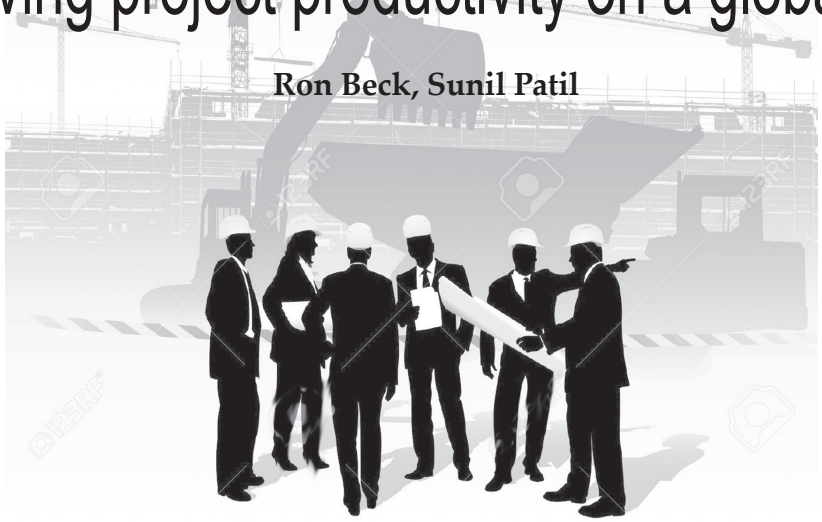
Improving project productivity on a global scale



Ron Beck, Sunil Patil

Achieving design objectives, productivity and time efficiency are the prime drivers in best practice engineering. For engineering, procurement and construction companies (EPCs), managing vast amounts of complex data is crucial to bridging gaps in all stages of the engineering workflow process. Design effectiveness and collaboration, therefore, is critical to ensure engineering companies achieve efficiencies during the bidding phase of projects and through Front End Engineering and Design (FEED) in order to gain a competitive advantage.

With an integrated, collaborative process engineering software platform, engineering companies can empower globally-based engineering teams to work around the clock and execute projects efficiently as work is passed from one location (or time zone) to another. With the use of consistent databases,which drive the content of datasheets, PFDs and other deliverables, engineers can be assured that accuracy is obtained across all project phases. With such sophisticated tools, EPCs can achieve more consistent design and estimates across multiple projects and lines of business around different office locations, irrespective of who the user is, or where they are based.

Achieving executional efficiencies

With today's capital projects, FEED execution is a major focal point for automation and improved business process. For many EPCs, licensors and owner-operators, achieving efficiencies at this stage is vital to reach project goals on time and within budget. If FEED schedules are not met and projects not defined at this stage, the impact on schedule and cost will cascade to other design disciplines and throughout the rest of the engineering lifecycle.

Due to market pressures, owner-operators can change a number of project design objectives throughout the FEED process as economics objectives shift. This makes engineering execution in traditional FEED environment-particularly problematical, where process flow diagrams (PFDs) are simply drawings and datasheets are individual spreadsheets. In addition, as the industry moves towards standardised designs, a FEED platform that supports re-usable design templates provides a clear competitive advantage. Therefore, improving the alignment between owner-operators and contractors through better collaboration and execution of FEED is an important priority for stakeholders.

So, why is FEED an on-going challenge? One explanation is that this early phase ofengineering is one of the least automated of engineering functions, due to individual tools used by individual engineers, yet it offers the opportunity to achieve the strongest gain from improved business processes and execution.

Authors

Ron Beck, Engineering Director, Aspen Tech

Sunil Patil, Sr. Principal BusinessConsultant, Aspen Tech

Streamlining basic engineering

A standardised design is a generic starting point and it must be scaled and modified in several different directions. The most obvious is size and throughput, based upon the target yield and economics of the proposed project, as contrasted to the baseline reference project. A second consideration is project location, which has a significant impact on civil and structural engineering and also on elements such as heat exchanger selection, insulation and others. A third factor is feedstock. A standard design will vary based upon the specific feedstocks. All of these factors can easily be handled in aspenONE Engineering where Aspen Basic Engineering (ABE) software platform captures the standardised design template and the process simulation is integrated with the economic software. This enables a proposal team to consider alternative sizes, locations, feedstocks and design both in terms of process parameters and specifications. In addition, capital and operating costs, project deliverables, datasheets, equipment lists and PFDs can be quickly generated.

