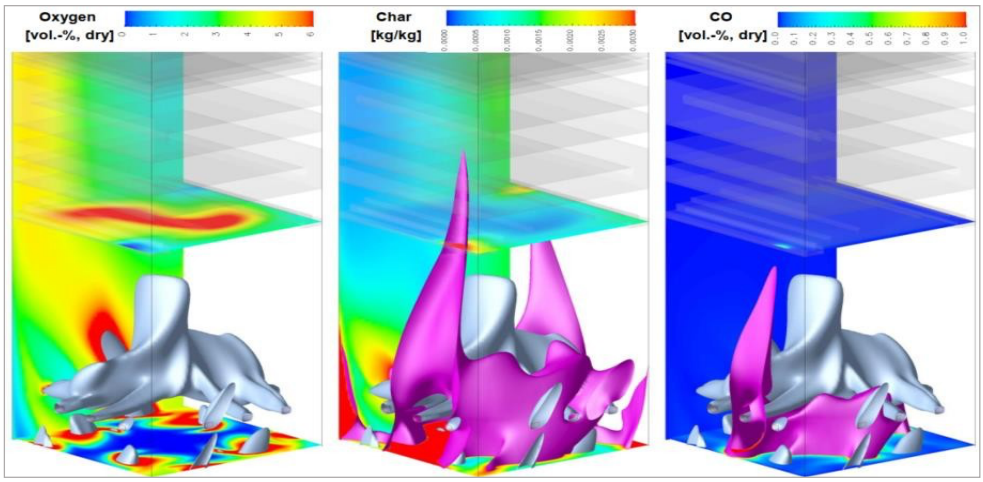
TECHNOLOGY
NEWSLETTER
QUARTER 04 2022
The journey of technology

Training in Computational Fluid Dynamics (CFD) with RECOM Services GmbH - Germany

The training course will take place from November 5th to December 24th, 2022 in Stuttgart city, with the participation of 10 trainees from various units within EVNGENCO3 (Technical-Production Department, Thermal Power Companies: Vĩnh Tân, Mông Dương; EPS Company).

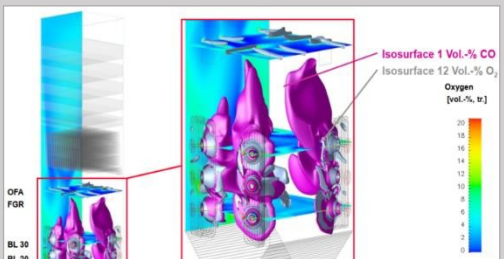
With the changing source of coal supply due to the decreasing domestic coal supply and the need to increase imports, it has affected the operation of systems and equipment in the coal-fired power plants (such as crushers, burners, heat exchange systems, etc.), causing various negative impacts on equipment performance, such as tube erosion, slagging, reduced boiler efficiency, etc. Therefore, CFD simulation is one of the effective tools for analyzing and evaluating the operating conditions of boilers, and subsequently adjusting operating parameters to achieve the most efficient operation state.

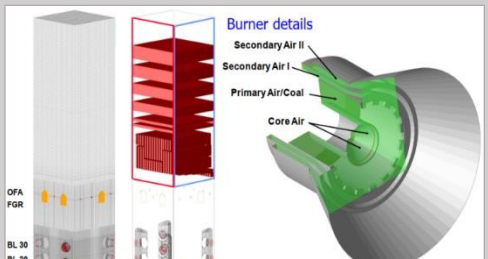


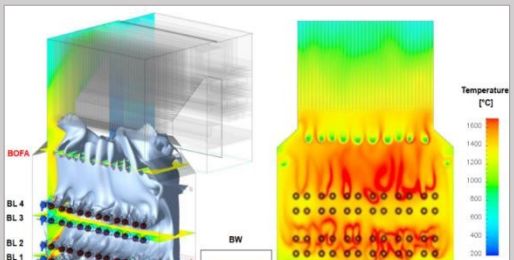
CFD simulation (or also known as Computational Fluid Dynamics simulation) is a solution that utilizes numerical analysis methods to analyze and solve problems related to the motion/flow of fluids (gases, liquids). The simulation results help us gain a deeper understanding of the nature of flow and its impact on systems and equipment.

Understanding the significance and power of CFD simulation, along with the commitment to technological development by EVNGENCO3, in 2022, EPS company has implemented a CFD simulation training course with RECOM Services GmbH - Germany.

