Engineered for Future Factories

MAGNETO AI APS

- MAGNETO AI APS
- SOLUTION PROPOSAL
- USE CASE

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The biggest challenge in industrial production is no longer complexity, but unpredictability.

MECHANICA enhances factory efficiency, strengthens agility, and revolutionizes decision making speed with its AI powered solutions.

From production planning to quality control, from supply chain management to urgent order fulfillment, we deliver a results driven approach at every stage focused not just on data, but on outcomes.

MECHANICA

Aitech

WHY

magnetoAIaps

AI Powered Planning

It generates the most optimal plan for complex manufacturing structures in seconds.

Real Time Responsiveness

It responds to plan changes instantly and intelligently, keeping production running.

Critical Order Management

It seamlessly optimizes last-minute orders, with no disruption to operations.

With MAGNETO, production never stops, even when plans change. It's designed not for today's factories, but for tomorrow's.

Production Resource Optimization

It uses machine, labor, and material resources in the most efficient way possible.

Plug and Play Integration

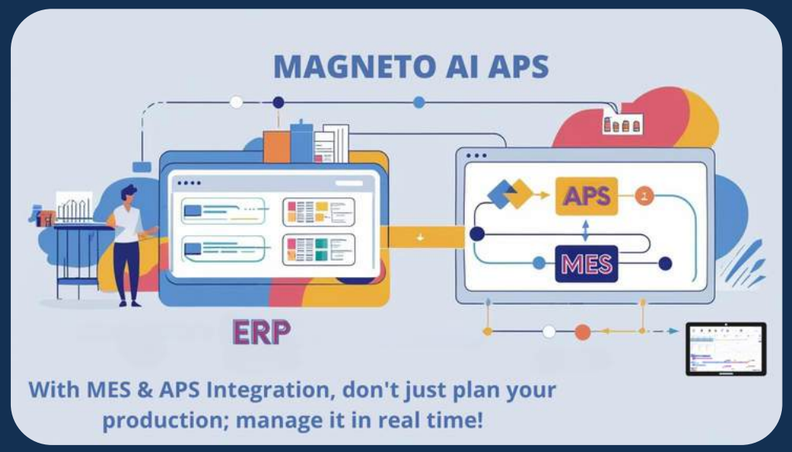
It enables rapid and trouble-free integration with ERP, IoT, MES, and other systems.

Modular and Scalable Architecture

It's designed to meet both today's requirements and future needs.

What Happens When All Systems Work in Perfect Harmony?

With the integration of ERP, IoT, MES, and MAGNETO AI APS, your entire production process transforms into a flawless symphony.
The disconnects between planning, execution, and resource management disappear; disparate data unifies, decisions accelerate, and efficiency soars.



Improvements

360 Degree Visibility

We integrate and make traceable every step, from procurement to final shipment.

Dynamic Decision Intelligence

By combining ERP order data, MES production information, and MAGNETO's AI scheduling power, it delivers an optimal production plan in seconds.

Cost Efficiency

Reduced downtime, controlled waste, and maximize production efficiency.

Production Flexibility in Crises

Manage plan changes, downtime, supply chain gaps, and urgent orders all without disrupting production.

Our philosophy: Action Over Analysis

Now you can instantly see not only what occurred, but also what action to take.

MODULES

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- **Demand and Order Management Module**
- Capacity Planning Module
- Material and Inventory Planning Module
- Scheduling Module
- Real-Time Monitoring and Feedback Module
- Scenario Analysis and Optimization Module
- Production Management with IoT, SCADA & MES Integration

+

Demand and Order Management Module

Scope:

Customer orders often reach the production line with varying delivery dates, urgent priorities, or fluctuating quantities. The purpose of this module is to accurately analyze customer demand and plan orders according to both commercial priorities and production constraints. By forecasting demand fluctuations in advance, sudden capacity bottlenecks and overstock problems are prevented. Furthermore, dynamic planning is performed for different order types (standard, custom production, export, etc.), providing flexible solutions that enhance customer satisfaction.

Technical Features:

- Automated integration of order data from ERP/MRP systems (SAP, Oracle, Microsoft Dynamics, etc.)
- AI based demand forecasting algorithms (Time series, ARIMA, Prophet, LSTM models)
- Ability to manage different planning rules such as FIFO, LIFO, customer priority, and delivery date
- Scenario based simulation support for order fluctuations

Advantages:

- Automatic prioritization of orders based on delivery date
- Early detection of risks arising from excess stock or insufficient production capacity
- Flexible, customer oriented planning

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Capacity Management Module

Scope:

The primary objective of this module is to ensure the optimal utilization of available resources in the factory, including machinery, production lines, labor, and energy. In production processes, each machine or work center operates at different speeds and efficiency levels; some machines may create bottlenecks while others remain idle. This module balances capacity across the entire factory, enabling the early identification and resolution of bottleneck points. As a result, it contributes to both the accurate planning of investments and achieving higher production volumes with existing resources.

