

Prior and Proper Planning for Profitability

Process engineering software integration and visualization promote better project management

Conceptual development is a necessary part of all projects in the process industry. This involves working out sufficient strategic information through which risks can be addressed and decisions on resource commitment can be made in order to maximize the potential for success. However, it is a known fact that it is during this phase that most companies make blunders and go over budget. Here's an overview on how to make project planning efficient in the initial stage itself.



Source: Aspen Technology Inc

Focusing on pre-FEED and FEED ensures the success, profitability and completion of process projects of all sizes

Traditionally, the focus on improving project management of large projects has revolved around detailed engineering and construction phases of a project. This is natural, since those phases of a project involve a large amount of labor hours, logistics, movement and fabrication of millions of components, and proper sequencing of fabrication and installation. However, owners are recognizing the criticality of focus on pre-FEED and FEED to

ensure the success, profitability and completion of process projects of all sizes, and especially mega projects. This increased focus is articulately described in a recent article in Alaska Business Monthly. The article concludes that the long-term success of a project is closely correlated with how well pre-FEED and FEED is performed. When pre-FEED gets behind schedule or is unable to reliably project ultimate project costs, the long-term economic success of a project is put at risk.

EPCs and FEED contractors are focussing on improving their ability to manage projects closely at the front end. Better management of all aspects of FEED can be a key competitive advantage for an E&C in securing and successfully performing FEED projects. These areas of focus include better collaboration and oversight during conceptual modeling, using the conceptual model to define scope that can be passed electronically to estimators, evaluating costs during conceptual modeling, just-in-time project team training, and visualization tools for project management and oversight. Some of these areas are discussed herein.

Improved conceptual estimating accuracy

Keys that help project managers improve the execution of pre-FEED and FEED come from unexpected places. One crucial area is the initial conceptual estimate of a project that needs to be completed, often when only a small percentage of the engineering work has been completed. The conceptual estimate is critical for the owner and the EPC contractor to predict project capital costs, key project risk factors, and to focus on areas where significant costs can be saved. With several high visibility mega-projects running over budget and significantly behind schedule worldwide – in particular several currently running LNG projects (for instance, the Gorgon LNG project in Australia, which is currently 40 per cent over budget) – owners are looking at better ways of anticipating factors that may create difficulties.

There are some proven methods and approaches to reducing capital estimate uncertainties. Companies including Kuwait National Petroleum Co (KNPC), ConocoPhillips, and DuPont have demonstrated that front-end



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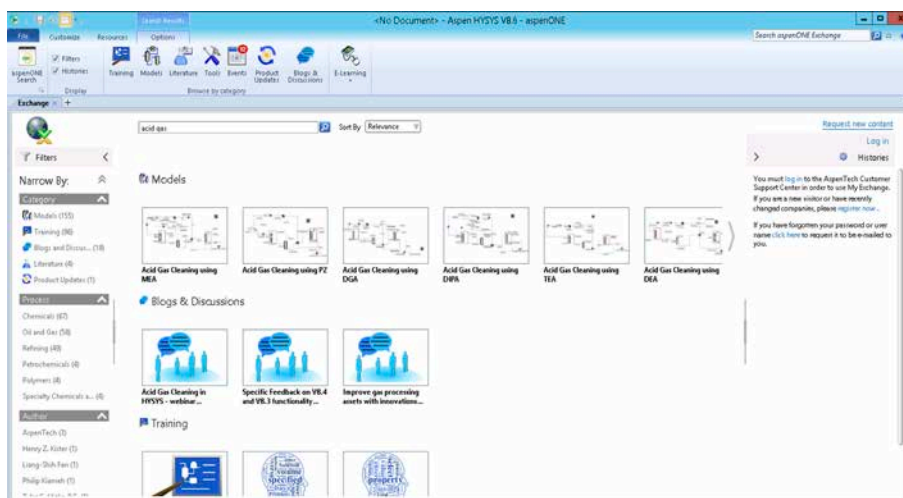
loading project scope to the estimating function coupled with the use of advanced model-based estimating approaches can significantly reduce variability and increase precision of estimates prior to authorization-for-expenditure (AFE) on a project. By extracting project scope from the process simulation model as early as possible, the conceptual estimate will be more reliable. Also, model-based estimating systems use first principle engineering models to build up scope without enumerating bulks or using inherently inaccurate factor-based approaches.