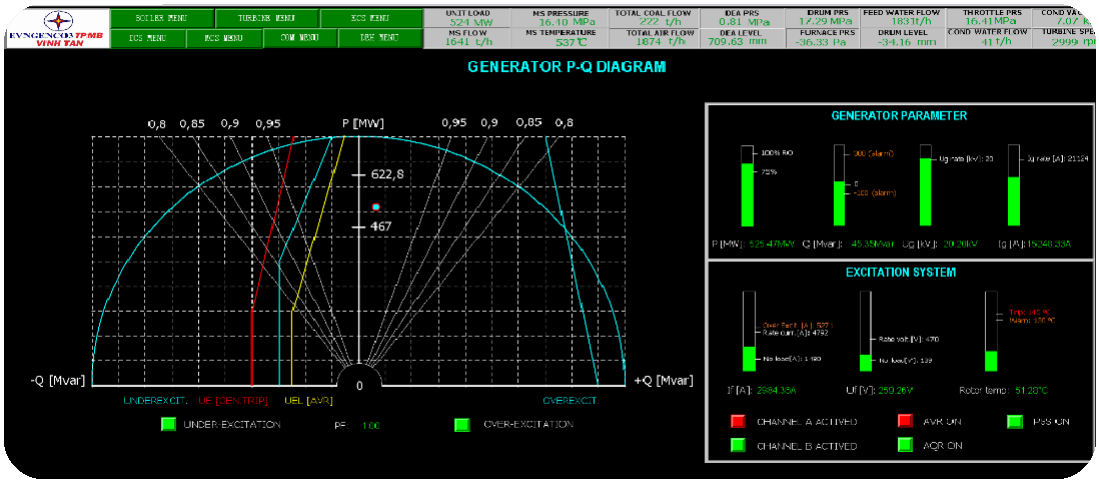
The trainees have been provided with fundamental knowledge related to combustion processes, guided and practiced in drawing, meshing, and running simulations of various burner types and boilers using the RECOM-AIOLOS 3D Combustion CFD software. This software will also be equipped by EPS Company in 2023 for practical application in the analysis, evaluation, and optimization of the combustion process for the boilers at Vinh Tan 2 Thermal Power Plant.







Constructing the P-Q diagram and operating points of the power generator on the DCS system - Vinh Tan 2.



Vinh Tan Thermal Power Company has designed and added a supplementary user interface to display the P-Q diagram, operating points, monitoring, and alerting of the power generator on the DCS system of Vinh Tan 2 Thermal Power Plant. This is aimed at equipping Shift Supervisors, Team Leaders, and Control Room Operators with a tool to visually and accurately monitor the operating parameters of the power generator, thereby improving the stability and safety of the power generation process, as well as enhancing the operational efficiency of the generating units.

The solution has been officially implemented since April 2022.

Furthermore, the solution has proven to be beneficial in facilitating training for the rotation of operators within the power plant.

INTELLIGENT MOBILE ROBOTS MONITOR POWER STATIONS

The equipment systems in the transformer station will increase the risk of abnormalities after a long period of operation due to various factors such as insulation aging, material durability, oxidation, and external environmental contamination..

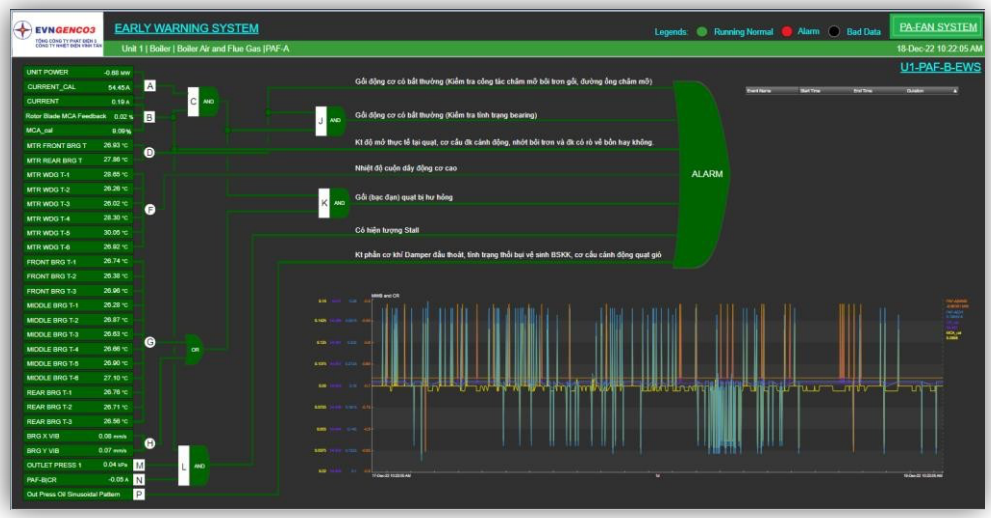
Common abnormalities in transformer stations include: overheating and melting of terminal connectors due to poor contact, wire breakage; partial breakage of jumper wires leading to overheating and melting of the jumper wires; partial breakage of flexible conductors leading to overheating and melting of the conductors; electrical discharge in insulators, bushings, and through-wall bushings causing insulator failure and explosions; internal abnormalities in on-load tap changers (OLTC) and bushings due to localized overheating and electrical discharge.

