

Pinda Digital Twin

Scenario-based digital twin for
production planning in rolled
aluminum manufacturing

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Agenda

01 Metal Flow in Scope

02 Project Overview

03 Solution & Architecture

04 Impact & Scalability

05 Q&A

Simplified Metal Flow

Aluminum rolling operations



Executive Summary

Aluminum rolling operations for data-driven planning

The challenge

The planning team lacked the ability to perform what-if scenario analysis, resulting in limited insight into bottlenecks, constraints, and interdependencies. Decisions were primarily based on static planning approaches that did not account for system variability and operational uncertainty.

The solution

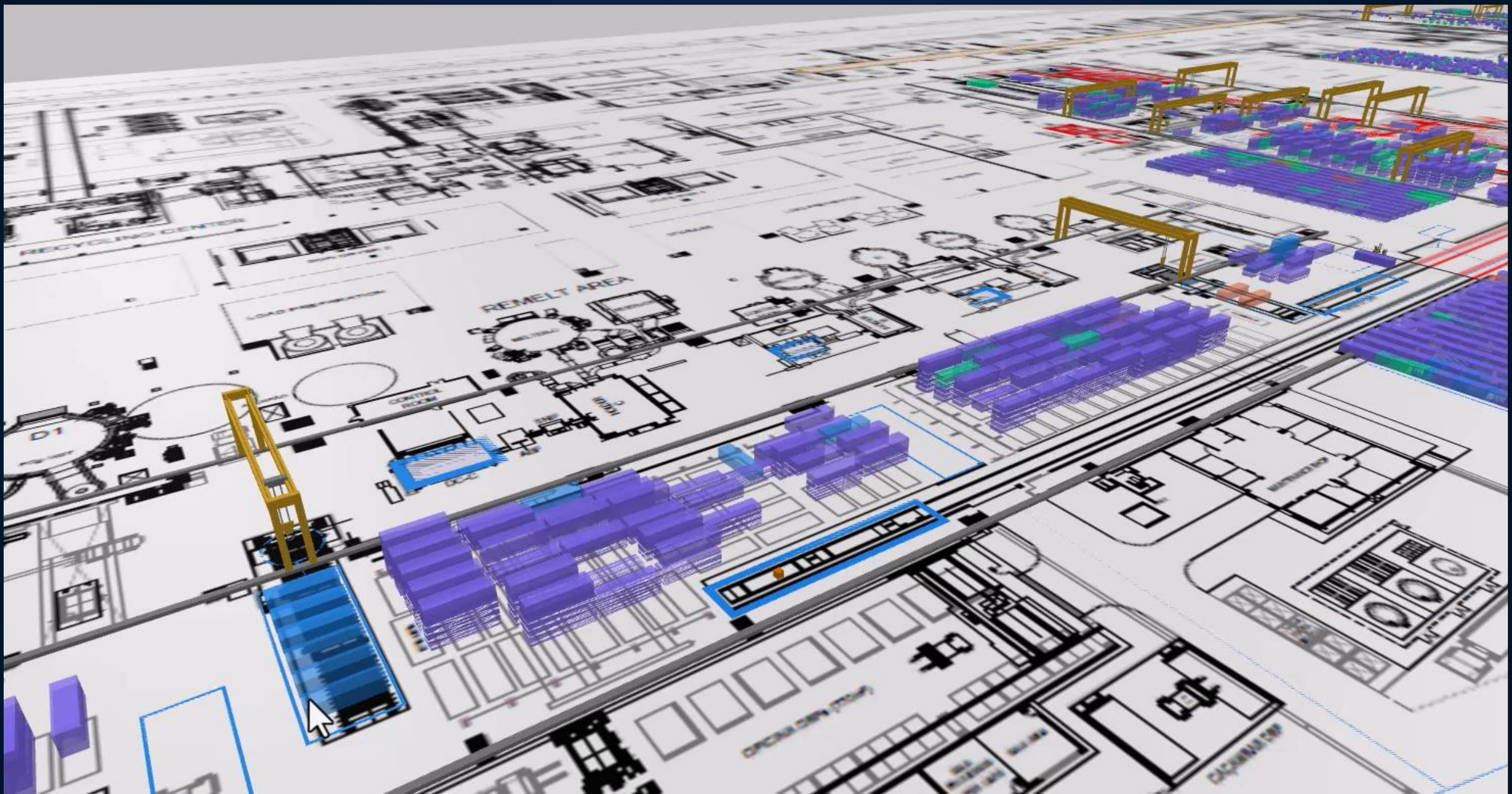
Developed an in-house digital twin spanning the full rolling value stream, from casting to finished coil, supported by a custom web application and integrated data pipelines. This enables planners to evaluate scenarios using historical production data and initiate simulations from the most recent inventory state.