Technical Features:

- Detailed capacity analysis: Line cycle time, machine efficiencies (OEE), labor shifts
- Automatic bottleneck detection through Constraint-Based Planning
- Forecasting the effects of capacity increases/decreases via "What-if" scenario simulations
- Heuristic optimization + MILP (Mixed Integer Linear Programming) methods

Advantages:

- Capacity utilization reports that illuminate investment plans
- Maximum efficiency in labor and machine utilization
- Early prediction of bottleneck lines

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Material Requirements Planning (MRP) Module

Scope:

The most critical component of production continuity is the timely availability of raw materials and semi-finished goods in the correct quantities. The purpose of this module is to integrate material flow with production plans, preventing downtime caused by material shortages and reducing the cost of excess inventory. Dynamic material plans are created by considering supplier lead times, minimum stock levels, and production recipes (BOMs). As a result, production lines do not wait for materials, and capital tied up in inventory is minimized.

Technical Features:

- MRP (Material Requirements Planning) algorithms + AI-powered stock optimization
- Planning that considers material shortages, supplier lead times, and minimum stock levels
- Real-time synchronization with stock levels via ERP integration
- ABC/XYZ classification, safety stock optimization

Advantages:

- Prevention of production downtime caused by material shortages
- Minimization of excess inventory costs
- Continuous flow production aligned with the supply chain

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Advanced Planning and Scheduling (APS) Module

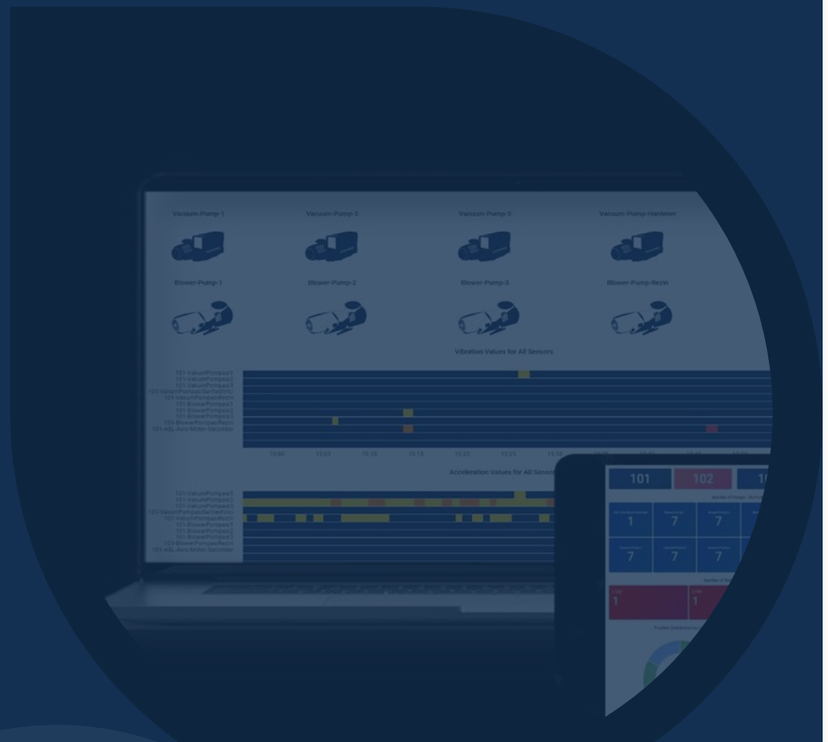
Scope:
Determining the sequence of production orders, along with which machine and time slot they will be processed in, is a complex optimization problem. The purpose of this module is to organize the production flow in the most efficient sequence, taking all constraints into account. Job sequences are optimized by considering setup times, maintenance needs, operator availability, and process dependencies. As a result, unnecessary waiting in production lines is prevented, delivery dates are secured, and customer demands are responded to more quickly.

Technical Features:

- Gantt chart based visual scheduling
- Constraint based job sequencing (e.g., machine setup times, operation dependencies)
- AI algorithms: Genetic algorithms, tabu search, artificial neural networks
- Dynamic rescheduling: Automatic updates in case of order changes or machine breakdowns

Advantages:

- 20–30% reduction in setup/adjustment times
- Shorter production cycle times
- Real time, flexible, and adaptive scheduling



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Real-Time Monitoring and Feedback Module

Scope:

The variance between planned and actual production is a critical performance indicator for businesses. The purpose of this module is to continuously compare planned versus actual performance by collecting real-time data from the shop floor. When machine failures, quality issues, or unexpected stoppages occur, the system instantly issues alerts and triggers plan updates. This enables management to intervene in real-time, rather than learning about delays only from reports. Furthermore, the data collected provides direct input for continuous improvement initiatives.