These abnormalities can be detected early through monitoring temperature increases to promptly address and prevent incidents. Phu My Power Plant has equipped an intelligent mobile robot system, which includes a robot, a charging station, thermal cameras, regular cameras, obstacle detection sensors, acoustic wave sensors, wireless signal transmitters and receivers, on-site data processing system, and a centralized data analysis system located in the control room. This system utilizes artificial intelligence to automatically recognize instructions and detect devices in the station.

The robot is capable of monitoring the temperature of equipment, ensuring safe and reliable operation of the power station.

Early Warning System

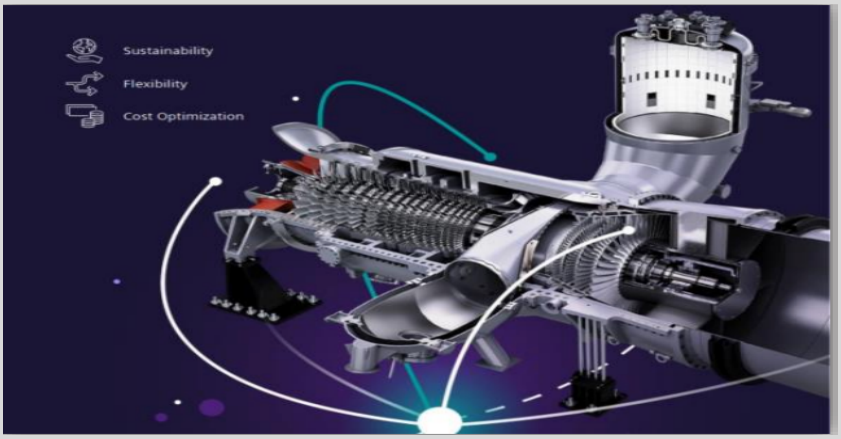
The Remote Monitoring System (RMS) is a real-time remote monitoring system for monitoring the operational parameters of systems and equipment in power plants. It has been implemented in Vinh Tan, Mong Duong, and EPS power plants. The system consists of two main components: the Plant Information System (PIS) for data collection and the Early Warning System (EWS) for early detection and alerting.



EPS Company, with its operational experience and SCBD (Smart Condition-Based Diagnostics) expertise, has developed the EWS system by constructing anomaly diagnosis logic based on the relationships, behaviors, and thermodynamics theory among operational parameters within the PI System software.

In the future, EPS Company will continue to research and apply advanced data processing and analysis algorithms, such as machine learning, to the system

The trend of transitioning from natural gas to hydrogen as a fuel for gas turbines is emerging



In the context of the world's efforts to achieve carbon neutrality by 2050, using hydrogen as a replacement for natural gas in the thermal power industry is seen as a solution due to its lack of CO2 emissions. However, one of the major challenges in using hydrogen for gas turbines is the high combustion speed, which can lead to the phenomenon of "flashback" back to the fuel supply. Therefore, achieving high efficiency and low emissions when burning 100% hydrogen is a goal that manufacturers are striving for.

Currently, Mitsubishi Power's gas turbine models can burn hydrogen, including the following types: Diffusion type, capable of burning 100% hydrogen; Pre-Mix (Dry Low NOx) type with pre-mixing, capable of burning 30% hydrogen; Multi-Cluster (Dry Low NOx) type with multiple fuel nozzles, under research and development aiming to achieve 100% hydrogen combustion.

Siemens Energy's gas turbine models can burn hydrogen, including the following types: DLE (Dry Low Emissions) fuel nozzle type, WLE (Wet Low Emissions) fuel nozzle type, and Diffuser fuel nozzle type, with the ability to burn fuel containing hydrogen ranging from 10% to 100%. Siemens also aims to achieve 100% hydrogen combustion with the DLE fuel nozzle type for its gas turbine models by 2030.