In use today

Today, the platform supports production plan validation, route allocation optimization between mills, throughput target evaluation, and scenario analysis for operational disruptions, from shifting demand patterns to critical asset outage events.

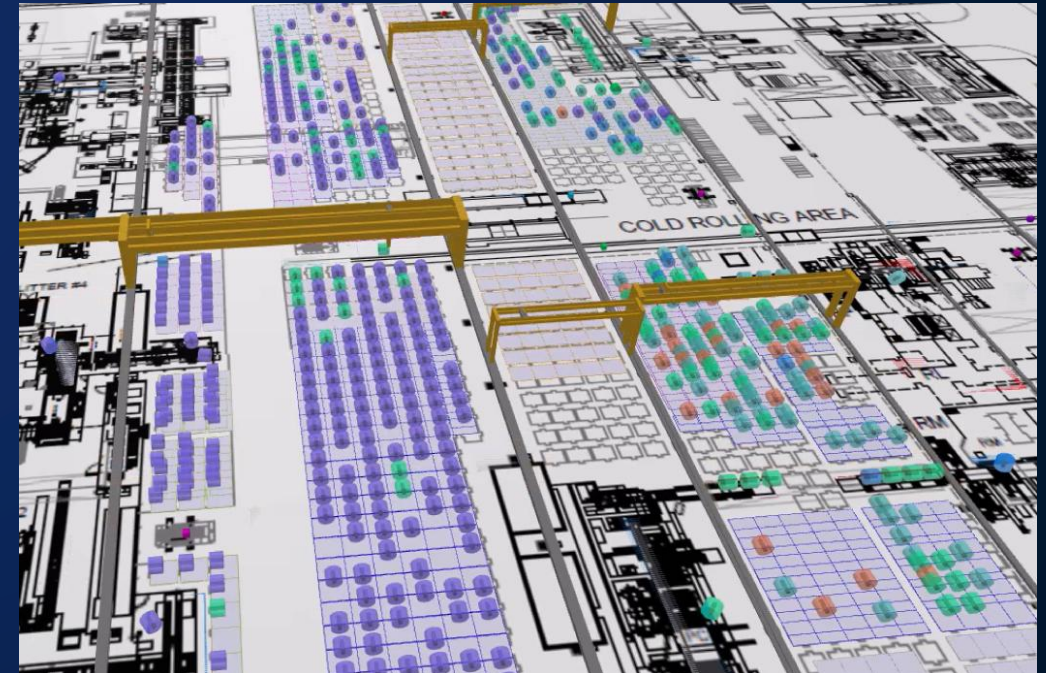
Value and scalability

The digital twin improved planning and operational decision-making by providing visibility into bottlenecks, inventory, capacity constraints, and disruption risks. It enabled faster scenario evaluation, better asset utilization, and more confident investment decisions. Built on reusable components and standardized data pipelines, the platform established a scalable foundation that can be replicated across other facilities, accelerating future deployments and increasing enterprise-wide value.

