Same Tasks, Bigger Challenges, Better Solutions

Having to exactly meet the electricity demand, power plants have always been challenged with planning for the future. But the energy transition made things worse.

Planning the operation of a power plant has always been a laborious task, but with the electricity markets undergoing huge transformations due to renewable energy intermittency, pressure to reduce CO2 emissions, distributed generation, reserve capacity or energy storage, dispatch planning has become a seemingly unsolvable challenge.

The goal is to make decisions better and faster. The solution is to use accurate digital twins in combination with artificial intelligence and human-like reasoning.

ENEXSA, an Austrian expert company specialized in process simulation, and Beyond Limits AI, an offspring of NASA Jet Propulsion Laboratories and Caltech applying space-proven AI technology to industrial applications, have joined forces to tackle these challenges by combining the two key ingredients accurate modelling and AI-based decision-making & optimization.

It is the combination of these two that can consider all possible solutions in short-enough time to ensure optimal day-ahead or week-ahead planning or reacting quickly to intraday changes while at the same time ensuring that the resulting operating modes will be most profitable AND technically feasible.

The digital twin must be accurate and based on first principles, otherwise you cannot find the true optimum being a convertible solution.

ENEXSA starts with a detailed thermodynamic model of the plant which accurately reflects design and off-design characteristics of all major equipment items. This model also includes the control strategy of the plant and most important all technical limitations that constrain the actual operating range of the plant. Whatever property may become a limiting factor under specific operating conditions (e. g. the pressure at one extraction port of a steam turbine delivering process steam to an industrial customer), it can be calculated from the process model. Including the underlying physics enables the model to extrapolate safely to operating modes or conditions that the plant has not encountered before.

Understanding and evaluating all options by Machine Learning and Cognitive Artificial Intelligence

Mapping all possible operating modes is a gigantic task, but in times of high-performance computing technology and machine learning it's not a road blocker anymore, so that the model information can be transferred into superfast surrogate models.

Searching this typically huge space of possible operating modes most effectively and considering the existing know-how of the operators as well as continuously learning from the results, this is where the decision-making technology of Beyond Limits AI comes into play.

Similar to guiding and manoeuvring space vessels and Mars rovers through unknown areas, the Cognitive AI technology of Beyond Limits optimizes the production plan fast and with focus on maximum profitability while staying within the technical limits of the equipment.

Dispatch optimization is not the only task to adopt this technology.

There are certainly many more applications in the power industry, such as performance monitoring and predictive maintenance, that can truly benefit from this powerful combination of technologies supplied from two companies that lead innovation in their respective field of expertise.

If you want to learn more about digital twins and AI-based solutions, please contact ENEXSA!

ENEXSA
Energy Expert Software Applications

BEYOND LIMITS

Contact Information: Josef Petek, Manager Commercial Operations, ENEXSA GmbH, Parkring 18, 8074 Raaba-Grambach, Austria ■ www.enexsa.com
josef.petek@enexsa.com