

Powering Uniper's Digital Transformation with Data Analytics

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The energy world changes rapidly

"Paris Agreement" - global warming to be significantly below 2°C

EU states agree on CO₂ neutrality by 2050

Germany, the United Kingdom and the Netherlands decide to exit coal-fired power generation



Ukraine war brings security of supply and energy independence into focus across Europe



Uniper's business activities at a glance



Driving performance and efficiency in our fleets



Energy Asset Management

Vision

"Living Beyond Zero, asset, planet and people, through our role in managing our assets, Growth of our portfolio with expertise and competence and ensuring our assets operational performance and compliance"

Main areas of responsibility for Operations Strategy and Analytics

Steering
operational
performance
and nomination

Promoting and steering operational risk management

Steering cost competitiveness of our assets Digital evolution. Transforming the PI/IIoT strategy into a program





Uniper's assets include state of the art CCGTs



Combined cycle gas turbine power plants operating at various conditions and loads provide flexible and reliable power









Source: Siemens

Performance analysis of a combined cycle power plant

CHALLENGE Analyze and compare actual vs expected performance based on CHALLENGE models. Compare and evaluate performance pre and post upgrade installation



- Better understanding of our asset's performance
- Improve asset operation and maintenance
- Auditing and compliance
- Management of risks and opportunities
- Nomination of precise expected power generation to the grid



RESULTS

84 conneqt

How Seeq has helped us



BEFORE



Image: Second Second

AFTER

Complex Excel spreadsheet pulling data via PI Data Link, long loading times Analytics in PI System Explorer (restricted) Pre-defined PI Vision displays

Seeq Workbench analysis with polynomial fitting, updated quickly showing deviations at a glance. Easy review of load-dependent efficiency and impact of modifications



Boiler tube leaks in a coal fired power plant

CHALLENGE

SOLUTION

RESULTS

- Monitoring and analyzing temperature excursions in the evaporator membrane walls which accelerate boiler tube failures, ultimately leading to boiler tube leaks and thus unavailability of the power plant
- Efficient data import using Seeq DataLab to conduct calculations in Seeq Workbench giving an insight into deviations from design.
- Effective categorization of operational data to identify time periods where membrane wall temperatures are excessive.
- Management of risk
- Better understanding of stress on material
- Predict tube leaks (where but not yet when)
- Improve asset strategy and maintenance plan









How Seeq has helped us

BEFORE



Analysis of the DCS is limited to site personnel.

No monitoring of whether a fitted enthalpy controller to eliminate temperature excursions as a mitigation measure is working Closely monitor the performance of the boiler by identifying whether there has been any temperature excursions within the boiler tubes.

Adjust maintenance as temperature excursions increase the creep stresses in the boiler tube and accelerate boiler tube failure

Quick and easy to use with a lot more potential to be developed further.



How Seeq has helped us







Efficient import of more than 450 temperature signals using Seeq Data Lab to conduct calculations, giving an insight into the temperature profile over the boiler walls, and highlighting deviations from design.

Using Seeq we've managed to build a workbook that uses tools such as:

- Scorecard matrix
- Value search
- Manual condition
- Remove longer than

Impact on different roles in the organization





Operations Strategy Fleet Performance



Site Engineers



Performance and Reliability Engineers

CCGT use case:

Impact on Operations Strategy and Asset Parameter Optimization (central) Analysis and learnings can be adopted for similar assets *→*Time saving

Boiler use case:

Impact on Risk Management and Maintenance Strategy (central) Analysis and learnings can be adopted for similar assets *Time saving*





How Seeq supports us

Both use cases, CCGT performance, and boiler tube leaks, were supported by Seeq's Analytics Engineers and partners, providing guidance and coding in

- private trainings in English and German for site engineers and central functions
- analytics office hours
- AE use case consultation for Uniper
- ad-hoc support requests

First Uniper internal Seeq-Day took place in October 2023 with key representants from Seeq present





Organizational strategies that ensure success in an enterprise roll-out





What's next?



Root Cause Analysis

Exploring options on not only monitor and analyze boiler membrane wall temperature excursions but also leveraging Seeq to help identify the root cause of these events

Software

Integrating and applying machine learning by using Seeq's advanced tools Full integration of Seeq in company's data visualization strategy

Energy Management

Improving energy management by analyzing data to better understand and make decisions about energy use at power plants **Bad Actor Analyses**

Strategic setup on tackling operational issues leading to unavailability identified by bad actor analysis using Seeq



Conclusions



Driving digital transformation by applying advanced analytics

Enabling engineers across various functions to apply advanced analytics in a user-friendly, intuitive environment

Improved asset operations of our world-class technology platform, adding flexibility to generating, sourcing, and supplying energy for the energy system.





Thank you for your attention!

For further questions, please contact me:

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Thank You

