CASE STUDY

Voestalpine is a globally recognized steel manufacturing company that provides high-quality steel products for industries such as automotive, railway, aerospace, and energy. Operating multiple manufacturing plants worldwide, Voestalpine focuses on innovation, efficiency, and sustainability to maintain its competitive edge in the industry. To enhance the reliability and longevity of its machinery, the company sought a solution for preventive maintenance.

voestalpine
ONE STEP AHEAD.

The Organisation

Voestalpine is a globally leading steel and technology group with a unique combination of materials and processing expertise. voestalpine, which operates globally, has around 500 Group companies and locations in more than 50 countries on all five continents.

Industry

Steel Manufacturing

Region

50 Countries

Employees

51,600 Employees

Requirement

Voestalpine required a robust preventive maintenance system to enhance machine longevity, reduce downtime, and optimize operational efficiency. They needed a role-based dashboard with real-time IoT data to monitor machine performance, schedule maintenance, and prevent equipment degradation, ultimately lowering costs and improving productivity.

50
Countries

51,600
Employees

500
Locations

16.7 Billion
2023 - 24 Earning

Challenges

01 Unplanned machinery breakdowns, leading to production delays and increased operational costs.

02 Lack of a structured maintenance tracking system, resulting in reactive rather than proactive servicing.

03 Poor visibility into the performance and health of machines across multiple manufacturing plants.

04 High maintenance costs due to unexpected failures and emergency repairs & Inefficient allocation of maintenance resources, leading to underutilization or overuse of critical equipment.

05 No centralized system to monitor machine efficiency, lifespan, and overall performance

Solution

- IoT-Based Preventive Maintenance System: Implemented an IoT-driven system that collects real-time data from machinery sensors to predict potential failures before they occur.
- Cost Reduction through Predictive Analytics: Leveraged predictive analytics to reduce emergency repairs and operational costs by anticipating potential breakdowns before they happen.
- Custom Dashboards for Performance Monitoring: Developed interactive dashboards for different roles, including maintenance managers, engineers, and plant supervisors, to monitor machine health, efficiency, and lifespan.
- Automated Maintenance Scheduling: Created a system that schedules maintenance activities based on real-time data, usage patterns, and historical performance, reducing unplanned downtimes.
- Machine Life Cycle Optimization: Analyzed machine wear and tear data to determine optimal maintenance intervals, extending the lifespan of machinery and improving overall plant efficiency
- Centralized Data Management: Integrated a cloud-based data storage system to track machine performance trends across multiple locations, enabling data-driven decision-making.

Impact

Reduced Downtime: The proactive maintenance approach minimized unplanned breakdowns, ensuring continuous production and improved efficiency.

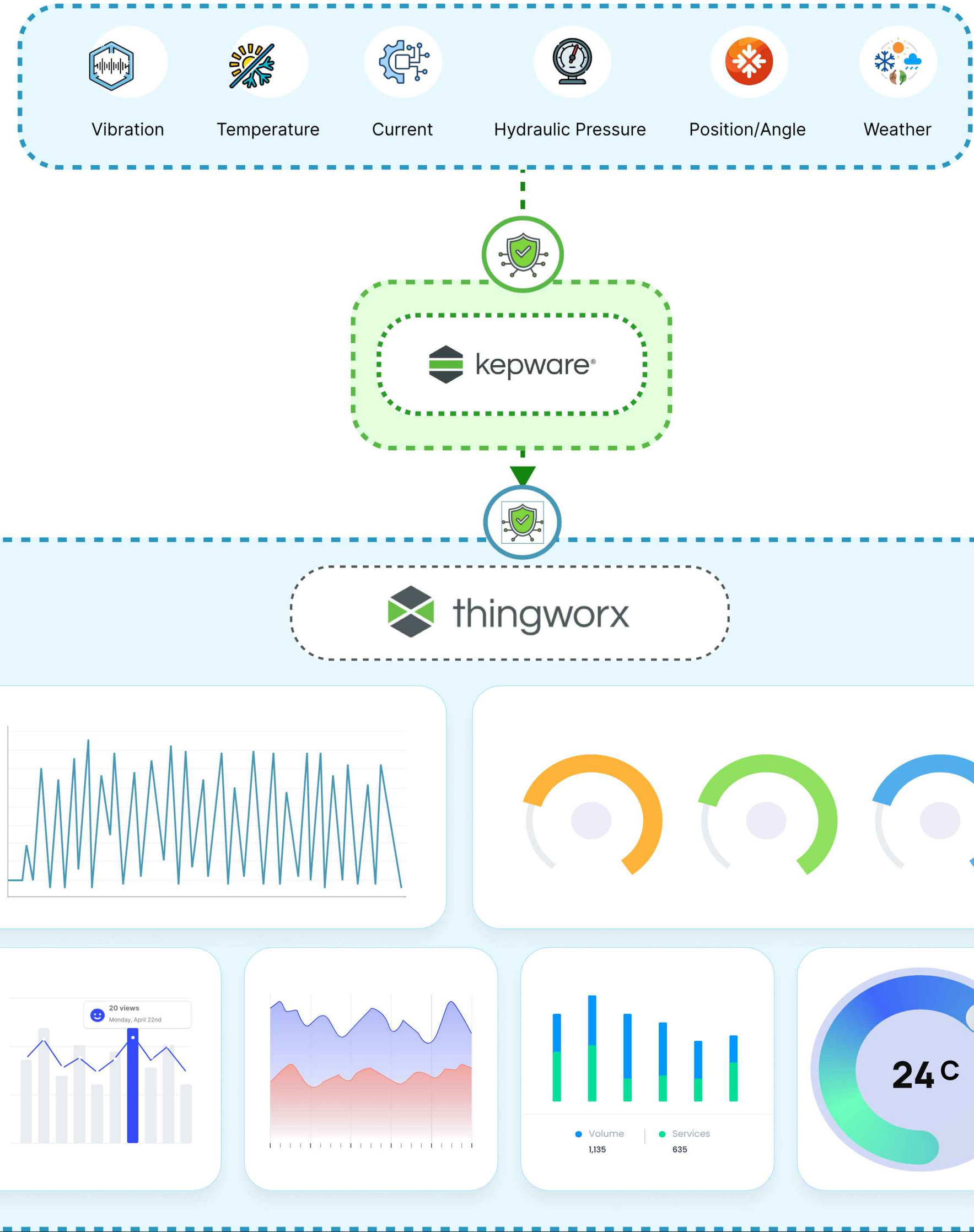
Enhanced Machine Lifespan: Regular, data-driven maintenance extended the operational life of machines, reducing the need for frequent replacements.

