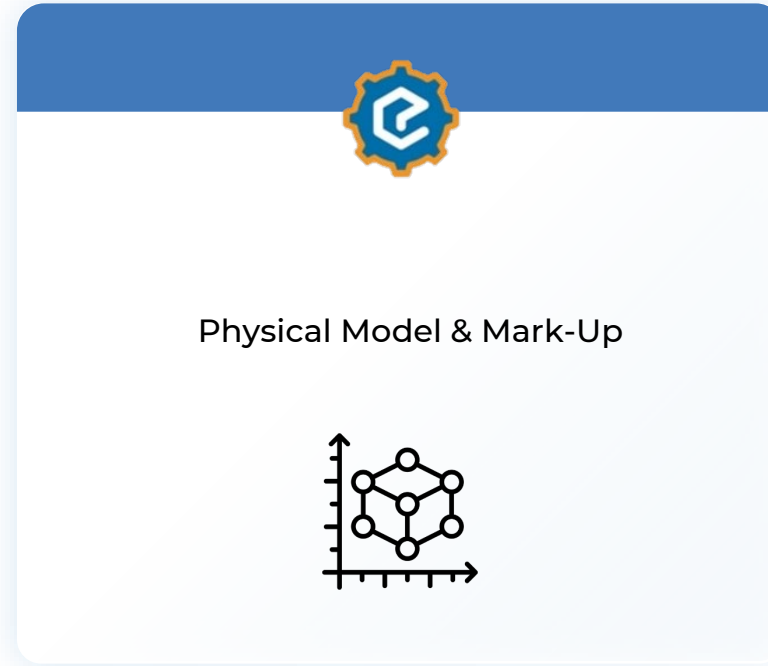
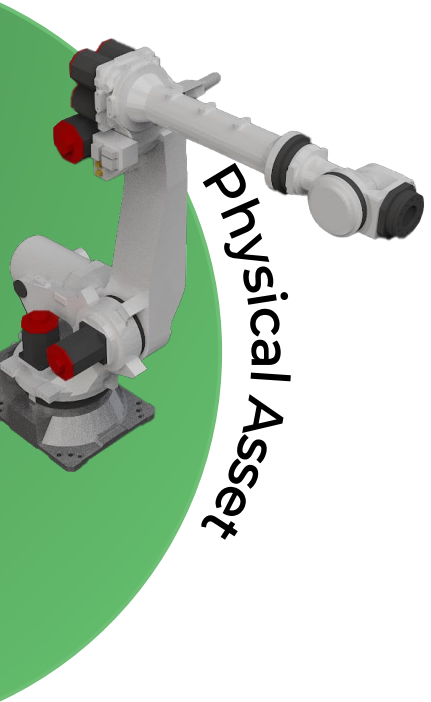
21%

Increase of efficiency.