Factor-based approaches do not work because they assume straight-line sizing relationships, while sizing of major equipment is usually discontinuous, and because their predictive ability falls apart when extrapolating beyond known cost numbers. ConocoPhillips in particular documented its experience in reduced estimating variability from 35 per cent to 12 per cent over a two-year period after adopting this approach, during the FEED phase of its projects, prior to AFE.

Just-in-time project team training

A second key area is rapid ramp-up and training of project teams to be effective in the use of mission-critical technical software. A project manager is almost always given an assigned project team, sometimes split over several geographies (for instance, India, Philippines, London and Houston) and an extremely difficult schedule. To meet the schedule, the project manager needs the team to be up and running almost immediately.

The project manager's dilemma is to select the best fit-for-purpose software tools to



'Just-in-time' eLearning resources available within the process modeling software

employ during a project, and at the same time mobilize the available project team, often geographically distributed. This requires key project team members to be fully productive on the key software tools immediately, or face getting behind schedule.

Traditional classroom training methods are inadequate to support these project managers' requirements to meet schedules. AspenTech has been aggressively developing a rich set of 'just-in-time' online training resources to satisfy these needs. These include computer-based-training (CBT) courseware, available on-demand through conceptual modeling software tools, together with written tutorials, video tutorials, sample models and function-specific video on usage. Use of these on-demand tools has been growing exponentially since their introduction 12 months ago. Preliminary data shows a strong relationship between use of on-demand training resources and engineers' productivity.

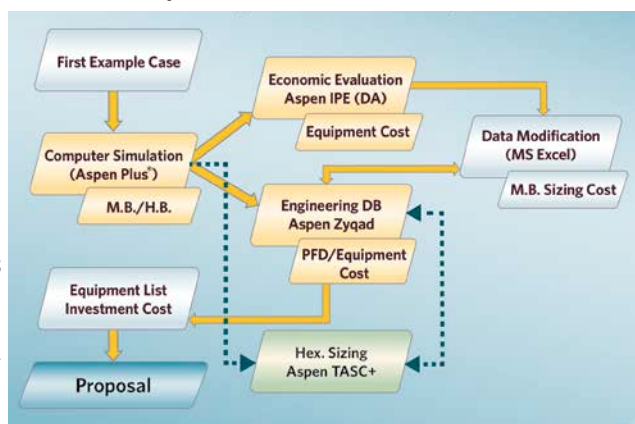
practices' engineering design for 'bread and butter' design modules such as gas-oil separation plants, gas sweetening plants, dehydration units, emissions controls and the like.

Several organizations, such as Japan Synthetic Rubber (JSR) have documented significant time savings in the development of proposals and feasibility studies through the use of re-usable design modules, incorporating template designs in process modeling tools and collaborative FEED databases. JSR documented reducing proposal engineering time from two months to one week.

Project status visualization

Finally, the project manager needs better tools to provide transparency into the front-end progress of a project. During the pre-FEED conceptual engineering phase of a project, process engineers are typically working individually to examine different process routes and schemas. This takes place in the individual process engineer's workspace, giving minimal visibility as to how a project is proceeding. Software usage dashboards, such as those provided by AspenTech, give the project manager visibility into how many hours of process modeling have been performed, providing an indirect metric into conceptual design progress. Also, if the organization is employing a collaborative FEED tool, FEED completion can be measured by progress in completion of the key deliverable, process and mechanical data sheets.

Automated Proposal Process



Re-usable design modules

A third key area is to re-use engineering design modules for commonly used process units. This empowers the engineering team to focus its engineering efforts on the critical and challenging aspects of a process design, while re-using 'best