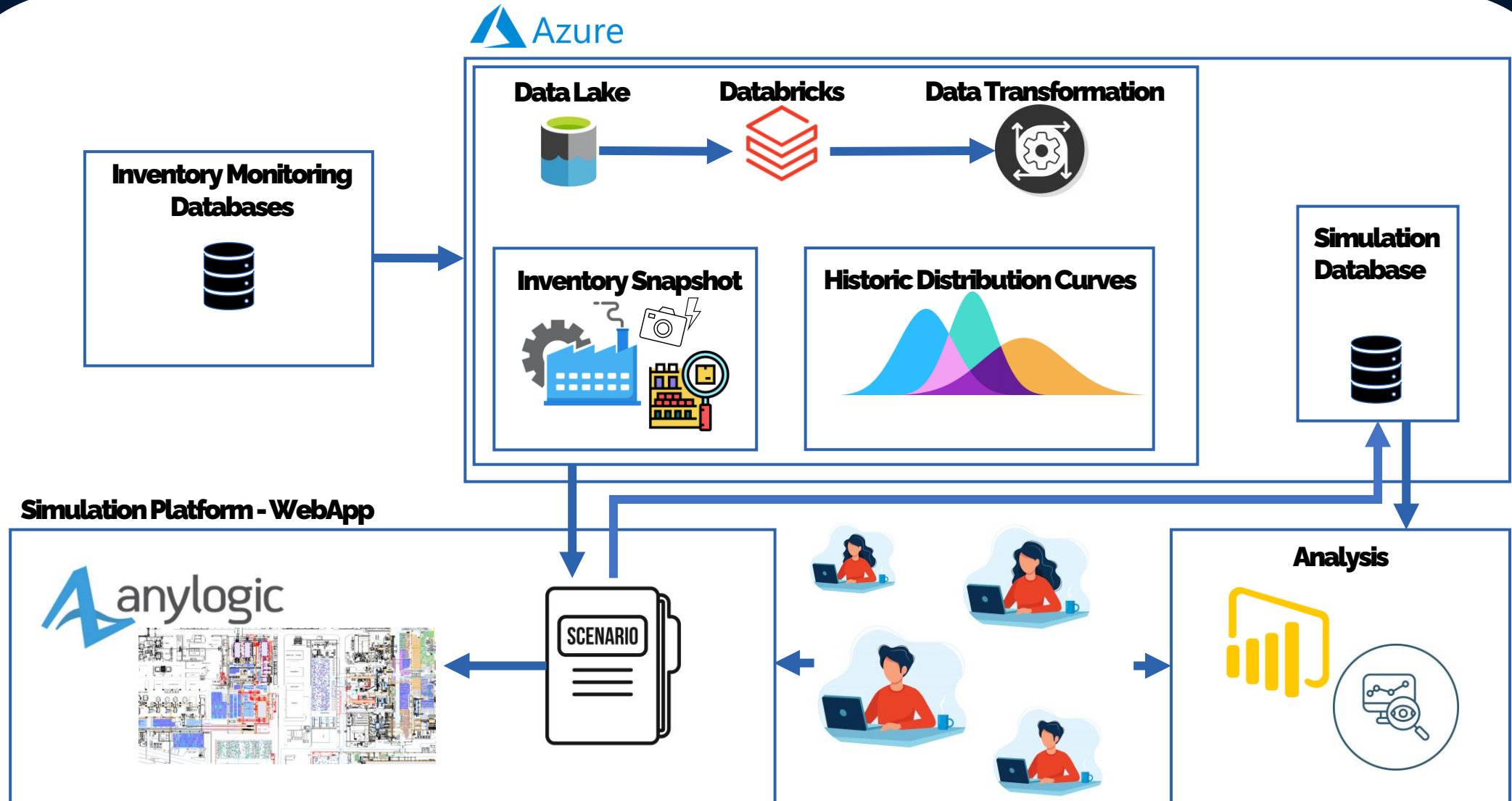


Our Solution

- Digital Twin - Near real-time simulation for better planning
- Web Interface - Streamlined workflow and easy access
- Simulation Database – Stored input scenario and output report
- Data Connectivity - Combining live plant conditions with historical trends



Pinda Twin Ecosystem Overview



User Interface

Custom Web App

- Access control
- Scenario management
- Visualize simulation or run without animation
- Several features for input configuration
 - Product routing
 - Demand profile
 - Planned/Unplanned downtimes
 - Temperature curves
 - Inventory status loading
 - Historic data loading

Impact & Scalability

Impact

- Inventory – Optimize preventive downtimes
- Capacity & CapEx – Validate gains, prioritize ROI
- Operations Readiness – Outage scenarios & risk plans
- People Development – Training via the model
- Qualitative Benefits
 - Predictability on performance and alignment between planning & operations
 - Confidence in decision making
 - Strengthen conversation between planning, operations and sales

Scalability

- Reuse framework & model components
- Agility on delivering

Thank you.

- Simulation Team:

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