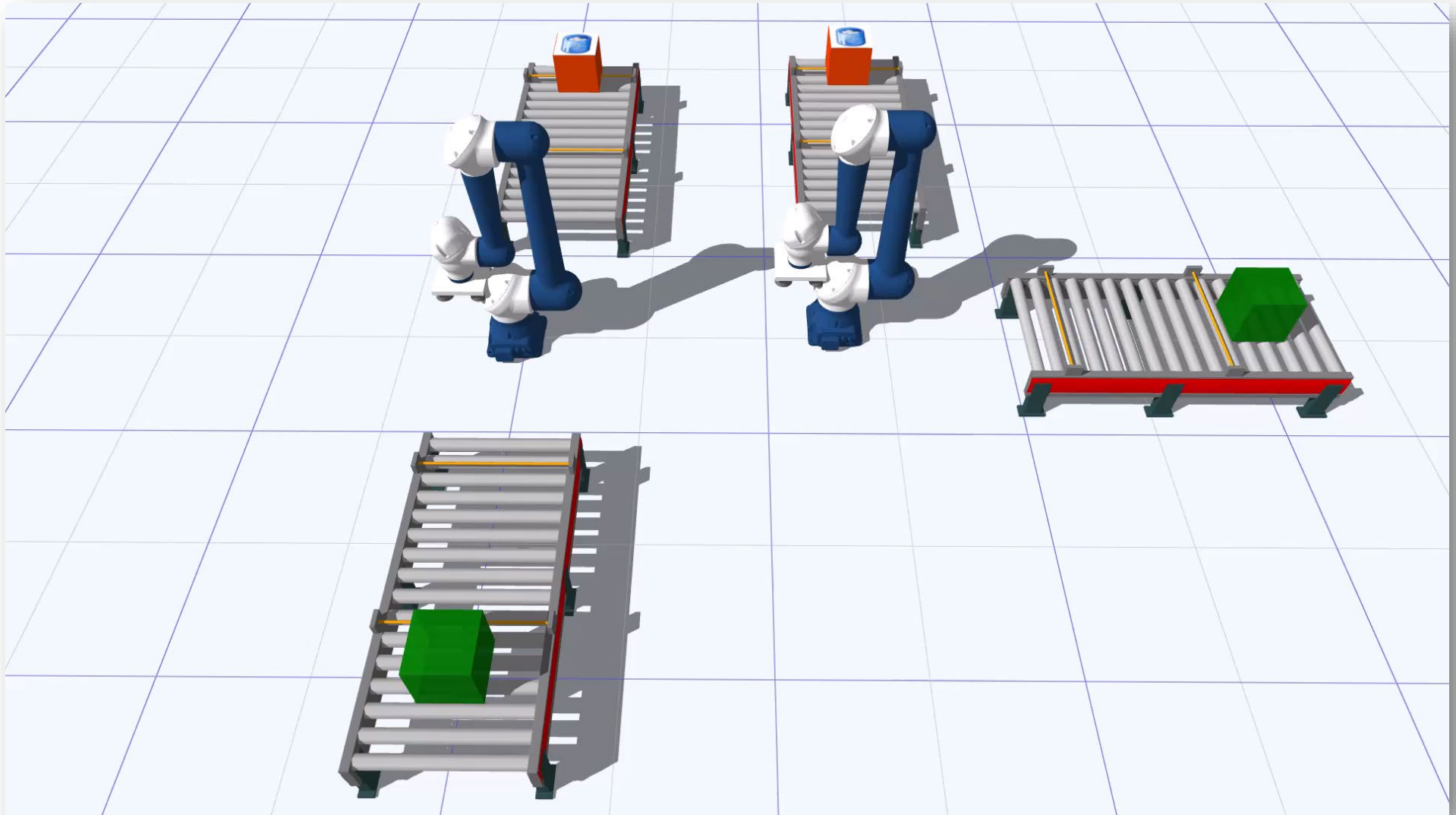
Digital Twin



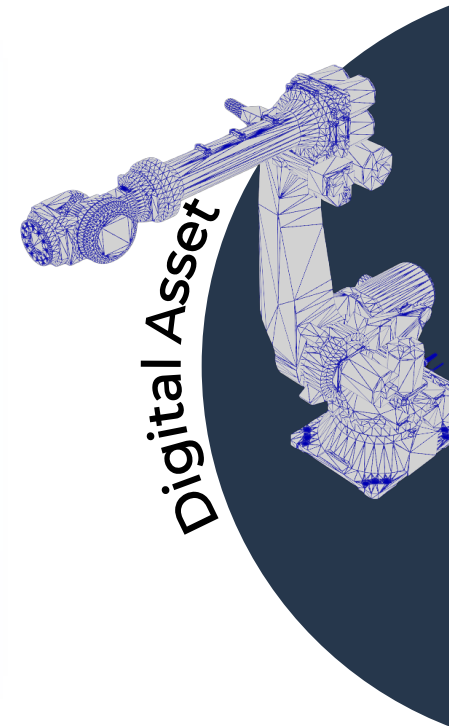
