Tecblic

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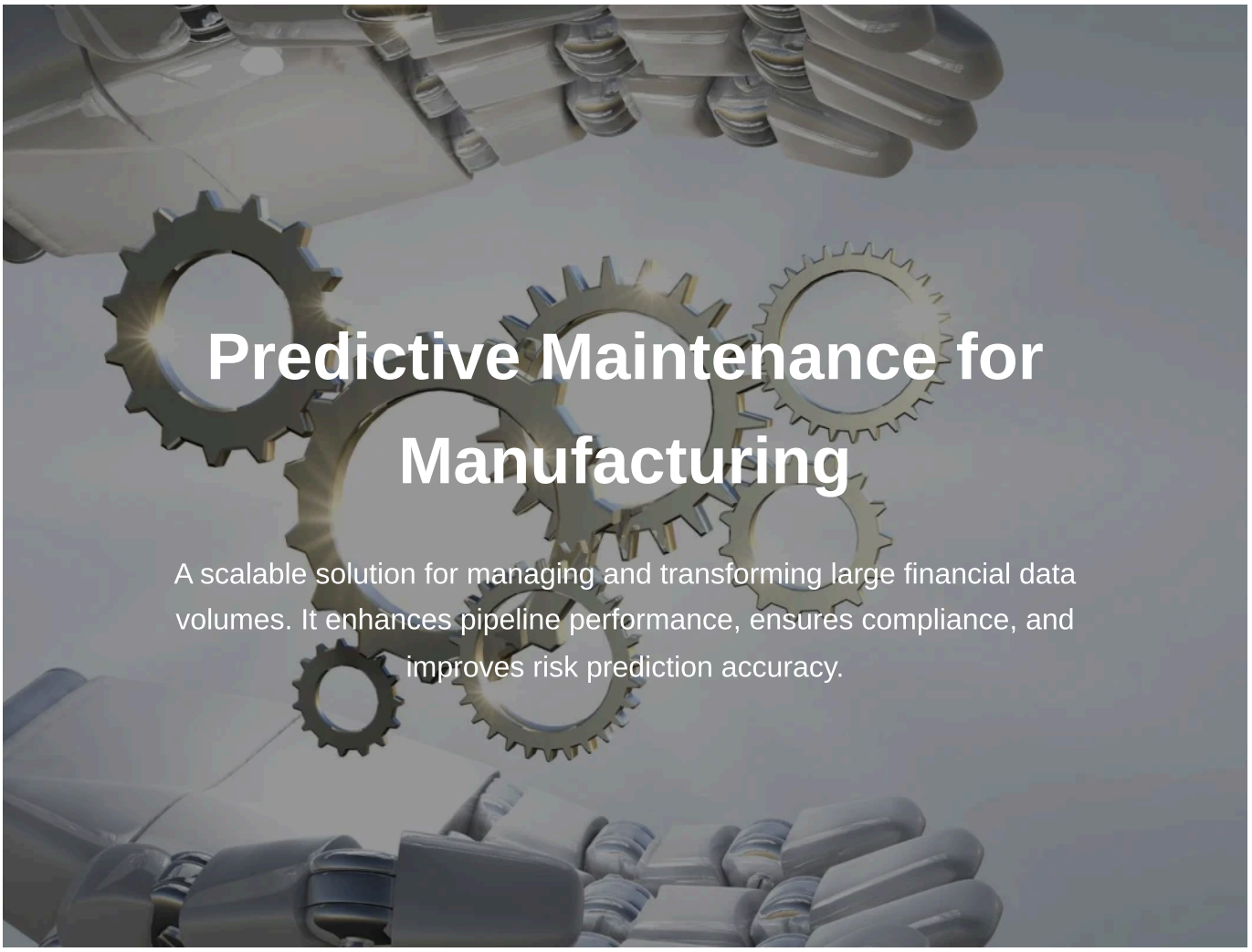

Predictive Maintenance for Manufacturing

Background

Manufacturing companies often face unexpected equipment failures, leading to costly downtime and operational inefficiencies. Traditional maintenance approaches, such as scheduled or reactive maintenance, are not always effective in preventing breakdowns. To address this issue, our team developed a predictive maintenance solution that leverages IoT technology and advanced analytics to forecast equipment failures before they occur. This solution helps optimize maintenance schedules, reduce costs, and improve overall equipment efficiency.

Key Challenges

Unreliable Maintenance Schedules, routine maintenance schedules were either too frequent, leading to unnecessary downtime, or too infrequent, resulting in unexpected failures. Data Collection Complexity in gathering real-time data from multiple IoT sensors across different

machines was challenging due to connectivity issues and data inconsistencies. Large-Scale Data Processing, massive amounts of real-time sensor data required a scalable and efficient data infrastructure. Predictive Accuracy, ensuring the predictive model accurately forecasts equipment failures, was crucial to gaining trust from stakeholders.

Our Solution

Our team designed a predictive maintenance solution that integrates IoT sensors, real-time data processing, and advanced analytics to optimize maintenance activities. Data Collection Strategy established a structured approach for collecting data from IoT sensors installed on manufacturing equipment. These sensors continuously monitored key parameters such as temperature, vibration, and pressure. Real-Time Data Processing using Azure IoT Hub and Azure Databricks, we built data pipelines that could ingest, clean, and analyze large volumes of real-time sensor data efficiently. Predictive Analytics leveraging PySpark and machine learning models, we developed algorithms that analyzed historical and real-time data to predict potential equipment failures before they happened. Seamless Integration with Engineering Teams and collaborated closely with engineering teams to ensure proper sensor deployment and data accuracy. Visualization & Reporting through Power BI dashboards are designed to provide maintenance teams with actionable insights, enabling them to schedule repairs proactively and reduce downtime.

Tech Stack

IoT Sensors: For real-time equipment monitoring

Azure IoT Hub: To ingest and manage sensor data

Azure Databricks: Used for data transformation, processing, and advanced analytics.

PySpark: For building predictive maintenance algorithms

Power BI: For business intelligence and interactive charts

Value Delivered

Solution helped reduce unexpected equipment failures, minimizing production losses.

Maintenance activities were scheduled based on actual equipment health, improving resource utilization.

Eliminated unnecessary maintenance and extended equipment lifespan, leading to a significant cost reduction of 84%.

Maintenance teams had real-time insights into equipment performance, allowing for proactive interventions.

This enhanced manufacturing productivity by ensuring machines remained in optimal working condition.