Reliance
Industries Limited
Growth is Life

Petrochemical Plant Troubleshoots Using Plant Digital Twin Built with Aspen Plus® and Saves $2.4M USD Annually

aspentech | Case Study

Savings of $2.4 million USD a year

CHALLENGE

Toluene separation was disrupted due to an offsite unit shut down, therefore an urgent revamp was needed to employ the local separation unit.

SOLUTION

To effectively troubleshoot the benzene/toluene units, Reliance developed a plant digital twin using Aspen Plus

BENEFITS

- Implemented the final proposed design successfully with minimal capital investment
- Enabled better control of product quality with new column configuration that matches Aspen Plus software's predicted performance
- Increased production resulting in savings of $2.4 M USD per year
- Completed in-house, avoiding the costs and delay associated with an outside simulation expert

"Aspen Plus is a very useful tool to predict and troubleshoot actual plant behavior, helping us to validate the actual performance and predict performance for revised hardware/operating conditions. Additionally, Aspen Plus helps us to optimize the new configurations."

- Karuna Potdar, Vice President Reliance Industries Limited

Reliance effectively reached the required separation through plant configuration changes to locally separate toluene. This change resulted in a savings of $2.4 million dollars a year.

Reliance Industries Limited is an Indian conglomerate holding company. Reliance businesses span hydrocarbon exploration and production, petroleum refining and marketing, petrochemicals, retail and telecommunications. They strive to maintain innovation-led growth in each of these areas and achieve global leadership by maintaining their position as the largest polyester yarn and fiber producer in the world and a leading producer of ultra-clean fuels.

Reliance Industries uses the aspenONE® Engineering suite of products in many of their businesses when designing new plants, revamping existing plants, and troubleshooting underperforming units. Using solutions like Aspen Plus®, Aspen HYSYS® and Aspen Capital Cost Estimator (ACCE), Reliance can address a multitude of design, operational and estimating challenges across their E&P, petroleum refining and petrochemicals businesses to increase production and drive down operating and capital costs.

Underperforming Unit and Revenue Loss

The existing benzene separation column was underperforming, with the benzene content in the bottoms being higher than the required 200 ppm, resulting in an unsuccessful planned revamp for benzene-toluene separation. The vendor was unable to offer a viable solution to the underperforming column, stating the column was too tightly designed, resulting in offsite processing of the benzene column bottoms containing toluene and heavies.

Following the shutdown of the offsite processing facility, the revamp for benzene-toluene became critical—Reliance was suffering heavy losses due to the lack of a local toluene separation facility. Reliance turned to Aspen Plus and the hydraulic modeling capabilities to troubleshoot the underperforming column and find a viable alternative. This was completed in-house, avoiding the costs and delay associated with getting help from an outside simulation expert.

Matching Design and Plant Data

Using Aspen Plus and plant data, Reliance built a plant digital twin of the unit rigorous enough to correctly explain why the unit was underperforming. Reliance determined that poor benzene-toluene separation tower efficiency was the reason (55% vs 76% in design) and found the benzene column to be hydraulically limited. Since the separation column required more trays to reach the required performance, Reliance considered a redundant column as a potential alternative to avoid column replacement or re-traying and further production losses. By confirming that the redundant column could be used as a stripper and reconfiguring the two columns, Reliance could effectively reach the required separation and locally separate the toluene.

The scheme was implemented successfully and the actual column performance matched what the Aspen Plus model predicted. This change resulted in a savings of $2.4 million dollars a year.

To further improve the process and reduce utility costs, Reliance optimized the feed temperature to handle the revised load and heat from upstream of the process. The plant also identified and implemented a suitable control scheme to meet the tight specifications for benzene and toluene.

Process Simulation in the Future

With advancements in technology and changes in raw materials and product specifications, organizations like Reliance with businesses in the refining, petrochemical, and textile industries, must be able to adapt to stay competitive and maintain market leadership. With Aspen Plus and the aspenONE Engineering suite, Reliance can predict and troubleshoot actual plant behavior, allowing them to validate actual performance and predict performance for revised hardware/operating conditions.

aspentech | Technology That Loves Complexity

About Aspen Technology

Aspen Technology (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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