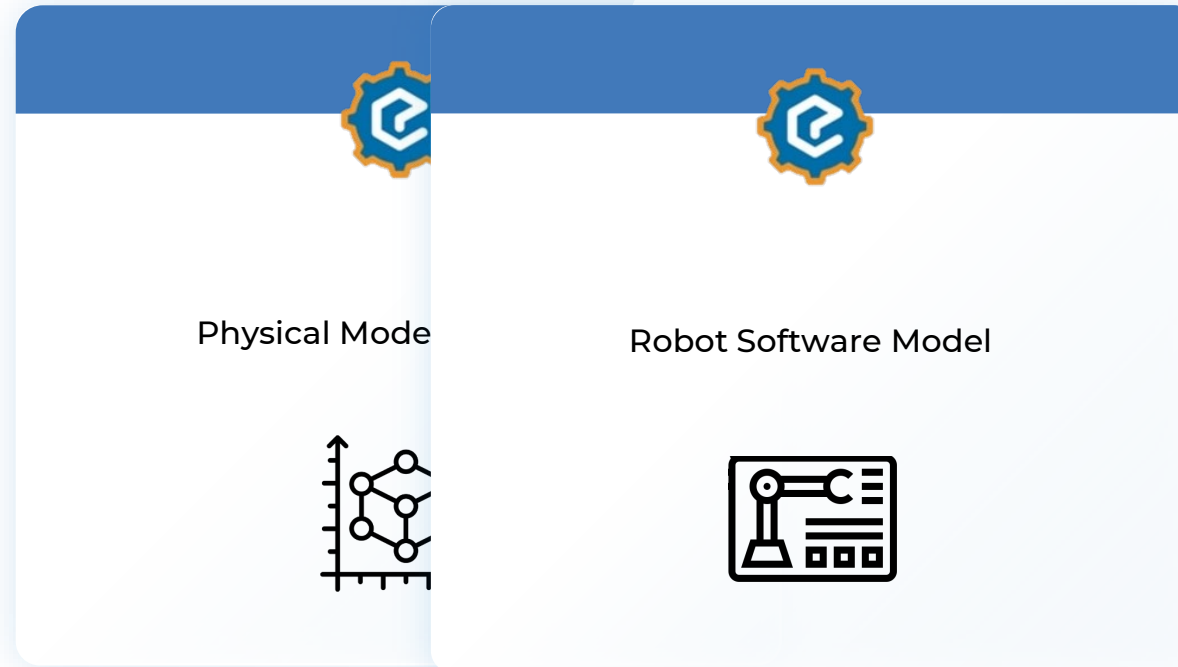
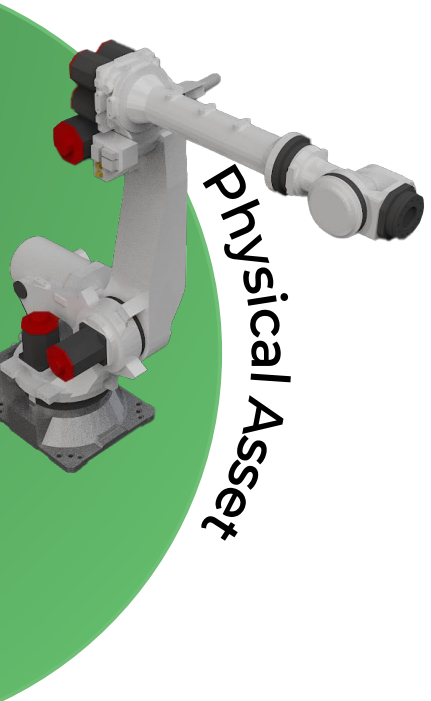
❖ Digital Twin: Case Study



