

OCTOBER 24, 2023

Equipment condition evaluation based on online monitoring of vibrations and temperatures

Jan Molnar

AVEVA

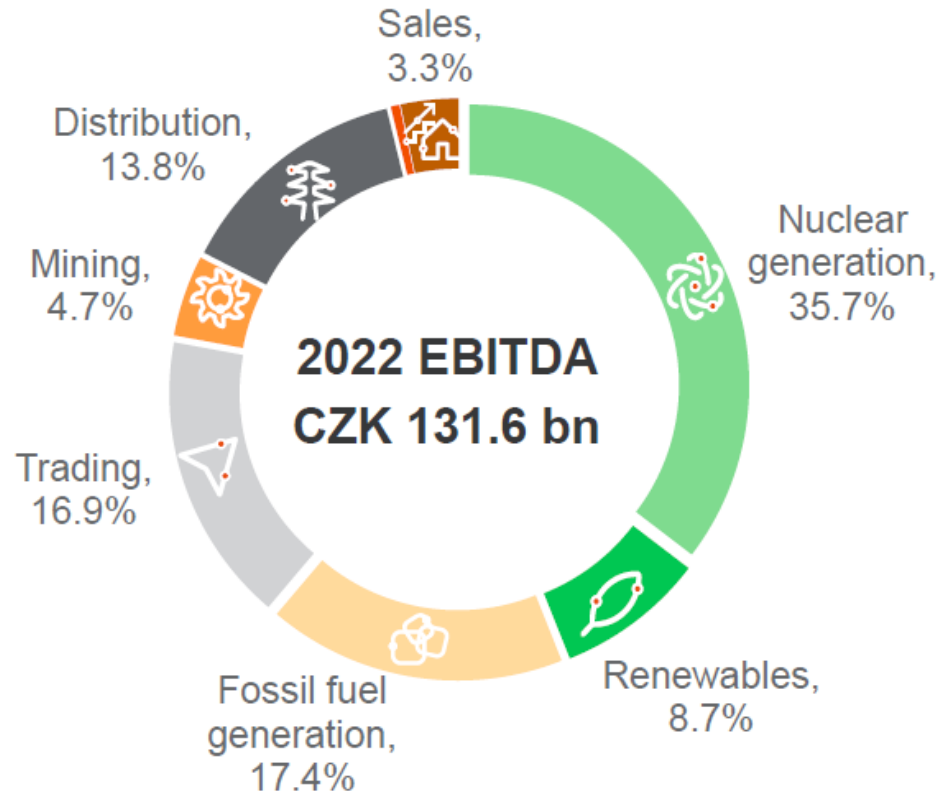
Content of presentation

- I. About ČEZ a.s.
- II. Introduction to Vibrations
- III. Work in AVEVA™ PI System™
- IV. Summary
- V. Future

