■ Rakesh Rao

An ideal tool for n-time project delivery

For an Engineering & Construction (E&C) company, on-time delivery/commissioning of project is the topmost priority. Using right integrated software solution, it can simplify the execution process by ensuring better co-ordination between various departments and external vendors.

Construction of chemical and petrochemical facilities is a complex process and calls for expertise on the part of E&C company. For any new project, the E&C workflow ties together many different activities and disciplines that are involved right from conceptual design through to project delivery and start-up. Between these two start and finish phases, there are various processes involved that add information and incremental value to the engineered design. "The E&C company's involvement usually starts with conceptual engineering, which entails designing and screening several process options through trading-off energy, equipment, economics and other factors through several types of analyses. Once the conceptual design is selected, the subsequent basic engineering and detailed engineering phases involve progressively more engineers from different disciplines such as equipment specialists, estimators, safety system specialists, all working together to develop thermal and mechanical designs, size and cost equipment, and develop project deliverables such as drawings, datasheets, equipment lists, etc," observes Sanjeev Mullick, Director - Industry Marketing, AspenTech's Process Engineering Business.

Integrated approach

Traditionally, this array of activities was performed in silos. However, nowadays there is the trend to use single integrated engineering solution, which can handle all these activities and fasten the process of project execution. Mullick elaborates, "Today with the emphasis on optimising designs for capital and operating costs, designs that are flexible, safe and environment-friendly, along with global project delivery to shrink project schedules, there is a need for an integrated engineering workflow that enables these disciplines to collaborate across the lifecycle of a project and to work more concurrently. The goal is to enable early and fast assessment of a maximum of options to achieve inherently better designs while optimising the use of capital. This ensures that everyone on the project is working with the same and up-to-date data and information, irrespective of where in the world they may be located."

For example, software such as *aspenONE Engineering* from AspenTech enables this seamless and collaborative engineering workflow. He adds, "*aspenONE Engineering* provides the broadest range of capabilities supported by the best-in-class software products for simulation (such as *Aspen Plus* and *HYSYS*), energy analysis, flare system design, economic analysis (such as *Aspen Process Economic Analyzer*), heat exchanger design and rating (*Aspen EDR*), dynamic modelling for safety assessment, detailed cost estimation (*Aspen Capital Cost Estimator*), and basic engineering (*Aspen Basic Engineering*). But more than just offering a portfolio of excellent modelling tools, *aspenONE engineering* provides close workflow and dataflow integration between these functions."

Breaking the boundaries

Often, EPC projects are of global nature with vendors spread across the globe. E&C company can use integrated software solutions to improve collaboration with customers and vendors. "Collaborative engineering systems such as *Aspen Basic Engineering* (ABE) offer a common platform for all engineering disciplines to access consistent project data and information, irrespective of their location across the globe. Using ABE, many leading E&C firms and process licensors are executing projects by work-sharing across many different offices including accelerating project

delivery by adopting a 'follow the sun' philosophy whereby teams at different locations work on aspects of the project during their working hours, enabling teams at other locations to pick up when they start their work day. By providing interdisciplinary work flow management and change management, these different global groups can co-ordinate their activities and ensure engineering quality," opines Mullick.

Integrated engineering systems also allow electronic sharing of equipment lists, datasheets and other project deliverables between multiple E&C companies, customers and JV partners, process licensors and vendors.

Simulating success

With growing awareness about environment and safety, governments (State as well as Union) have become more vigilant while approving new project plans. In this circumstance, software solution providers can help E&C companies in carrying out environmental impact assessment (EIA) of the new project. Siddharth Wazir, Director, Libra Techcon, says, "Simulation models can be used for the scenario analysis and estimation of impacts. Simulation software can be useful for EIA. It is required once schematisation is completed. The simulation software provides the most probable scenarios and impact estimates."

Simulators are valuable tools for predicting air and water emissions, and enabling engineers to trade off design parameters to better meet environmental constraints. These tools now automatically perform certain environment-related calculations such as CO_2 emissions for a process. This includes accounting for both direct and indirect emissions based on a variety of fuel types and for either the US EPA or European norms. "Additionally, indirect emissions attributable to utilities such as steam and electricity, as generated at their source of origin, can also be accounted for. These capabilities also enable process operators, during operations, to manage the monitoring and reporting of their emissions and to examine operational strategies to keep plants within their permitted limits," states Mullick. In addition, safety, control and operability analyses using dynamic simulation and flare system analysis, for example, allow EPC companies to investigate various scenarios and improve their designs. It also enables EPC companies to design mitigating features to their process designs so that the plant and its control system will better respond to any operating and environmental incidents.

Improved co-ordination

Project planning, designing, execution, etc involves professionals from various departments of the E&C company. By using appropriate software solution, an E&C company can improve communication between these multiple disciplines to develop a co-ordinated plan for fast project execution. Mullick elaborates, "Examples of improved engineering include the ability to rapidly develop and explore various options to identify the optimal process design. Several case studies have demonstrated that E&C companies are able to simultaneously optimise capital and operating costs, improve energy-efficiency and reduce environmental footprint, design and select better equipment designs in terms of performance, size, weight, cost, etc, use a combination of steady state and dynamic modelling analysis to quickly test the designs for safety, reliability, operability and control."

For better engineering quality, software tools can enable engineering groups to implement company standards in templates, which encourage organisation-wide use of best practices. "From a project execution perspective, these integrated software solutions provide a collaborative platform to enable various disciplines to share data and information resulting in better quality of designs and consistency of project deliverables. This superior quality and consistency results in dramatically reduced rework, work-sharing across high-value engineering centres globally, less time to project completion, trouble-free and faster start-ups and operations," Mullick adds.

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Intuitive gains

As EPC companies devise strategies to cut project execution cost, experts feel that these companies will use more and more IT-enabled tools to optimise resources. "I see increased usage of integrated software solution during project execution in future. The adoption and deployment of these integrated solutions is already a best practice in many of the leading E&C companies worldwide. The benefits reported clearly demonstrate tremendous value. In addition, process licensors and owner-operators are seeing the value of higher quality, consistency and reduced time to delivery, including that for mega projects," states Mullick.

While the demand for integrated solution will rise, the challenge for software developers will be to offer solution, which can be easy to use and reliable across various functions. Mullick avers, "Given the benefits accruing to all project stakeholders – process licensors, E&C companies, and owner-operators – one can clearly see that the best practices supported by integrated software solutions are being embraced across multiple offices within individual companies and between JV partners to enable everyone to electronically share and communicate vital project data, information and deliverables in a consistent and efficient manner." This trend is accelerating, he emphasises. ■

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