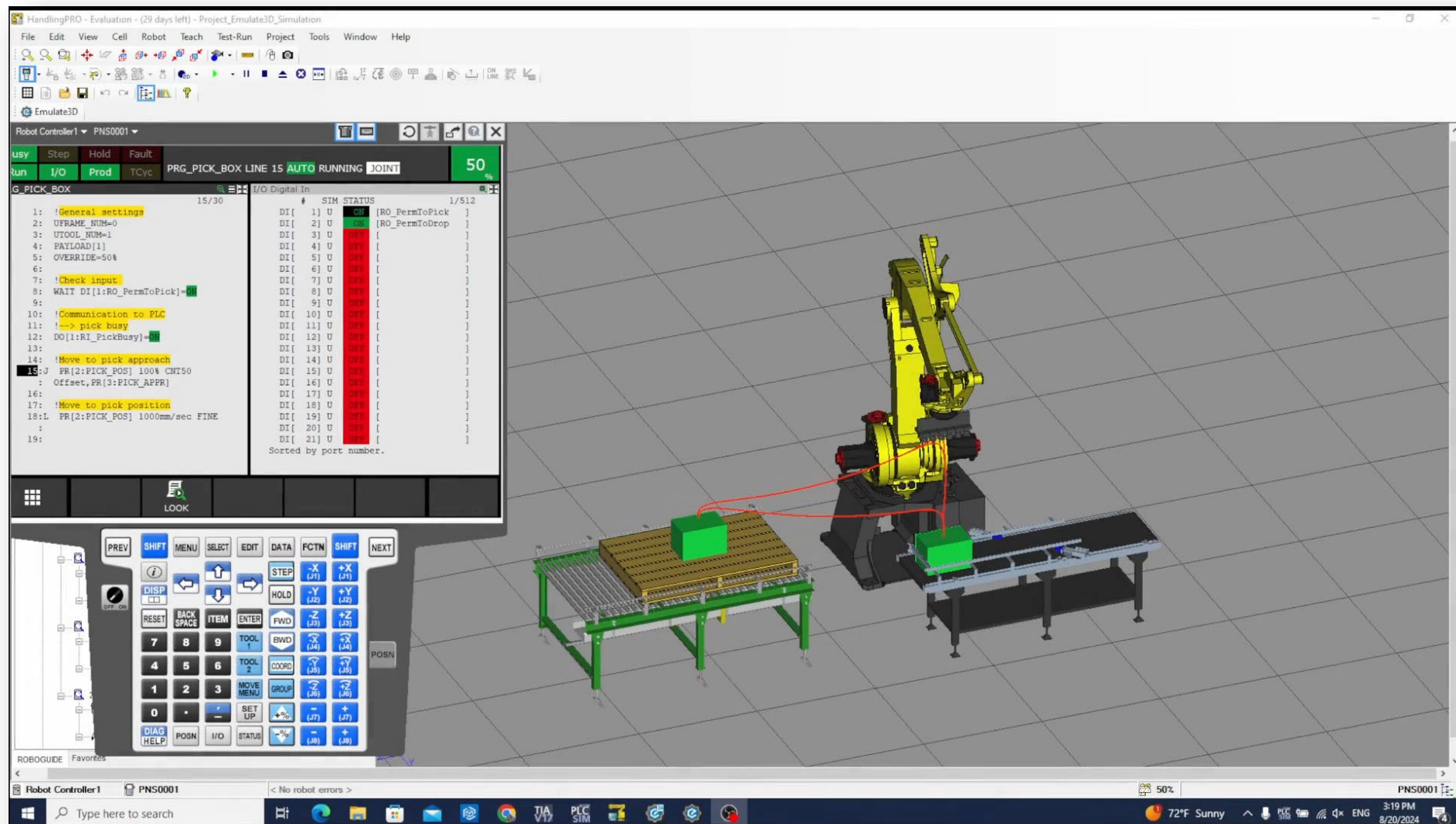
❖ Digital Twin: Case Study



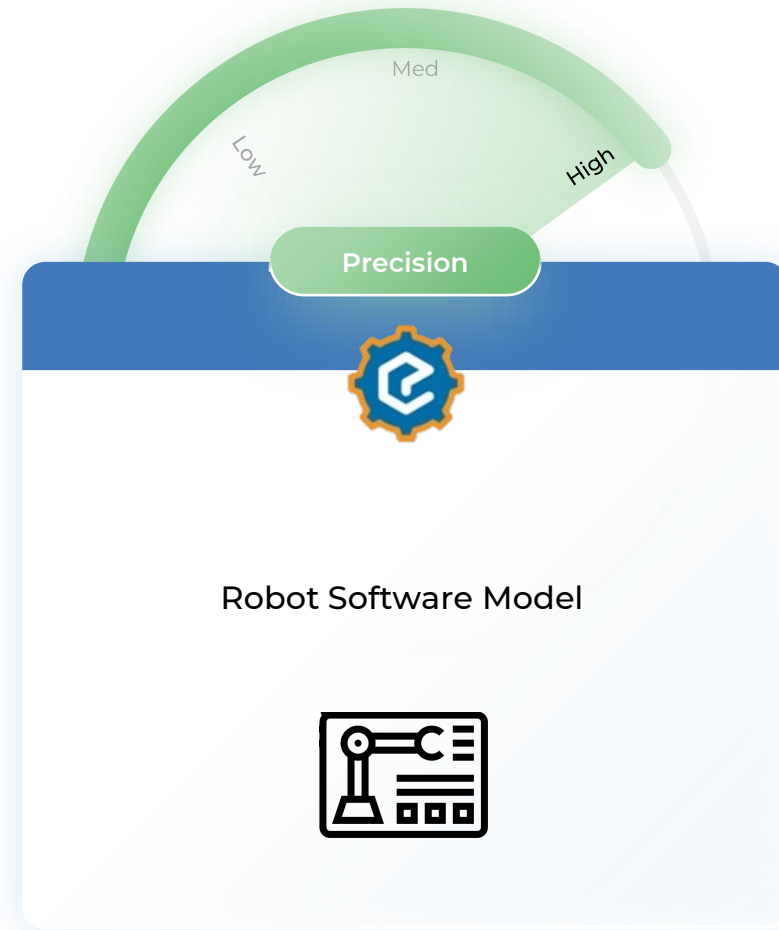
