

# SPYRO® for Asset Management (SAM)

Our digital service for direct insight into your ethylene plant operations



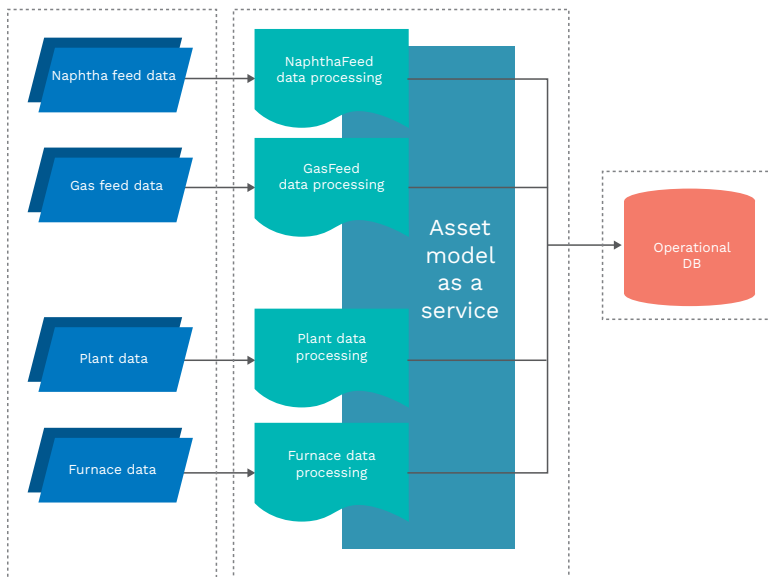
Furnace project in Europe

Technip Energies, a global leader in ethylene technologies, with decades of experience in equipment design and engineering, is now offering a major advancement for ethylene plant operators with our new digital service for operational support, SAM. Based on real-time plant data, this service continuously monitors the operation and advises on optimized settings.

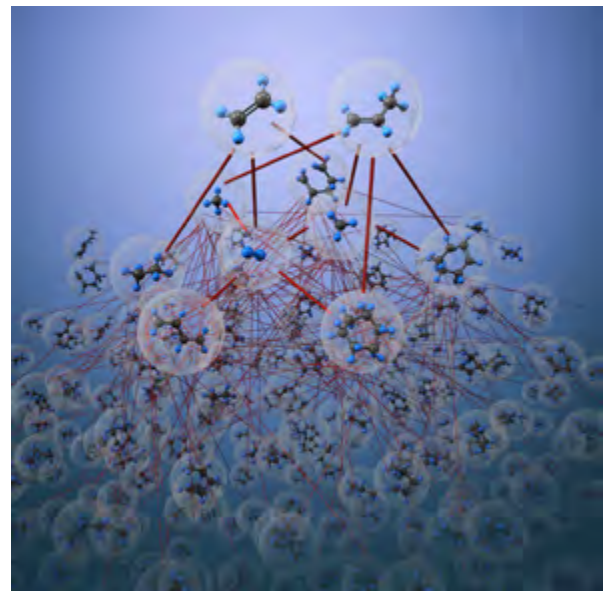
SAM enables plant operators and managers to see a real-time overview of the operation of the furnaces on the ethylene plant, for example, to:

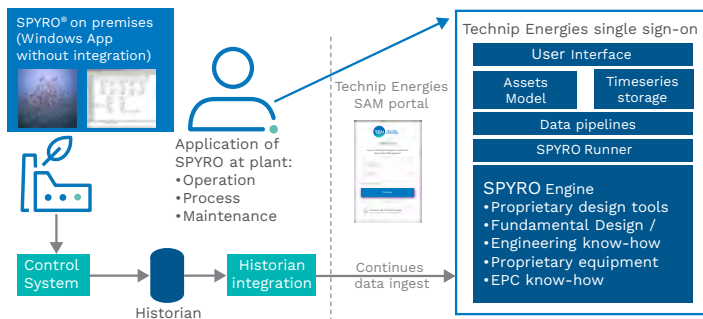
- Plan the timings of decoking and maintenance to maximize furnace availability
- Optimize the operation of the furnaces to maximize the product value and/or minimize feed consumption
- Adjust the furnace operation to maximize coil life
- Receive alerts about deviations from set operating boundaries

Technip Energies has teamed up with Arundo, an expert provider of proprietary software and advanced analytics solutions for asset-intensive industries in the machine-learning and cloud computing space. Technip Energies has enhanced the optimization and proven simulation capabilities of SPYRO® for this specific application in asset management.



SAM data processing flow chart





High-level architecture of SAM

## SPYRO® foundation

SPYRO® is Technip Energies' proprietary software for steam cracking yield prediction and furnace simulation of gas or liquid feedstocks. The tool simulates the performance of any type of pyrolysis furnace. SPYRO®, in combination with other simulation tools, provides key know-how based inputs for plant design. Since its introduction in 1979, SPYRO® has been adopted by approximately 80 percent of ethylene producers worldwide.

## Process analytics for ethylene plants

For ethylene producers, the SAM cloud service brings additional value in unlocking the hidden information in the historical data of their ethylene plant.

By applying Technip Energies' know-how and experience as an ethylene technology licensor and EPC contractor, as well as Arundo's cloud computation, Artificial Intelligence (AI) and

Machine Learning (ML) capabilities, we have developed an invaluable digital service that facilitates the improvement of operations, availability and reliability in ethylene plants. SAM enhances the optimization and simulation capabilities of SPYRO® by using actual operational data and offering extended visualization, alerts and recommendations.

SAM provides accurate predictions of yield (production numbers versus planned production numbers and expected remaining run length), decoke scheduling, and coil carburization, as well as benchmarking of furnace runs and furnaces. This is achieved by real-time simulation of furnace operations and a continuous understanding of the furnace conditions, operating parameters, and feedstock.

## Direct insight on your ethylene plant operation

SAM offers real-time insight in the ethylene plant operation and its performance from the click of a mouse.

SAM's Foundation:

- Technip Energies' fundamental design and engineering knowledge of ethylene plants
- Arundo's cloud software, AI and ML expertise
- Connection of real-time plant data to the SPYRO® model and proprietary equipment
- The skillset of Technip Energies' staff to provide solutions for bottlenecks based on decades of technology-based EPC contracting experience

When using SAM, plant operators will now be able to easily further optimize operations, flexibility, availability and reliability of their asset.



SAM plant overview



SAM production overview



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