Technical Features:

- Real-time machine/line data collection via IoT sensors and MES integration
- Real-time KPI monitoring: OEE, production counts, scrap rates
- AI-based anomaly detection (unexpected stoppages, quality issues)
- Dashboard + mobile notification infrastructure

Advantages:

- Real time monitoring of production performance
- Rapid resolution of delays between planning and operations
- Data driven continuous improvement culture

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Scenario Analysis and Optimization Module

Scope:

In the world of manufacturing, unexpected changes always occur: new customer orders, urgent jobs, machine breakdowns, or supply delays. The purpose of this module is to objectively demonstrate which plan offers the optimal solution by generating alternative scenarios, and to provide decision support to management. Different scenarios are compared in terms of cost, delivery time, and resource utilization. As a result, the enterprise becomes prepared for potential crises and selects the plan that ensures the highest customer satisfaction at the lowest cost.

Technical Features:

- Multi-objective optimization (Cost, time, energy consumption)
- Monte Carlo simulation, heuristic algorithms, and AI-powered decision support systems
- Comparison of different customer orders, shift patterns, and capacity increase scenarios
- Reporting and visual comparison dashboards

Advantages:

- Strategic decision support for management
- Rapid generation of the optimal plan during crises
- Higher customer satisfaction at lower cost

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Production Management with IoT, SCADA & MES Integration

Scope:

In factories, production planning is often executed based on limited information, leading to significant discrepancies between planned and actual outcomes.

Through the integration of IoT, SCADA, and MES, the objective is to enable real-time data from the shop floor to flow directly into the planning system, ensuring that plans remain dynamic, flexible, and constantly up to date.

Thus, production automation not only manages machinery but also becomes an ecosystem directly fueled by planning decisions.

Technical Features:

- IoT Sensor Integration: Collection of real-time data such as machine status, energy consumption, temperature, vibration, and speed.
- Data Exchange with SCADA Systems: Transfer of process control data (pressure, flow, temperature, process parameters) to the planning system.
- Bidirectional Connection with MES:
  - Order from ERP → MAGNETO APS creates a plan → MES dispatches it to the shop floor.
  - Actual production data from the shop floor (production count, scrap, downtime) → updates the APS plan via feedback.
- Real-Time Schedule Updates: Automatic re-optimization of the plan in case of machine failure, quality deviation, or material delay.
- API & OPC UA Based Communication: Industrial standard protocols enabling compatibility with machines of different brands/versions.
- Real-Time KPI Monitoring: Continuous tracking of metrics such as OEE, productivity, capacity utilization, and delivery reliability.

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Advantages:

- Uninterrupted Production: Machine downtime, maintenance, and failure events are instantly reflected in plans, minimizing production losses.
- Real-Time Decision Making: Planning is based not on forecasts alone, but on real-time data from the shop floor.
- High Resource Utilization: Capacity, energy, and workforce planning are executed in a more balanced manner.
- Customer Satisfaction: Reliability of delivery times increases, and urgent orders are responded to more quickly.
- Operational Transparency: Management can monitor all factory operations from a single screen, comparing planned versus actual performance.
- A Step in Digital Transformation: The integration of IoT, SCADA, MES, and APS enables the full implementation of Industry 4.0.

