



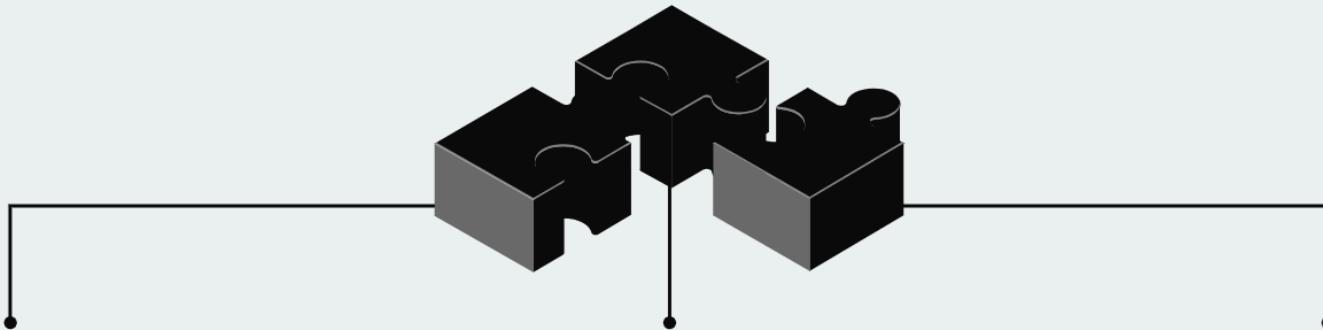
Comprehensive Guide to Predictive Quality in Manufacturing

Emergence of predictive quality
as a crucial addition to
production environments

Meghana Srilekha P | Presenter

Introduction to Predictive Quality in Manufacturing

Emergence of Predictive Quality in Production Environments



Predictive Quality in Manufacturing

Application of advanced data analysis techniques to proactively predict quality issues in the manufacturing process

Driven by Industry 4.0 Technologies

Cloud computing, artificial intelligence, and machine learning

Benefits of Predictive Quality

Improves quality, optimizes processes, and benefits manufacturing, quality, and engineering teams, as well as end customers

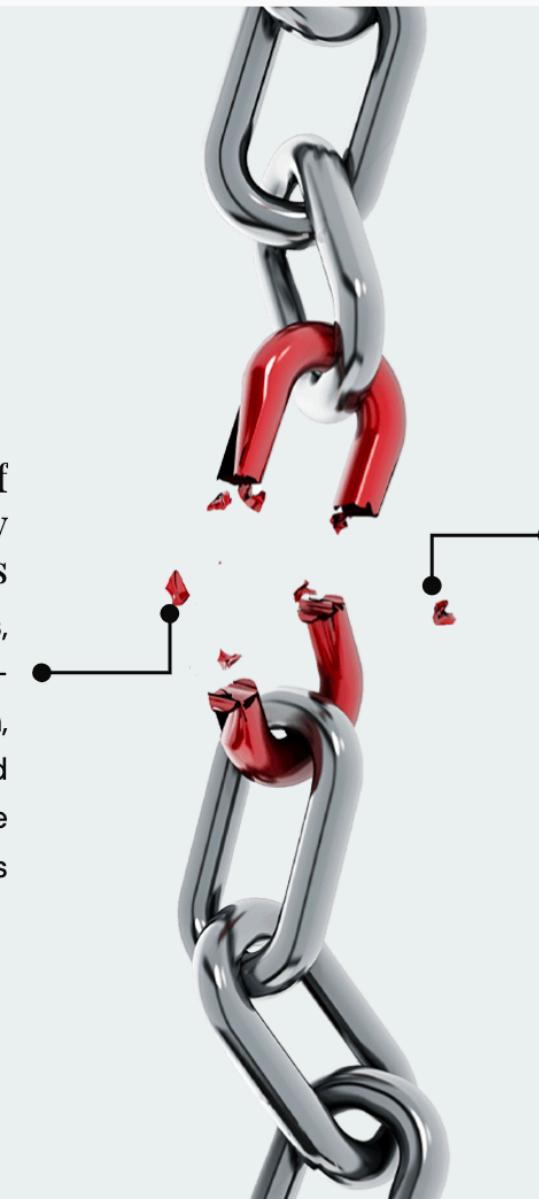
Understanding the Importance of Predictive Quality

Working Principles and Key Components

Key Components of Predictive Quality Solutions
Centralized dashboards, single-variate and multi-variate anomaly detection, predictive quality alerts, and automated root cause analysis

Working of Predictive Quality

Data collection, preprocessing, training and validating machine learning models, predicting real-time quality, and leveraging advanced quality insights



Data Collection and Analysis Techniques

Collecting and Analyzing Manufacturing Data



Data Collection Techniques

Capture and analyze data from various sources including sensors, IoT devices, and production systems

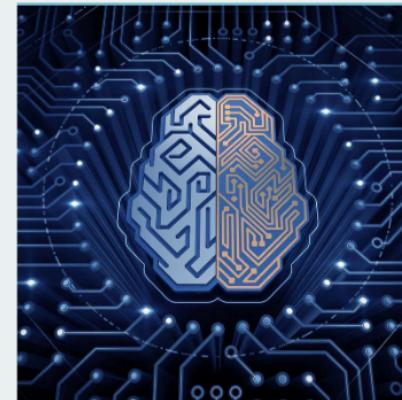


Data Preprocessing

Cleaning, transforming, and organizing data for analysis

Implementing Predictive Quality Models

Applying Machine Learning and Statistical Modeling



Training Machine Learning Models

Using historical data to train models for predicting quality issues

Validating Models

Evaluating the performance and accuracy of trained models

Benefits of Predictive Quality in Manufacturing

Advantages for Manufacturers and Customers

Customer Satisfaction

Delivers high-quality products, improving customer experience and loyalty



Optimizes Processes

Enhances production efficiency and reduces downtime

Improves Quality

Identifies and prevents quality issues in advance, reducing defects and rework



Case Studies: Successful Implementation of Predictive Quality

Real-world Examples

Case Study 1

- In thread rolling, the quality of the threads depends on the hydraulic pressure and the roll wear.
- Hydraulic pressure drops in the circuit due to dust ingestion. The pressure drop would indicate the quality of the thread, you are likely to get and would point to previous maintenance of the hydraulic system.
- Roll wear This forces you to increase the set pressure. This would indicate when to replace thread rolling dyes/chasers.



Case Study 2

Company A reduced defects by 30% using predictive quality techniques.
Company B improved production efficiency by 20% through predictive quality implementation

Challenges and Limitations of Predictive Quality

Considerations for Implementation

Data Availability and Quality

Access to reliable and relevant data for accurate predictions

Interpretability

Understanding and interpreting the outputs of predictive models

Model Complexity

Building and maintaining complex predictive models

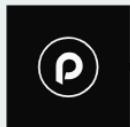


Best Practices for Predictive Quality in Manufacturing

Guidelines for Successful Implementation

Ensure data accuracy, completeness, and reliability

Data Quality Assurance



Iterative refinement of predictive models and processes

Continuous Improvement



Collaboration between Teams
Effective communication and coordination
between quality, production, and
engineering teams

THANK YOU