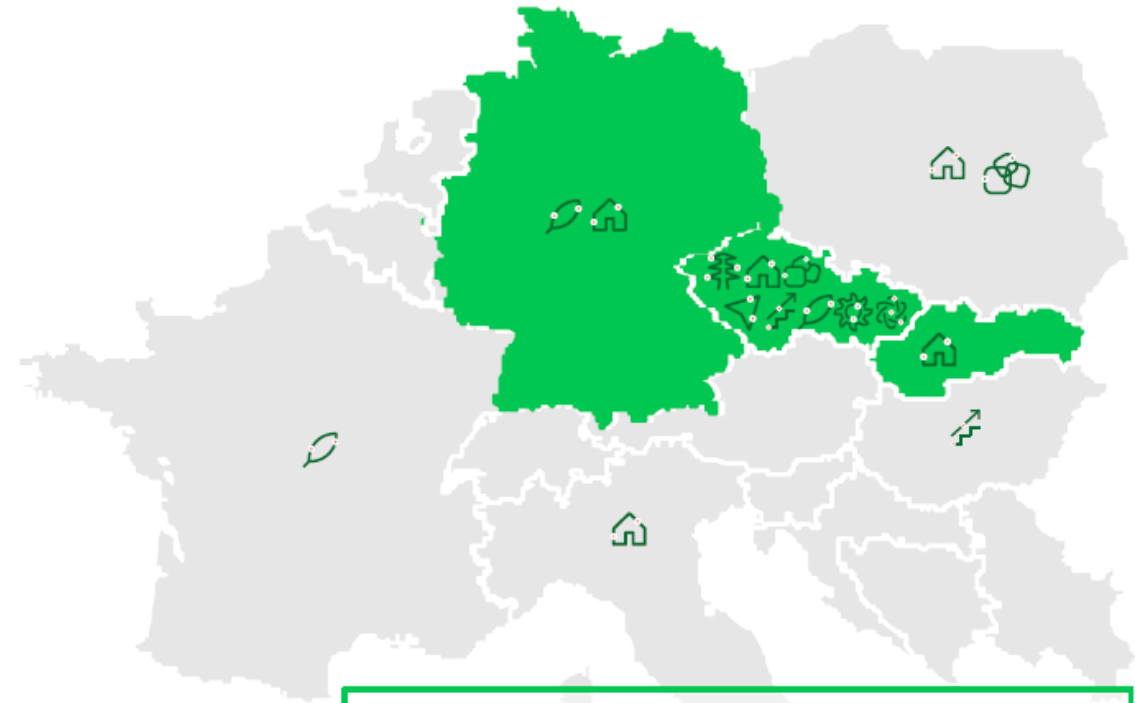
Chapter I. - About ČEZ

CEZ Group

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

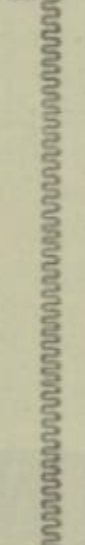


* as of August 22, 2023



Chvění či kmitání (oscillace, jest pohyb opakující se stále v určitých dobách kolem dané polohy. Vychýlení př. strunu upevněnou na obou koncích

A



B

polohy, vrací se do ní s rychlostí stále rostoucí, přejde přes rovnovážnou polohu a pohybuje se dále s rychlostí stále ubývajících, až se zastaví. Načež týž pohyb koná ve směru protíném; pohyb tento tam a zpátky kolem původní polohy pořád se opakuje. Jiným příkladem jest pružné péro stočené do spirály, obtěžkané závažím (obr. č. 1941.). Prodloužíme-li a pustíme-li je, počne se zkracovati, zkrátí se přes původní délku a zase se prodlouží, tak že jednotlivé částice kolem své rovnovážné polohy se pohybují. **Ch.** nastává, je-li těleso nebo jednotlivé jeho části puženo nějakou silou, nejčastěji pružností, do určité polohy a přivedeme-li je z této nějakým způsobem. Dle směru pohybu částic jest buď příčné (transverzálné), nebo podélné (longitudinální), nebo otáčivé. S **ch.** podobné jest kývání.

Nejjednodušší případ **ch.** jest, když síla pužící částici do rovnovážné polohy jest úměrná výchylce z ní, což u pružnosti jest pokud vzdálenost ta není větší než mez pružnosti a u kyvadla, dokud úhel výchylky jest tak malý, že místo sinu úhlu lze vzítí úhly; tudíž i zrychlení způsobené jest této výchylce úměrné. Pohyb takový nazýváme jednoduchým pohybem harmonickým. Myslme si bod O (

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)