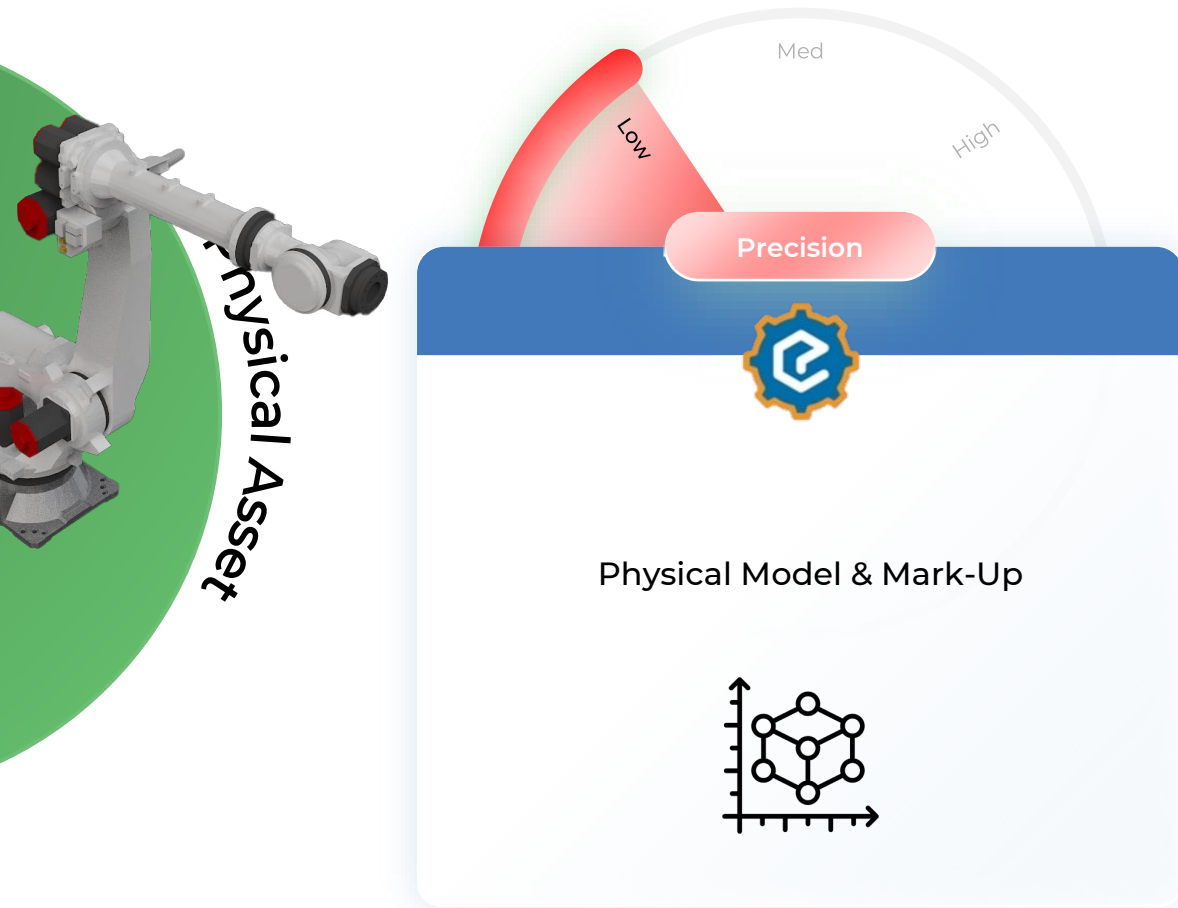
❖ Digital Twin: Case Study



