

## Streamlining projects with a modular approach

Project overruns in the oil, gas and petrochemical industries have cost impacts that extend over the lifetime of the delivered asset, pressuring companies to deliver on schedule and remain profitable. Implementing standardisation designs and adopting a modular approach to process units reduce design, schedule and cost uncertainty and, therefore, saves significant amounts of time and money. For many engineering and construction companies (E&Cs) and their clients, getting to the construction phase more quickly is the aim of the game. With the use of model-based software applications, process designs can be created for re-use in a modular fashion on similar projects and based on varying locations, applications and scale, thereby increase overall project management efficiency.

### Streamlining projects

Breaking the habit of re-inventing solutions associated with traditional engineering methods can be difficult. Onsite build can be time-consuming and costly where there are logistics con-

straints and unpredictable local labour conditions. Historically, engineers have often used traditional tools, such as Excel spreadsheets to model and calculate their project schedules, costs, risks and scope. However, by using specialist integrated engineering software, the strategy behind standardised modularisation offers a different approach and involves dividing a plant into modules that are then re-used multiple times. E&Cs can reduce direct project costs (i.e. product equipment units, logistics and installation) by 10% or more and project engineering, procurement and construction delivery can be significantly expedited.

Project design is the first key area to embrace a modular approach and re-use standardised design modules for oil and gas plants. Many oil and gas companies design and build customised projects to specific locations with geological conditions. A more effective way of working in design is to re-use existing engineering templates, which unitise the work. This is a typical licensor workflow business model that has proven to be highly

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successful. It has conventionally been thought that upstream oil projects had to be custom-designed for a particular oil field and crude oil fingerprint. However, recent experiences with such modular design approaches have proved successful.

The concept of off-site fabrication and modularisation in engineering and design can be scalable from small to large-scale projects, such as a floating production, storage and offloading vessel scaled to the oil and gas flow characteristics of the particular well. Something like a compressor module could be standardised because the same equipment design can be re-used on many other vessels. For larger facilities, such as liquefied natural gas (LNG) plants, the focus moves to replicating modules that make up the plant. Another example could be less need for heavy lifting equipment and scaffolding, which would save space and costs. Many companies have successfully adopted modular standardisation to apply common design specifications and guidelines across each project (i.e. a refinery or production platform). The use of libraries containing design templates, which include datasheets, equipment lists and line lists is a powerful way of avoiding unnecessary duplication of data entry and copying, helping minimise engineering time and reducing costly overruns. Key to this strategy is aligning the engineering stages from conceptual design through basic engineering to detailed design. Collaboration across the project teams is essential to leverage important documentation.





### Leveraging technology saves time

Off-site modular assembly is becoming the preferred method of construction in industrial development. This highly efficient process alleviates the challenges typically associated with tight project schedules, changing site conditions and availability of skilled field labour and minimises variability in quality of the finished product. The safe and correct assembly of equipment, such as columns and reboilers, is critical to performance and reliability. Units derived from fabrication workshops, (i.e. steel casings, stacks and ducts, burners, piping), can be pre-assembled for shipping anywhere around the world and modular construction can be more easily executed with available on-site skills.

As modular design and construction projects become the adopted standard, powerful and integrated engineering tools can help engineers to complete datasheets much quicker and allow the ability to communicate with all stakeholders working on the project. Many E&Cs have standardised on AspenTech's 'aspenONE Engineering' software suite, which contains process modelling analysis and design tools that are integrated and accessible through process simulators. Engineers can optimise process designs for energy use, capital and operating costs and product yield through the use of activated energy, economics and equipment design during the modelling process.

E&Cs continually seek ways to improve workflow and streamline pro-



cesses. AspenTech's 'Aspen HYSYS' is the tool of choice with engineers using a modular approach to design. It comprehensively provides access to over 1,000 assays representing global production, as well as to the world's most extensive property database. Process units targeted for re-use can be captured as templates and quickly accessed from within the process model when the next project is in design. The tool helps deliver faster project execution, meeting increasing demands and minimising performance degradation, while complying to strict environmental and product quality standards.

For E&Cs, it is imperative to deliver accurate cost estimation earlier into the concept design and basic design stages. Implementing standard practices and methods enterprise-wide ensures design quality, reduces maintenance costs and meets safety compliance. Crucially, it is also important to capture design knowledge to improve the ability of less experienced engineers in delivering high-quality designs. Aspen Basic Engineering (ABE) is an industry-leading process engineering solution that enables global organisations to seamlessly and accurately bring together all aspects of front end engineering design (FEED) and basic engineering. Now it is possible to achieve a huge competitive advantage by delivering process data packages for licensed technologies and other repeatable designs in half the time currently required. Through capturing process technologies and best practice designs in re-usable templates,

engineers can apply them repeatedly for dramatic time saving in future projects. In addition, Aspen Capital Cost Estimator (ACCE) is a powerful tool for evaluating the efficacy of modules for projects. The software provides estimators with an early look at resource constraints, such as craft, labour and fabrication equipment and then enables them to easily evaluate and quickly shop versus field fabrication, including a whole host of trade-off scenarios.

### Modularisation streamlines schedules

With capital project investments under scrutiny, modularisation increases project management efficiency and presents opportunities for trade-offs between on-site fabrication and shop modular fabrication. When modular construction is considered, lead times can be improved and the shop fabricator can efficiently fabricate and then ship. Therefore, early and accurate conceptual design becomes even more important to achieve fast-track designs. Off-site modular assembly is an effective method of construction to help oil, gas and petrochemical companies manage projects more profitably.

Standardised modular design gives E&Cs the opportunity to gain a competitive position and take advantage of the unique characteristics of integrated engineering modelling and analysis software tools. This supports the concept of repeatable designs, which save time to re-enter data and to enable optimisation of a design across the feasibility study, conceptual engineering and FEED workflow. The software tools also help knowledge sharing across the organisation and allow efficient access for project delivery teams to streamline and deliver accurate engineering solutions that meet deadlines. In essence, modularisation expedites project execution by compressing project schedules and integrates global design teams for faster on-time delivery.