Optimized Maintenance Scheduling: Automated scheduling reduced manual effort and improved resource utilization, leading to cost savings

Improved Cost Efficiency: Reduced emergency repairs and extended machine lifespan contributed to lower overall maintenance costs.

Increased Production Efficiency: Machines operating at optimal performance levels led to higher productivity and reduced cycle times

Better Decision-Making: Real-time dashboards provided management with actionable insights, allowing for strategic planning and resource allocation



IoT based Preventive Maintenance

The IoT-based Preventive Maintenance Architecture for Voestalpine’s steel cutting machines is designed to continuously monitor machine health, predict failures, and optimize maintenance schedules using real-time data analytics. The architecture integrates industrial IoT sensors, connectivity protocols, data processing platforms, and AI-driven predictive analytics to ensure seamless machine performance and efficiency.

Key Components & Workflow

Data Collection (Edge Layer - IoT Sensors & Devices)

- Various IoT-enabled sensors (vibration, temperature, current, lubrication, pressure) are installed on steel cutting machines.
- These sensors capture critical machine parameters such as blade wear, motor temperature, power consumption, and hydraulic pressure.
- The raw data is continuously generated and transmitted for processing.

Data Aggregation & Connectivity (Industrial Gateway - Kepware)

- Kepware acts as an industrial connectivity layer, collecting sensor data using OPC UA, Modbus, or MQTT protocols.
- It standardizes and securely transmits the data to the cloud or local edge computing system
- The system ensures real-time data flow and seamless communication between legacy industrial equipment and modern IoT platforms.

Data Processing & Predictive Analytics (IoT Cloud Platform - ThingWorx)

- The sensor data is ingested into ThingWorx, where AI-driven predictive analytics models process the information.
- Real-time dashboards display machine health metrics, performance trends, and alerts.
- Anomaly detection algorithms identify early warning signs of potential failures.
- Predictive maintenance scheduling is automatically generated based on sensor insights and historical data patterns.

Visualization & Monitoring (Dashboard & Alerts System)

- A role-based dashboard provides different views for operators, supervisors, and maintenance teams.
- Live machine status, efficiency heatmaps, and predictive failure trends are displayed for real-time decision-making.
- Automated notifications and alerts are triggered when a machine shows early signs of deterioration, allowing preemptive maintenance.

Action & Maintenance Execution (Maintenance Team & ERP Integration)

- The system integrates with ERP and CMMS (Computerized Maintenance Management System) to schedule maintenance tasks.
- Maintenance teams receive automated work orders and alerts, reducing downtime.
- After servicing, updated machine data is fed back into the system for continuous learning and improvement

Benefits of the IoT Architecture

1. ✅ **Minimized Downtime**
   Detects machine issues before they cause unexpected failures
2. ✅ **Optimized Maintenance**
   Predictive insights allow for planned maintenance, reducing emergency repairs.
3. ✅ **Increased Machine Longevity**
   Predictive insights allow for planned maintenance, reducing emergency repairs.
4. ✅ **Cost Savings**
   Reduced repair costs and lower production losses due to breakdowns.
5. ✅ **Improved Productivity**
   Reduced repair costs and lower production losses due to breakdowns.
6. ✅ **Real-Time Decision Making**
   Live dashboards help management make informed operational choices.

Conclusion

The IoT-Based Preventive Maintenance System enables Voestalpine to achieve predictive maintenance precision, cost-efficient operations, and extended machine life for its steel cutting machines. By integrating Kepware for industrial connectivity and ThingWorx for IoT analytics, the architecture ensures seamless monitoring, proactive issue detection, and intelligent maintenance execution, transforming the steel manufacturing process for enhanced reliability and efficiency. 🚀

About **TROOLOGY**

TROOLOGY, an ISO/IEC 27001:2013, ISO 9001:2015 & CMMI 3 certified organization, is a group started by young, dynamic and experienced professionals in the field of Information Technology & Allied Services. We strive to deliver the technologically driven values to your business process and streamlining the organization-wide processes.

With substantial experience in delivering small, medium & large scale Websites, Web-based Applications, Mobile Applications, eGovernance Consulting, Industrial Solutions, TROOLOGY has set a benchmark in its field with its quality and service-oriented approach for its esteemed clients.

TROOLOGY
TECHNOLOGIES

TROOLOGY
www.troology.com

Call Us
+91 99189 00409

Mail Us
info@troology.com