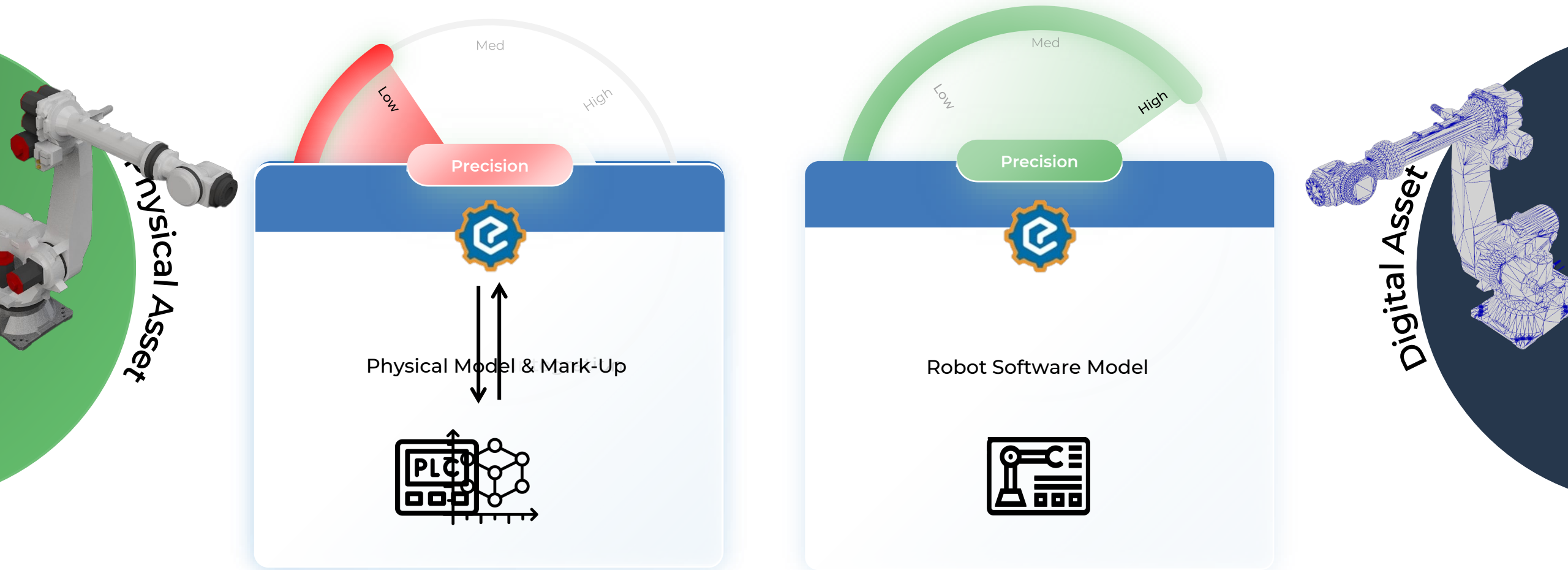
Digital Twin: Case Study



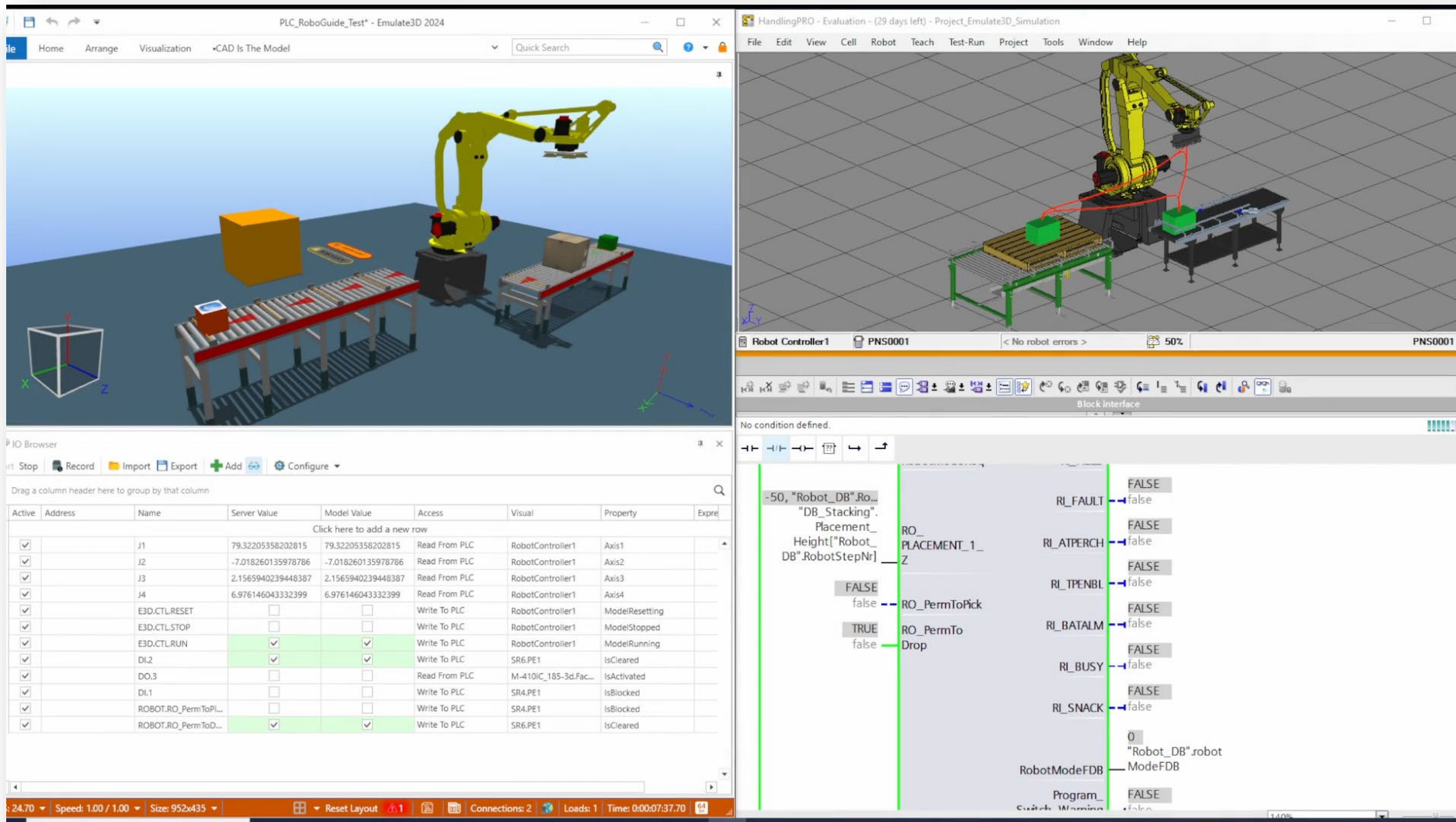
❖ Digital Twin: Case Study



❖ Digital Twin: Case Study



Digital Twin: Case Study

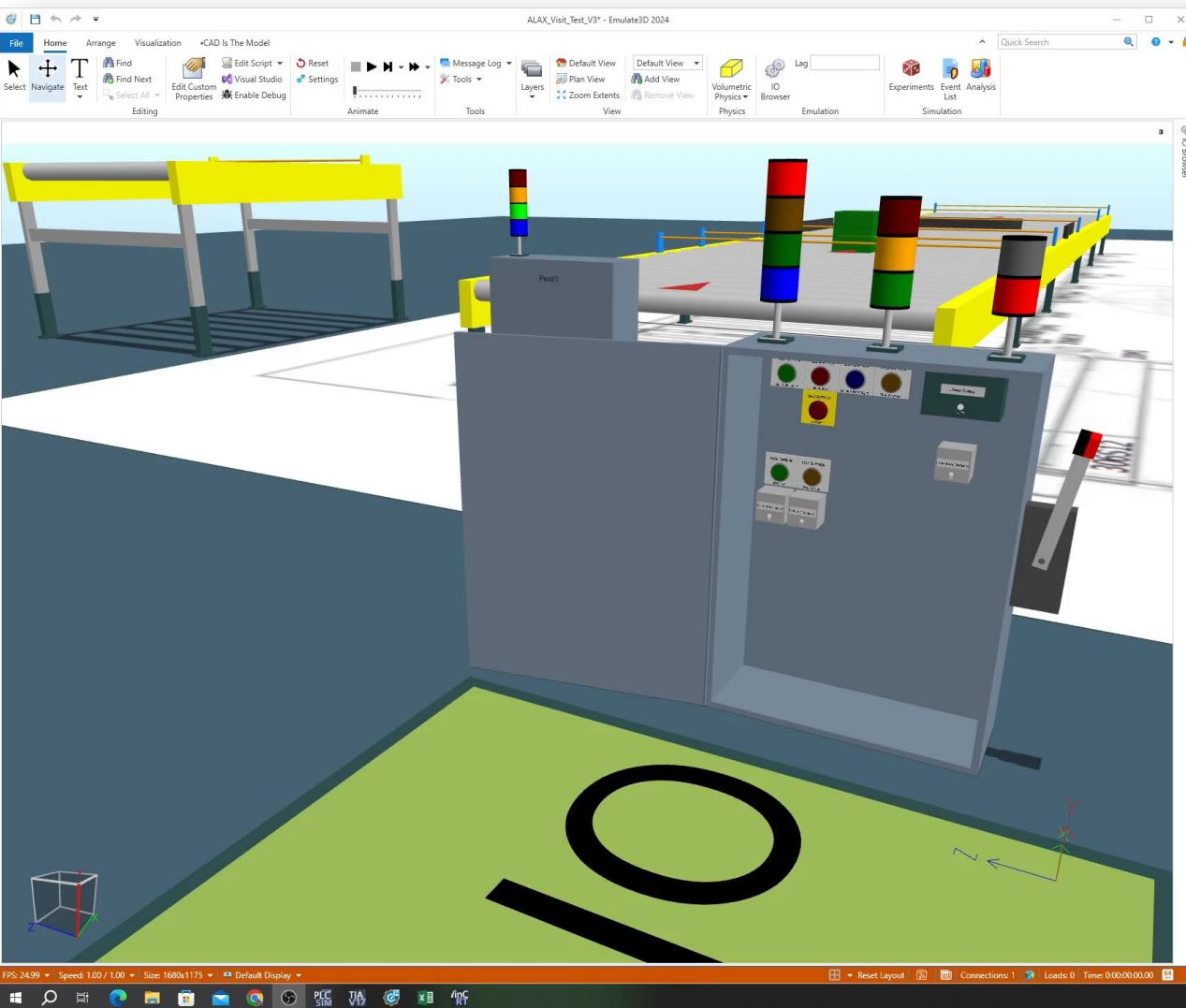


The screenshot displays the Emulate3D 2024 software interface, showing a digital twin simulation of a robotic system. The interface is divided into several sections:

- 3D Visualization:** The top-left pane shows a 3D model of a yellow robotic arm positioned over a conveyor belt system. The background is a light blue sky and grey ground.
- IO Browser:** The bottom-left pane contains a table listing the system's I/O points. The table has columns for Active, Address, Name, Server Value, Model