



**FLUOR**<sup>®</sup>

Fluor Achieves Significant Time Savings in SRU Simulation

**“Fluor is particularly pleased that Aspen HYSYS® allows integration of streams and equipment blocks using multiple property packages in a single simulation file.”**

#### **CHALLENGE**

Model liquid elemental sulfur and vapor allotropes, furnace and recycle loops in one simulation file

#### **SOLUTION**

Create a digital twin of the entire sulfur recovery unit, including recycle streams, in a single file using Aspen HYSYS with Sulsim

#### **BENEFITS**

- Saved a week of simulation effort
- Multiple empirical O<sub>2</sub> models for furnace
- Better prediction of sulfur degassing system
- Rapid output of information into Excel spreadsheets



## Overview

Fluor is one of the world's largest publicly traded engineering, procurement, fabrication, construction and maintenance companies. Fluor is also experienced in and licenses a whole portfolio of sulfur technologies to help their clients' meet environmental requirements with a cost-effective solution. Fluor/GAA has developed their own patented COPE II process, which uses high levels of oxygen enrichment to increase processing capacity of a sulfur recovery unit (SRU) or tail gas treating unit (TGTU) and utilizes a recycle stream to moderate the temperature in the furnace.

Modeling SRUs, with both liquid elemental sulfur and vapor allotropes, typically requires several simulation files which are iterated manually to balance material and energy recycle loops required in the COPE II process. Multiple files are generally required because of an inability to use multiple property packages in a single simulation. Aspen HYSYS v9 and above can model both the sulfur recovery unit and the tail gas treating unit in one simulation, or digital twin, and converge on a solution with multiple recycle streams.

Aspen HYSYS allows Fluor to evaluate different configurations of oxygen enrichment in the reactor model, with empirical correlations built in for more accurate modeling. AspenTech's solution for SRU optimization allows users to increase production, reduce OPEX and meet emissions regulations by modeling the complexities of the SRU and the full gas plant. AspenTech's sulfur models are validated based on empirical data from Sulphur Experts' Sulsim.

Using only one simulation for each feedstock case allowed Fluor to save a week's worth of simulation effort, which they could pass on to their client. The savings come from to being able to converge more rapidly than if they were manually converging multiple recycle streams across simulations, while also reducing errors from the manual operation.

## The Quest for Time Savings

Oxygen enrichment in a sulfur recovery process is a popular technology for increasing the sulfur recovery capacity of a unit. Using oxygen enrichment, Fluor can provide the same capacity increase at around one-third of the total installed cost of a new SRU. Oxygen enrichment decreases the amount of nitrogen, allowing for an increase in acid feed rate without having to install a new SRU, thereby saving capital expenses and time.

Fluor/GAA has patented a COPE II process, which uses very-high-level oxygen enrichment (up to 100 percent) by using recycle streams to moderate the flame temperature in the furnace to maintain safe operating limits. Traditional sulfur simulators do not integrate well with tail gas treating, the upstream process and air blower systems, which are more accurately simulated using other property packages. Manually adjusting the recycle streams to account for multiple property packages as an iterative method is time-consuming and introduces room for error.





## A Wealth of Benefits

Aspen HYSYS not only integrated multiple property packages into a single simulation, but it also offered several other benefits for Fluor/GAA's SRU COPE II modeling:

- Several empirical models for prediction of the reaction furnace temperature, based on feedstock composition, configuration and level of oxygen enrichment
- Unit operation blocks for critical specialized equipment such as sulfur condensers
- Updated estimations for dissolved H<sub>2</sub>S and H<sub>2</sub>S<sub>x</sub>, for better prediction of the sulfur degassing system, especially for O<sub>2</sub>-enriched SRU
- Easy incorporation of multiple recycle streams
- Integration of the SRU with upstream and downstream processing steps or units in one simulation
- Integration with utility simulations for steam production and cooling water consumption
- Rapid output of information into customizable Excel spreadsheets.
- Easier-to-handle multiple feedstock cases

Moving forward, Fluor will standardize on Aspen HYSYS for all licensed SRU simulations, primarily because of the time savings they are able to realize.

AspenTech is a leading software supplier for optimizing asset performance. Our products thrive in complex, industrial environments where it is critical to optimize the asset design, operation and maintenance lifecycle. AspenTech uniquely combines decades of process modeling expertise with machine learning. Our purpose-built software platform automates knowledge work and builds sustainable competitive advantage by delivering high returns over the entire asset lifecycle. As a result, companies in capital-intensive industries can maximize uptime and push the limits of performance, running their assets faster, safer, longer and greener.

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