CASE STUDY 02

AI for Precision Machining & Automotive Component Manufacturing

Automotive Components / Precision Engineering

Predictive AI | Computer Vision | Machine Telemetry

Business Challenge

A precision component manufacturer operates CNC, grinding and machining lines producing components with extremely tight quality tolerances. Traditional PLC and SCADA systems provide machine status but can miss subtle problems such as cutting-tool degradation, abnormal vibration, micro-chatter, surface-quality deterioration, gradual dimensional drift and unexpected machine downtime.

Solution

A zero-intrusion industrial AI layer operates alongside existing PLC/SCADA infrastructure without modifying critical machine-control logic, combining external vibration sensors, read-only spindle load/torque data, edge computing, AI anomaly detection, computer vision inspection, tool remaining-useful-life estimation, and OEE/production analytics.

- Predictive Tool-Wear Monitoring - identifies degradation patterns and estimates replacement timing
- Micro-Chatter Detection - high-frequency vibration analysis identifies instability early
- Automated Visual Inspection - cameras inspect for scratches, burrs, cracks, coating defects
- Production Intelligence Command Center - cycle times, downtime, utilization, bottlenecks

Solution Flow

Business Value

The architecture is designed to reduce scrap, improve tool utilization, improve production visibility and introduce predictive intelligence without replacing the manufacturer's existing CNC, PLC or SCADA infrastructure.

TECHNOLOGY

Edge AI, Machine Learning, Computer Vision, IoT Sensors, OPC-UA/Industrial Protocols, Time-Series Analytics, BI Dashboard