Why Condition Monitoring?
Success case on Blow Moulding Machine

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Motivation

“When availability is the difference between life and death, on humans or companies”
ICU Conditions

- Heart rate
- Blood pressure
- Blood oxygen saturation
- Breathing
- Respiratory rate
- Diabetes
- Temperature
- Parenteral feeding
- Catheterization
- Hemodialysis
- ..... 

Condition Monitoring in a ICU - Increases substantially the chances of survival!!!
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Failure causes

Lack of lubricant: 15%
Aged lubricant: 20%
Unsuitable lubricant: 20%
Solid contaminants: 20%
Liquid contaminants: 5%
Other: 20%

Source: Prof. Gold, IME RWTH-Aachen
80% of the failure causes can be detected by the condition of the lubricant!

Condition monitoring of the lubricant is of crucial importance to reduce downtime!

Source: Prof. Gold: IME RWTH-Aachen
Online monitoring overview

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Properties of intelligent sensors

- Automatic processing of measurement data
- Execution of decentral logical functions
- Automated learning and creation of profiles
- Selfdiagnostic and status messaging
- Direct communication with decentral actuators and PLCs
Online monitoring connections

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Condition Monitoring Structure

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Evaluation and parameterization

Data fusion

Decentralized

Local

Application

Hydraulic Expert

Parameter

Reference values

Limits

Gradients

Rules & Algorithm

Machine condition

Data base

Condition

Time

Filtered data

Temperature

Humidity

Conductivity

Permittivity

Viscosity

Level

Particles

Pressure

"History"-Memory
Condition Monitoring Benefits & Costs

› Avoid unplanned downtime
› Increase availability
› Improved planning of services
› Optimized spare part sourcing and stocking
› Longer machine lifetime
› Increased safety for machine and operator
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Blow moulding machine

Argo-Hytos Pressure Sensor
PSC 250-1843 0 - 250 bar 4-20 mA
Hydraulic Circuit

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Hydraulic Circuit

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Accumulator initial charging

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Accumulator recharging

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Problems pointed out by Condition Monitoring

- Low Nitrogen pressure;
- Low pump efficiency;
- Inadequate performance of unloading valve on closing point;
- Low efficiency of unloading valve on higher pressure;
Production cycle before condition monitoring

Machines or Machinesh – Machine’s language

18 seg. cycle

12 seg. charging

6 seg. venting
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Status before condition monitoring

- Investments on new machines to recover total production;
- Hiring more operators;
- Connecting water circuit of heat exchanger to moulding chiller water;
- Investing on more chillers due high demand for water colling;
- Increasing maintenance team due acquisition of more equipments;
- Investing on new primary electric cabin due higher demand for power
Corrective maintenance pointed out by CM

• Pump changing ✓
• Mechanical unload valve changed for digital pressure switch + electric relief valve ✓
• Nitrogen accumulator pressure adjusted ✓
• Reconect water circuit of heat exchanger ✓
Production cycle after condition monitoring:

- **16,4 seg. cicle**
- **6 seg. charging**
- **10,4 seg. venting**
Status after Condition Monitoring

• Increasing 9.75% production;
• Decrease 33% of power consumption of main electric motor of hydraulic circuit;
• 12.5 Kw per machine on 3 shifts production, represents savings of US$ 100,00 per day per machine;
• Decreasing number of chillers and also their power consumption;
• Decreasing maintenance costs;
• Decreasing product costs;
• Increasing competitiveness;
• Increasing market share;
Why Condition Monitoring?

- Muito Obrigado!
- Thank you very much!
- 謝謝
- Danke!
- Tack!
- Mange tak!
- Dziękuję!
- Merci!

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