- Dividing plane

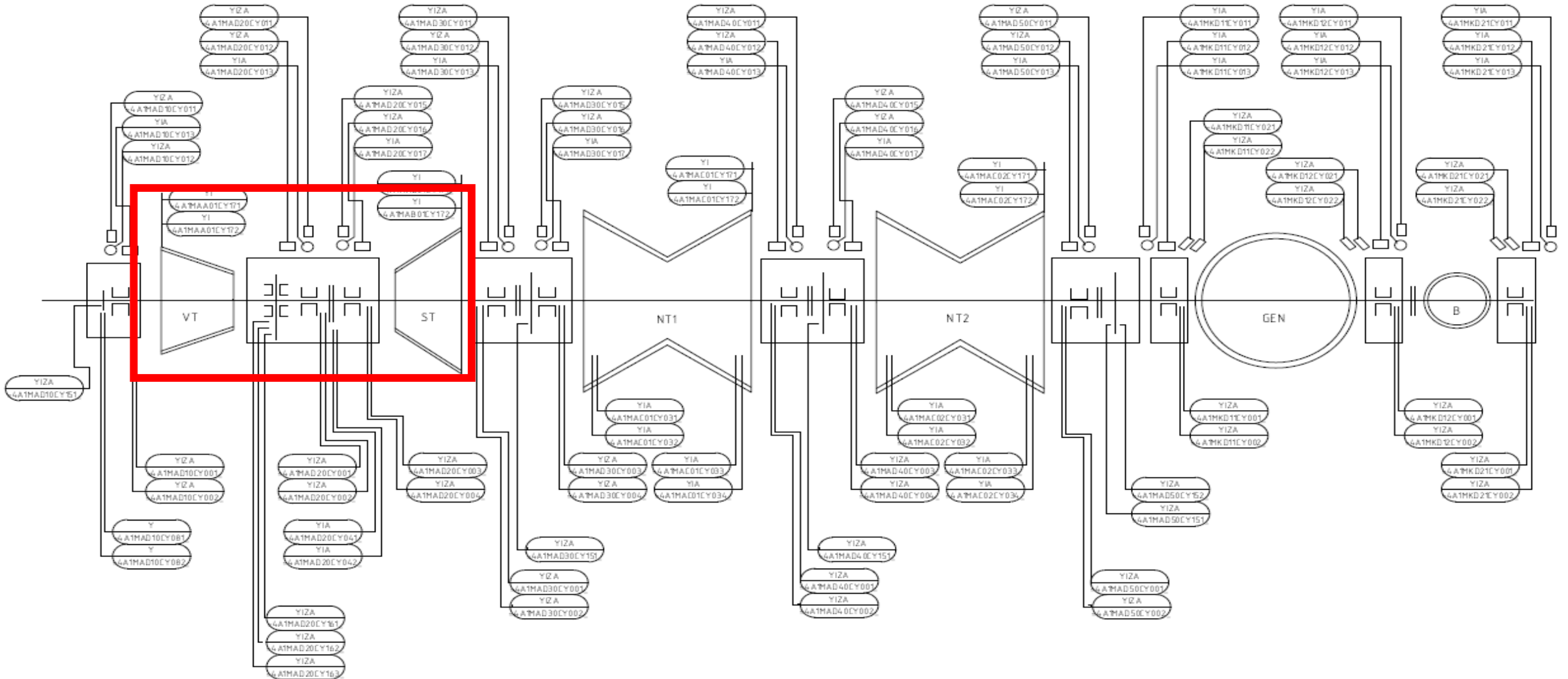
- Low pressure part
steam turbine

- Generator

Steam turbine



Steam turbine

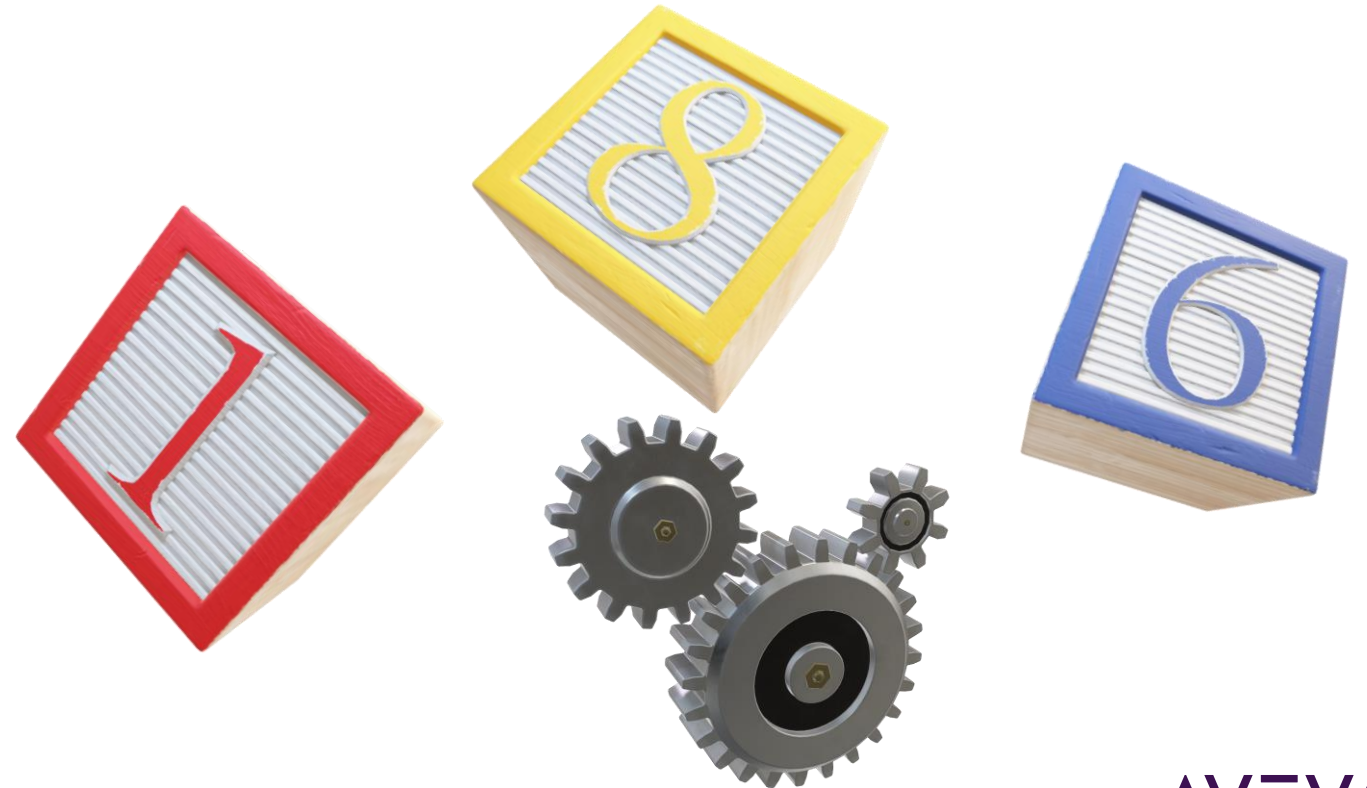


Our devices

Power plants	ETU2	EPR2	ETR	PPC	EET	ELE	EHO	EPO	EDE
Devices	54	68	5	18	8	23	1	3	6
Sensors	More than 3,000 sensors								

