visplore

User Success Story:

How an expert consultancy built physically plausible digital twins for power plants more effectively.

Problem: Building physically plausible digital twins of power plants

Since electric power cannot be stored in sufficient quantities, power plants must follow the demand of the grid under all ambient conditions. A purely data-driven digital twin based on historical records of the plant is therefore prone to failure, as the records do not cover all possible situations that may occur.

Therefore, an Austrian expert consultant company developed a new approach for digital twins based on physical process models that are refined utilizing historical data but safely allow for extrapolation into formerly 'unknown' regions. To adjust such models to the plant as built, representative operating points must be derived from the plant records for the tuning of the performance characteristics.

Highlights

- **Interactively explored and cleaned massive amounts of sensor data**
- **Compared historical data to physical model and expert knowledge**
- **Identified 'clean' data for model tuning**

Need: Preparing and validating model data against physical conditions

The engineers needed to explore and validate historical data of the power plant to find those time periods or situations where 'good' data for the adjustment of the models to the actual performance of the plant were available.

An important part of this screening was to identify implausible time ranges and to exclude them from model tuning. On the other hand, various sets of specific load conditions had to be selected to make sure that the physical model covers representative data over the entire operating range.

Benefits

- **Reduced time to tune digital twins by 20%**
- **Saved around $10,000 of cost per project for data preparation and model adjustment**

Solution: Flexible generation of ‘clean’ data for building physically plausible digital twins

By choosing Visplore, the expert engineers were able to review hundreds of time series and were guided to time ranges or situations needed for model tuning. Despite facing thousands of data rows, they were able to interactively zoom into areas of interest and check them in further detail.

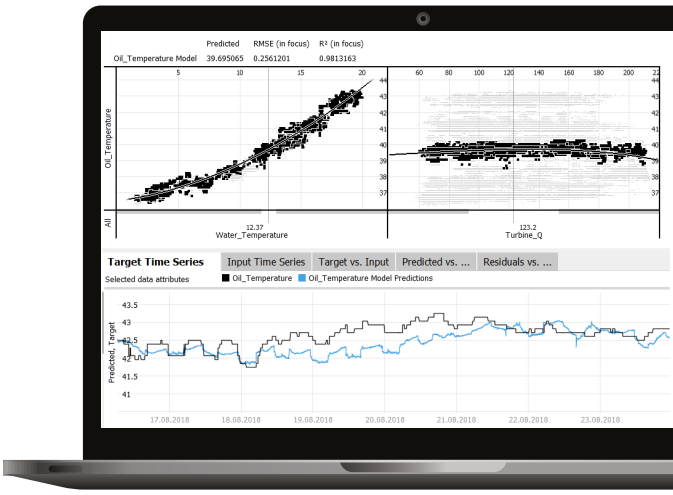
By visualizing correlations for many different operation parameters, the performance engineers could quickly check the plausibility of the data. Utilizing Visplore’s advanced display and drill-down features, they were able to identify data quality issues such as outliers or periods of transient operation, and tuning data sets could be cleaned for modeling right away.

> *“Visplore allows us to quickly identify appropriate data packages in the plant history, eliminate outliers from the data, and effectively analyze the resulting clean data of the physical processes.“*
>
> **Performance Enginnering Expert, Expert Consultancy Company**

Result: Reducing time to generate digital twins by 20% and saving around $10,000 expenses

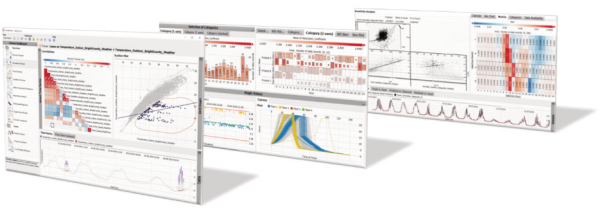
Visplore’s ready-to-use cockpits reduced the time for exploring and cleaning the data set enormously. Due to the interactive nature of Visplore’s pre-configured cockpits, the engineers were able to gain significantly higher confidence in the data.

Eventually, this also allowed the company to save around $10,000 of cost per project. Moreover, detailed checks of the models’ physical plausibility can now be conducted much more regularly and very efficiently by comparing model predictions with current data from the plant. Being able to quickly identify deviations and to verify that these deviations are caused by performance changes and not data quality issues, the digital twin can be updated much more frequently to ensure high accuracy of the simulation results over time.



visplore – Fast visual analytics for energy experts

- Monitoring Plant Operation
- Start-up and Ramp-up Optimization
- **Building Physically Plausible Digital Twins**
- Modelling for Condition-Based Monitoring
- Troubleshooting of Complex Energy Systems



www.visplore.com office@visplore.com +43 660 10 57 150