Equipment condition evaluation based on online monitoring of vibrations and temperatures

Jan Molnar
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Chapter I. - About ČEZ

**CEZ Group**
- 13th largest in number of customers
- 10th largest in installed capacity
- 8th largest by market capitalization*

**2022 EBITDA**
- CZK 131.6 bn

**Sales**
- Distribution, 13.8%
- Mining, 4.7%
- Trading, 16.9%

**Nuclear**
- Nuclear generation, 35.7%

**Renewables**
- Renewables, 8.7%
- Fossil fuel generation, 17.4%

* as of August 22, 2023
Chapter II. - Vibration

Technical Description:

Vibration is a periodic back-and-forth motion of the particles of an elastic body or medium, commonly resulting when almost any physical system is displaced from its equilibrium condition and allowed to respond to the forces that tend to restore equilibrium.

- shivering
- trembling
- shaking
- oscillation

+ Useful (in medicine, in compaction)
− Damaging (earthquake, harmful mechanical vibrations)
- Generator
- Low pressure part steam turbine
- Dividing plane
Steam turbine
Our devices

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<th>EPR2</th>
<th>ETR</th>
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<td>5</td>
<td>18</td>
<td>8</td>
<td>23</td>
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<td>More than 3,000 sensors</td>
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**Device types**
- TG – steam/gas turbine
- TN – turbo boiler feed pump
- EN – electro boiler feed pump
- KV – Induced draft fan
- VV – Forced draft fan
- RV – gas recirculation fan
- VM – pulverised fuel mill
- CCHV – cooling water pump
- CSV – raw water pump
- OXI – air compressor
- KC – condensate pump
Chapter III. – AVEVA™ PI System™

CEZ optimizes staff performance by streamlining data collection, access and analysis

Challenge
- Simplify work process to optimize the number of staff in person
- Unify method of equipment evaluation to increase staff performance
- Optimize financial benefits

Solution
- Deployed AVEVA™ PI System™ to streamline data collection, access, analysis, for semi-automatic evaluation of vibration and temperature monitoring devices: Asset Framework, PI Vision, PI Data Link, AF Analytic

Results

?
PI System Explorer
Jan Molnár
PI Datalink

Jan Molnár
PI Vision

Jan Molnár
Chapter IV. - Summary

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Results

• What used to take 4 people to complete now is done by one person
• Quick overview of device status provides Operation and Maintenance clear insight of rotating equipment condition in one centralized place.
• Specialists have more time to perform more added-value tasks and dedicate more time to other tasks (ie: field measurements)
• Optimization of work has immediate impact in financial results of the company.
Chapter V. - FUTURE

1. EXTENDING
   Implement online monitoring into our hydroelectric power plants

2. SOLVING
   Solve the problems of an automatic evaluation during the machine start-up and shut-down

Note
   Creating a new device in PI AF and displaying it in PI Vision is a matter of a few minutes.

20 30
   SOLAR POWER PLANTS
   More than 200 projects
   Power output around 6GW

Entire system was implemented by two people only, one vibration and one IT specialists.
All major work was completed within 1 year.
Jan Molnar

leader of the prediction group and online systems

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Questions?

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