Fluor accelerates initial process design phase for ULSD projects with Aspen Hysys®

Profile

Fluor Corporation is one of the world's largest publicly owned engineering, procurement, construction, and maintenance services organizations. It maintains a network of offices in more than 25 countries across six continents and employs more than 30,000 people. Fluor serves clients in a wide variety of industries worldwide, including oil and gas, chemicals and petrochemicals, commercial and institutional, government services, life sciences, manufacturing, microelectronics, mining, power, telecommunications and transportation.

Fluor's services for the refining industry extend from initial business evaluation studies to detailed feasibility studies, front-end engineering package development, detailed engineering, procurement and construction, to final commissioning, start-up, and operations and maintenance services for grassroots, expansion and revamp projects.

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Larry Short
Director of Process Engineering
Fluor Corporation.

Business Challenges

Legislation for clean fuels is being set worldwide to lower sulphur levels in diesel fuel. Referred to as Ultra Low Sulphur Diesel, or ULSD, it is essentially cleaner for the environment and better for engines. It means fewer particulates (fine sooty emissions), which have been linked to asthma and cancer, and fewer sulphur oxides, which cause acid rain. An example of these requirements is the specification of a sulphur limit of 15 parts per million (ppm) for on-road diesel within the United States beginning in June 2006.

Refiners wishing to compete in the ULSD market face tight deadlines to adopt desulphurization technologies. On average, refiners are required to make significant capital investments, which include buying new or revamping existing hydrotreating equipment, to achieve the combination of reactor design and catalyst technology to produce diesel with reduced amounts of sulphur, on a consistent basis.

As ULSD specifications were announced, refining customers began approaching Fluor for initial recommendations on how to best meet these requirements at the lowest cost possible. **One of the major challenges associated with achieving ULSD requirements is the lengthy amount of time it takes from the initial process design phase until construction is completed – up to 18 months to revamp hydrotreating equipment and three years for new construction.**

The initial process design phase of ULSD projects, which can take 6-12 weeks before Front End Engineering Design (FEED) begins, can be especially time consuming and unpredictable as multiple issues can occur in communication with catalyst licensors, including the following scenarios:

- **If the catalyst licensor is not able to meet the desired process conditions, it will be necessary to begin again with a different feed slate or operating pressure**
- **If the EPC contractor cannot meet the required conditions from the catalyst licensor, the process begins again.**
- **If these issues are resolved, but the cost estimates are too high, the process begins again.**

Each new cycle adds weeks to the process design phase.

Solution

Fluor recognized that by leveraging the capabilities of simulation software, it could build a model which would help its customers optimize activities during the initial process design phase and, therefore, shorten the timeframe for meeting ULSD standards. "The real challenge for refining customers is that that it takes many months to complete construction and a year prior to that to buy the equipment, which does not leave adequate time for optimization," said Matt Reisdorf, Senior Process Engineer, Fluor Corporation. "Fluor recognized that automating intermediate process steps during the initial process design phase could save refiners millions of dollars by

creating the most optimized design and shortening the overall project timeframe."

Fluor decided to base its ULSD Solution ModelSM on AspenTech's Aspen Hysys® solution for process simulation. One of the major reasons Fluor selected Aspen Hysys was due to its open architecture that enables integration from multiple sources. "Fluor is an experienced Aspen Hysys user as it is commonly used for many of the designs of our refining units. Its open architecture makes it possible to incorporate inputs from multiple external and internal sources so that complex design processes can be automated," said Larry Short, Director of Process Engineering, Fluor Corporation.

Based upon Aspen Hysys, the ULSD model calculates accurate material balances, thereby enabling the generation of process flow diagrams, equipment sizing data, and, ultimately, estimates for capital and operating costs. **By automating intermediate process steps, the ULSD Solution Model eliminates the need for multiple design cycles, and makes it possible to proceed directly to the FEED phase within days, or even hours.**

Built with a simplified input form based on Microsoft Excel, the ULSD Solution Model is used as a sales tool to help Fluor customers quickly approximate the amount of time and money necessary to meet ULSD requirements. Calculations can be done for many variations of the hydrotreating unit so that the design is optimized and construction can begin as quickly as possible.

A critical component of the ULSD model is the integration of catalyst information directly into the model. Since discussions with the catalyst vendor can be a major source of delay for ULSD projects, Fluor made it part of its strategy to partner with Albemarle to build a catalyst database into the simulation model to minimize back and forth discussions. The information provides details on how the catalyst performs under certain operating conditions, which is used as a starting point to figure out size and pricing of equipment.

Business Benefits

Today, Fluor is using its ULSD model both externally as a sales tool and internally as a basis to derive quick cost estimates for projects. Basic input forms based on MS Excel ensure that users who are not familiar with Aspen HYSYS can utilize the ULSD Solution model without any special support. These forms allow users to change variables throughout complex process simulations, using a single, familiar form. "The usability of the ULSD Solution Model is one of the primary reasons for its success. Building an Excel interface on top of a powerful simulation model allows Fluor employees with no engineering expertise to work interactively with customers by inputting numbers into the model and arriving at results that otherwise would have taken weeks to complete," said Short.

Overall benefits provided by the ULSD model include:

- **Results, which would typically take weeks to determine,now take only 15 minutes to complete.**
- **Reduction in cost of capital for clients**
- **Reduction in construction by several months**
- **Relatively little training necessary compared to the benefit of the solution.**

Legislation for low sulphur diesel is a global issue and the ability to rapidly deploy the solution across multiple Fluor offices represents a major advantage. "Aspen Hysys is integrated into our sales process through the ULSD Solution model. Deployment of the ULSD Solution Model across Fluor provides an optimized, lower cost solution which yields results in less time, engineering expense, and overall schedule for ULSD projects." said Short.

Vision

Fluor will continue to deploy the ULSD Solution Model globally as additional legislation is passed for on-road and off-road diesel.

In addition, it will be utilized in the event that refiners decide to expand their refineries, as hydrotreating units will be affected.

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About AspenTech

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