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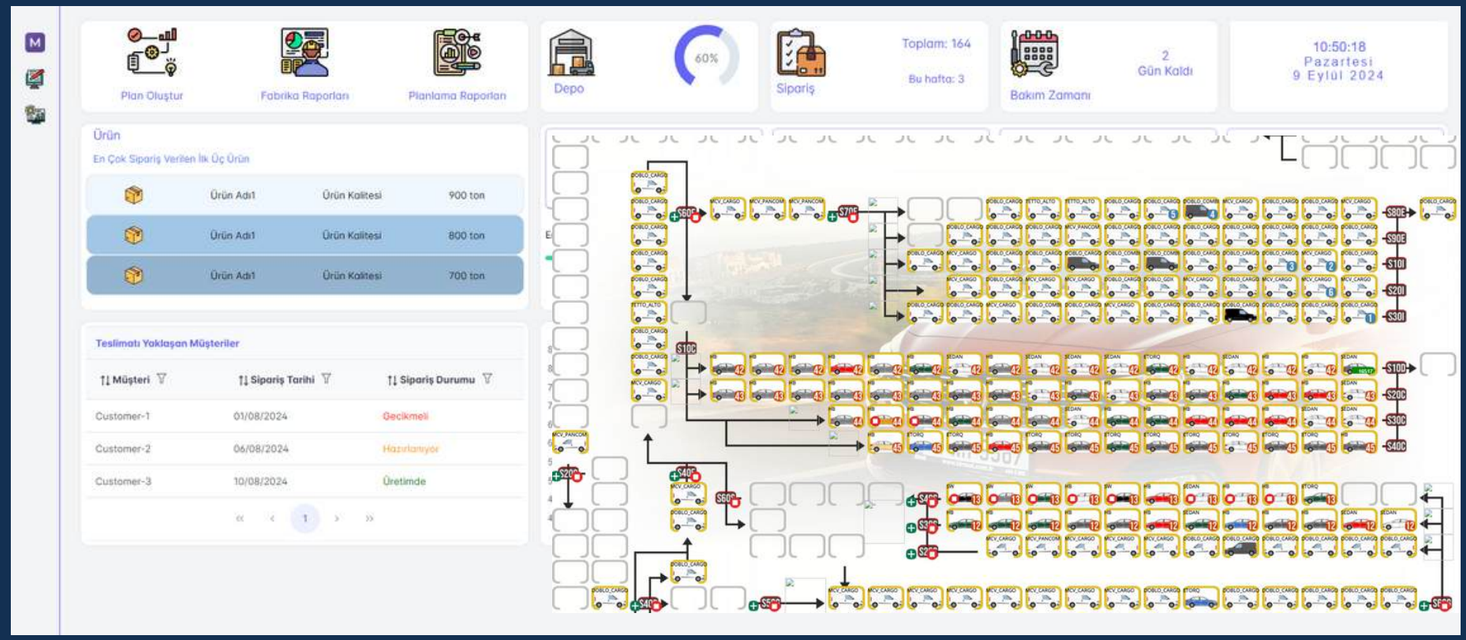

Use Case

Problems Experienced

- Hundreds of different dies and product types
- Limited die and machine capacity
- Frequent changes in OEM orders
- Impact of setup times on scheduling
- Overtime and unplanned downtime
- Personnel skill limitations

MAGNETO AI APS Modules Deployed

- AI-powered scheduling engine
- Mold & machine matching optimization
- Setup time and line balancing optimization
- Order deadline prioritization
- Overtime control module
- Automatic rescheduling

Corporate Overview

Industry: Automotive and Aerospace Sub-Industry
Product Group: Plastic and metal injection molded part production
Production Structure: A manufacturing facility that performs high-volume, multi-mold, multi-route production, includes manual assembly stations, and executes production based on specific customer orders.

- Planning Time Reduced by 90%
- Setup Times Decreased by 35%
- OEM Delivery Compliance Rate Increased to 96%
- Downtime Reduced by 25%
- Overtime Costs Cut by 22%
- Response to Plan Changes Within 3 Minutes

The Transformation After Half a Year

Use Case

Problems Experienced

- Complex manufacturing structure and variable OEM orders
- Production line and capacity balancing problems
- Effects of setup and model transition times
- Supply chain and inventory inconsistencies
- Workforce and shift scheduling challenges

MAGNETO AI APS Modules Deployed

- Advanced Production Planning (APP)
- AI-Based Scheduling & Sequencing
- Capacity & Constraint Management
- Setup Time Optimization
- Real-Time Rescheduling Engine
- Maintenance & Downtime Prediction
- Material & Inventory Synchronization
- Workforce & Shift Planning
- Performance Analytics (OEE Monitoring)
- Scenario Simulation & What-If Analysis

Corporate Overview

Industry: Automotive Main Industry (OEM)
Product Group: Passenger and Commercial Vehicle Manufacturing
Production Structure: A manufacturing facility that produces passenger and commercial vehicles through high volume, multi mold, multi route production incorporating robotic welding and manual assembly stations.

- Planning Time ↓ 92%
- Setup Times ↓ 33%
- OEM Delivery Compliance ↑ 97%
- Downtime ↓ 27%
- Overtime Costs ↓ 24%
- Production Throughput ↑ 18%
- Inventory Turnover Rate ↑ 21%
- Response to Plan Changes < 2 Minutes
- Resource Utilization ↑ 15%
- On-Time Maintenance Compliance ↑ 99%

The Transformation After Half a Year

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What We Offer for Factories: Advanced planning and optimization solutions

MAGNETO, the advanced production scheduling software, empowers businesses with a strong digital competitive edge by transforming manufacturing processes into smarter, more efficient, flexible, and sustainable operations.

Benefits!

- Up to 27% Gain in Manufacturing Productivity
- More Cost Efficient Operations
- Faster Delivery
- Minimum Downtime and Manpower Loss

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