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

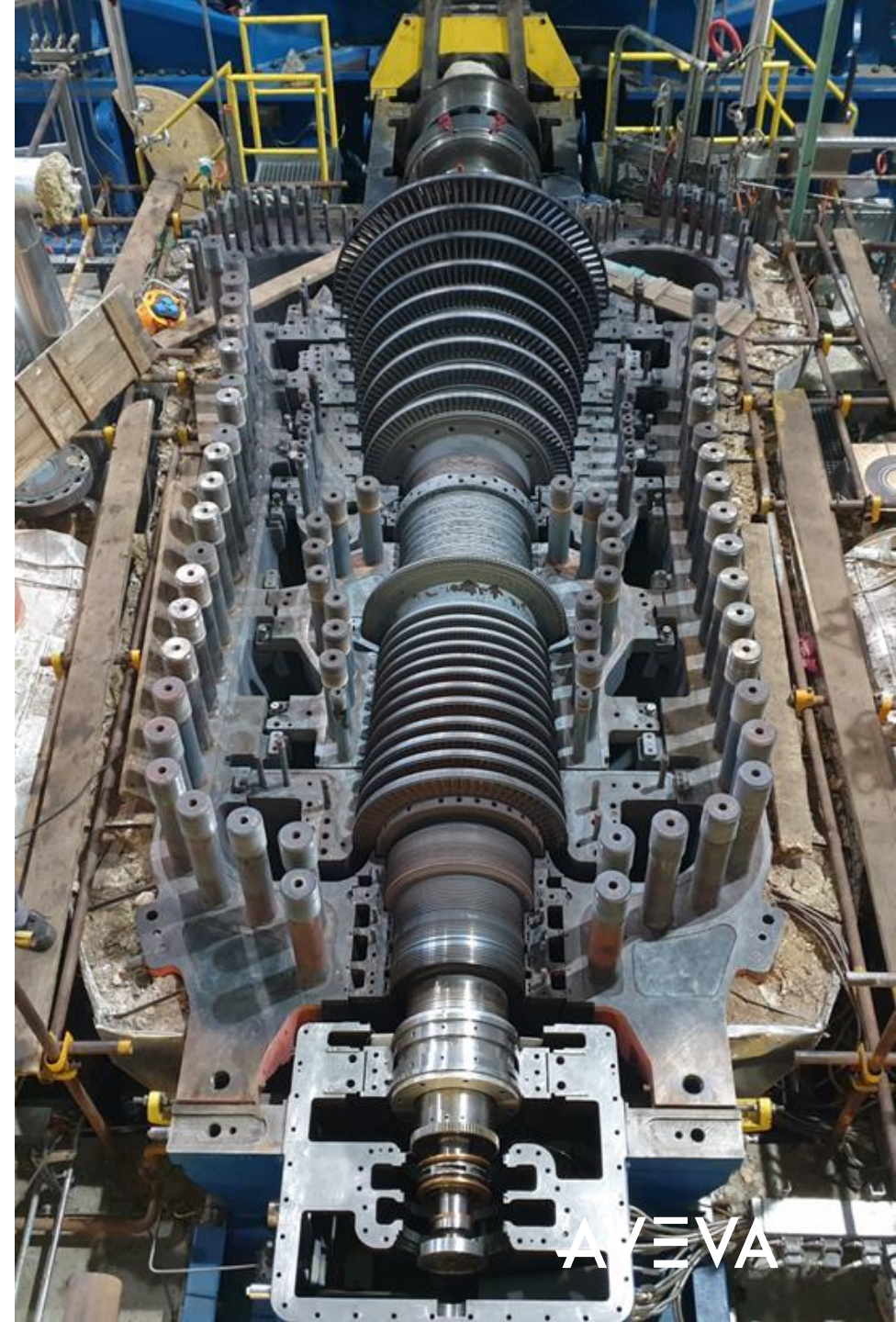
Challenge

- 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

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

Challenge

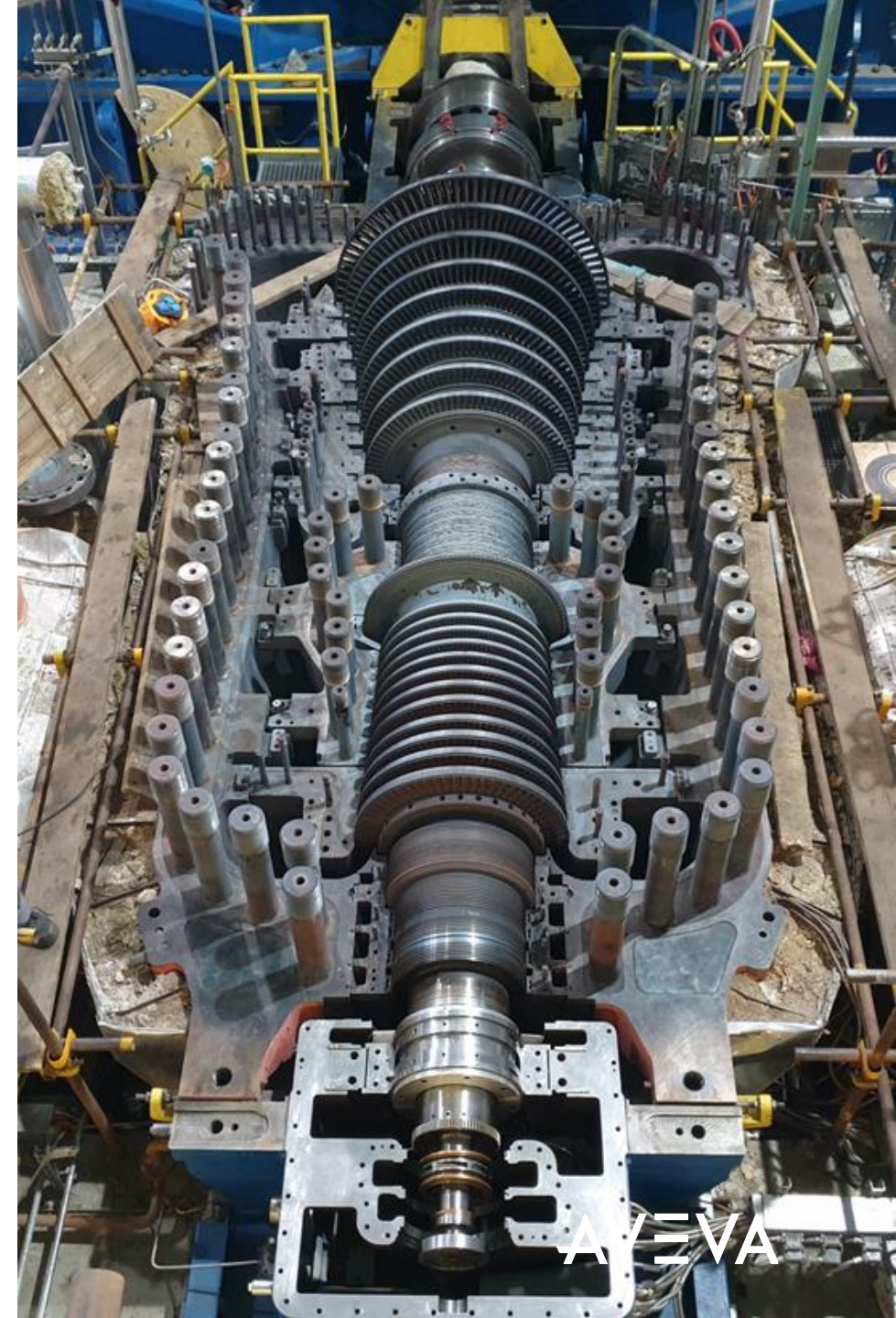
- Simplify work process to optimize the number of staff in person
- Unify method of equipment evaluation to increase staff performance
- Optimize financial benefits

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

- **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.

The biggest challenge

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

- CEZ a.s.
- Jan.molnar@cez.cz



Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

 [linkedin.com/company/aveva](https://www.linkedin.com/company/aveva)

 [@avevagroup](https://twitter.com/avevagroup)

ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com