Value, Access, Visual, Property, and Expanded. It lists various digital inputs (DI), digital outputs (DO), and robot-specific variables like E3D.CTL.RESET, E3D.CTL.STOP, E3D.CTL.RUN, and ROBOT.RQ_PermitToPick.
- Ladder Logic Diagram:** The right pane shows a ladder logic diagram for the robot controller. It includes rungs for robot status monitoring (e.g., RL_FAULT, RL_ATPERCH, RL_TPENBL, RL_BATALM, RL_BUSY, RL_SNACK) and control logic for the robot's movement (e.g., RO_PLACEMENT_1_Z, RO_PermToPick, RO_PermToDrop).

The status bar at the bottom indicates the simulation is running at a speed of 1.00 / 1.00, with a size of 952x435. It also shows the number of connections (2), loads (1), and the current time (00:07:37.70).

Digital Twin: Ongoing Project



tion



Digital Twin: Next Steps

Virtual Commissioning

Finalize the connection between the simulation environment and the robot control logic to create a fully functional model.

Digital Twin Deployment

Establish real-time communication to mirror physical behavior for testing, validation, and live system monitoring.

Conclusion

2022 —————> 2025

Faster Simulation Cycles:

Reduced simulation time by 93%,
From months to one day.



Enhanced Customer Efficiency:

Achieved 20% efficiency gains through
Continuous improvement projects

Streamlined Project Delivery:

- Accelerated timelines
- Reduced commissioning risks
- Increased solution adaptability



THIS IS NOT THE END, BUT THE BEGINNING