Datasheets are a key focus point during FEED and are fundamentally multi-disciplinary documents, as well as key engineering communications tools. On a large project, thousands of datasheets and multiple data points are involved. Even on a small project, the datasheet and data quality challenges can be significant. ABE is a vital organisational tool for streamlining the process of both creating datasheets, as well as managing the versions and change process for datasheets in a project context. Conventional work procedures involve multiple disciplines working on a document in a sequence and data handling during a change involves either risk of errors(i.e. data consistency) or increased man-hours spent on engineering recycling activities (i.e. reduced productivity).

ABE also has the ability to bring in, manage and compare different cases from AspenTech's process modelling tools (i.e. Aspen HYSYS and Aspen Plus) and provide scope definition to estimating teams. Data is entered into ABE once and then maintained in a single, up-to-date central repository shared by team members in all locations. ABE manages data for multiple process cases and allows for different controlling cases to be selected or assembled for each equipment item. ABE includes out-of-the-box support for PFDs, MSDs and DPTDs, together with a library of over 190 templates for industry standard and best-in-class datasheets and equipment lists. Many process engineering groups have their own extensive libraries of PFDs, datasheets and lists based on prior designs/projects. The default templates available in the ABE database can be rapidly configured to a user defined format, which sets a standard applicable for the all users working on a particular project in one organisation at multiple locations.In traditional workflow, designs of prior projects may not be mobilised in a way that can be effectively re-used.

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The Aspen HYSYS and Aspen Plus process simulation systems can store completed designs as templates. A crucial accompaniment to this feature is the cost model to rapidly assemble a new design with associated costs. Aspen Capital Cost Estimator (ACCE) can both capture these historical costs and be easily adjusted based upon a new location, feedstock, workforce or project size and scope. Providing a structured framework for all of this is the ABE FEED platform, which provides a powerful database to store designs for re-use. ABE captures the PFDs, equipment lists and datasheets associated with the process model and cost estimate. ABE also supports the transmittal of basic design data to detailed design, providing an interface with external software platforms like Intergraph, AVEVA, AutoCAD and other systems.

Improving the basic engineering function with ABE delivers enormous engineering benefits:

- Significantly reduces elapsed time by up to 50% for the front-end design (FEL or FEED) process
- Improves engineering efficiency by up to 30% and reduces probability of design inconsistencies by eliminating data transcription between engineering tools and disciplines
- Takes advantage of an enterprise's global engineering resources by providing a platform to seamlessly enable worldwide access to engineering tools while working from a single database across multiple locations and disciplines
- Reuses best-practice design modules, saving re-design time for commonly used systems and units
- Implements enterprise-wide and global design standardisation of procedures and methods
- Leverages global purchasing power

A number of companies have achieved competitive advantage in the areas of collaborative FEED using AspenTech's engineering solutions. A leading Clean Fuels company captured several of their proprietary technologies in ABE and measured significant business benefits, includ-

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ing 50% reduction on process data packaged delivery times and achieved smooth support of their global teams.

A leading global E&C implemented a new software environment containing a new engineering workflow, which now enables them to react much more quickly to project proposals. ABE software platform is saving the company up to 10% cycle time and engineering hours on repeatable design, as well as capturing best practice process design templates.

"Aspen Basic Engineering is a great tool in the collaborative environment where people are distributed geographically across the globe. They can come together without travelling on a project and provide integrated solutions to our projects and clients." – Multinational US engineering and construction firm.

Conquering data complexity

Cutting-edge engineering software enables global organisations to seamlessly and accurately bring together all aspects of front-end design and basic engineering. Managing vast amounts of complex data more effectively can significantly bridge the gaps in engineering execution. Using a comprehensive software platform allows EPCs to increase agility, compress project schedules and integrate global design teams. Process information can then be handled consistently throughout the engineering and asset lifecycles and also improve design quality, accuracy and the ability to re-use operating information for future designs. Improving project productivity on a global scale achieves a competitive advantage and increases engineering efficiency and quality, as well as accelerates time-to-market, with payback in months instead of years.

For further information contact:

AspenTech India Pvt. Ltd.
SP Infocity, Survey No. 209, Pune-Sarwad Road,
Phursungi, Pune, Maharashtra – 412308
Phone: 020 - 66782500