Predictive Maintenance for Heat Treatment Furnaces

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Agenda

1. Industrial (R)evolution
2. IVA Schmetz’s Digital Story
3. Predictive Maintenance
   i. What does it mean?
   ii. Artificial Intelligence
   iii. Benefits
4. Key takeaways
Industry 4.0

Introduction
Digital Transformation

Industry 1.0

Industry 2.0

Industry 3.0

Industry 4.0

1784

1870

1969

Today
## 4 pillars of Industry 4.0

<table>
<thead>
<tr>
<th>CONNECTIVITY</th>
<th>MOBILITY</th>
<th>CLOUD</th>
<th>ANALYTICS</th>
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<tbody>
<tr>
<td>&gt; Lower cost of sensors</td>
<td>&gt; Pervasive and affordable communication</td>
<td>&gt; Massive aggregation of data</td>
<td>&gt; New functionalities</td>
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<td>&gt; Standards-driven connectivity</td>
<td>&gt; Rich UI</td>
<td>&gt; Stakeholder sharing</td>
<td>&gt; Artificial intelligence optimizing performance at all levels</td>
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<tr>
<td>&gt; Recognition of operator</td>
<td>&gt; Concentration of specialists</td>
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Digital Story of IVA Schmetz
Predictive maintenance & remote assistance

GAME CHANGER

CUSTOMER PLANT

CUSTOMER SITE

CUSTOMER HQ

ANALYZING CLOUD

OPERATIONAL

HTC HQ

Service Technician

Customer Service Manager

Digital Diagnostic Center

Service Team

ORDER NOW

Management
Predictive Maintenance
What does it mean?
What is Predictive Maintenance?

STAGES OF MAINTENANCE

- Reactive
  - Corrective based

- Preventive
  - Time/Use based
  - Diagnostics based

- Predictive
  - Monitored condition based

Criticality vs. Capabilities / Maintenance efficiency.
Potentials
OF PREDICTIVE MAINTENANCE

- Planability
- Transparency
- Downtime
- Costs
Condition Monitoring

WHAT DATA IS COLLECTED
Artificial Intelligence
Predictive Maintenance
Machine learning process

Input Data/Old Data

Analyze Data

Find Patterns

Prediction / Decision

Learns from the Feedback

Bildquelle: www.simplilearn.com
Machine Learning

THREE METHODS

Unsupervised Learning
Non-labeled training data

Supervised Learning
The machine learns from the training data that is labeled

Reinforcement Learning
The machine learns on its own

Bildquelle: www.simplilearn.com
Big data and analytical machine learning models

FOR SOPHISTICATED PREDICTIVE MAINTENANCE

Big data input
Per furnace p.a.

> 50 parameter
➢ 1.5 bn data points
➢ 11,5 GB

Machine learning model
Mathematical & analytical

- Data Science know-how
- Business understanding
- Installed base
- Resources to operate

Predictions

Probability of failure within a certain time period
Ihre Vorteile

Predictive Maintenance

Customer benefits

Optimize
- Workflows
- Inventory
- Accidents
- Energy usage
- Downtime
- On-call service
- Overtime

Minimize
- Repairs

Reduce
- Useful life
- Expand
- Lower machinery expenses

Enhance
- Plant performance
- Order planning
- Availability
- Attract and retain customers

Volume increase
- Price increase

Cost reduction

Improve
- Reliability
- Product quality

Enhance
- Reliability
- Product quality

Expand
- On-call service
- Overtime
Key takeaways

DIGITAL SERVICE

Predictive Maintenance for

# high availability  # sustainability
# cost cutting  # plannability

No theory!

It's working
Industry 4.0 is around us

Machine Learning
releases the potential

Thresholds are not enough

Outlook

# Support simply and transfer information with Mixed Reality
# Integrate in Customer Portals
I am convinced that it will be a game changer for the entire industry. [...] with Digital Service we have now achieved a breakthrough. The difference here is clearly made by artificial intelligence – Peter Lankes, CEO at IVA Schmetz
Reliable and innovative products for the heat treatment industry

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