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HP Project Management | RON BECK
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Build a better bid, or how to achieve a competitive advantage in capital projects

As backlogs and revenues continue to be strong and on an upward path for most global engineering and construction (E&C) firms, competition for the best projects has increased. The energy industry's turbulence and new sense of urgency have imposed aggressive schedules in the bidding phase. **Result:** E&C companies are responding with more aggressive bids, which, in turn, create more uncertainty over cost estimates and project scopes.

Resource shortages and other factors have played a major role in elevating project costs, and owners have responded by pushing E&C companies to provide lump-sum bids. In addition, owners have compressed the front-end engineering and design (FEED) stage of projects, which has led to more midcourse corrections in the project scope, thus taxing the project execution fluidity. To achieve a competitive advantage under this environment, leading E&C companies are applying new powerful and versatile software technologies that empower organizations during the bidding, contracting and project execution stages.

In addition to the increasing number of capital projects worldwide, the size and complexity of these projects have significantly expanded. While a number of global E&C companies have responded by increasing the size of their workforces through acquisitions and organic growth, some companies are concerned that this approach may not be the best solution.

According to Chiyoda Corp.'s executive, Takashi Kubota, speaking at Rice University in September 2014, "We need the size, but does bigger mean better? We are not sure." To remain agile as the size of projects increases, companies need to adapt software that provides the ability for lead estimators and project managers to have superior visibility over the details and complexity of the project. **Result:** E&C enterprises will have better opportunities to navigate through the necessary environment of risk and uncertainty. The SADARA petrochemical complex, the world's largest grassroots petrochemical engineering project, was successful in cost estimations and project planning by applying leading-edge technology.[1]

Additionally, a number of smaller and agile, boutique engineering companies have emerged to fill the needs of industry for specialized engineering to manage small- to mid-sized projects. These emerging companies, often innovative in their organizational style and business processes, have been able to take particular advantage of new software approaches to project development, thus enabling them to compete successfully in the E&C business.

Transparency in the estimate. Experienced estimators are among the scarcest resources in the downstream industry. When time is not a critical factor, brute-force estimating man-hours can be substituted for experience, but this usually only masks the importance and value of an experienced workforce. At the bidding and very early engineering phases, time is a gating factor. Additionally, the judgment and ability to consider contingencies by an experienced estimator are crucial.

For companies lacking experienced estimators, one solution has been to integrate proper software systems with the process, which can be critical in engendering success. The temptation of an estimating group, when under pressure, is to enumerate quantities by developing very large "supercharged spreadsheets." Many of the project assumptions are hidden in formulas within the spreadsheet, and the overwhelming size of such spreadsheets keeps increasing. The difficulties with this enumeration approach are that the full project scope is not transparent. There is a challenge in separating the important cost determinators from the less important details. **Result:** The flexibility to explore scope and process alternatives is lost.

A more sophisticated and effective approach focuses on providing the correct project scope and aligning this scope with the process definition, rather than focusing on enumerating details. Now, E&C companies can concentrate on getting major equipment items and metallurgy correct from the processing point of view. Bulk details, attained through statistical and experienced-based engineering approaches, can be built into the estimating software. This approach has been demonstrated to improve the overall predictability and variance of estimates, and it greatly reduces the required estimating manpower, while improving the transparency of the project estimate in communications between the estimators, the executive team and the proposal manager.[2]

Aligning with the owner. A recent Ernest & Young (EY) survey investigated 365 oil and gas megaprojects, where 64% were identified as running over budget, and 73% as behind schedule. While there were 15 key factors responsible for these problems, during the project development phase,

aggressive estimates and inadequate planning contributed largely to the overly aggressive forecasts.

By utilizing the proper software systems, E&C organizations can attack these problems. A strong front-end-design collaboration system can make a true and accurate process flow diagram (PFD) and key equipment lists available to the proposal team and owner. Such information is provided in a platform for clear and transparent communication and discussion of project scope. It ensures that bids and estimates are prepared with the same realistic basis that the owner is requesting and expecting. This also creates the basis for the owner and E&C company to confront areas of uncertainty and risk in the proposed project, required resources, and realism in the execution plan to make the appropriate decisions early enough in the project planning and development process.

Breaking down barriers.
As global work sharing and the size and scope of projects have increased, managers have become resistant to changing the highly structured business processes. To meaningfully address both the bidding and project execution challenges and risks, these business processes are now being evaluated and upgraded. The powerful capabilities of underlying systems, together with wholesale changes in the engineering workforce, present opportunities for conceiving, developing and executing projects in new ways.

Specifically, during the bidding process, the opportunity to tie together process modeling systems, software to rate major equipment items, front-end deliverable collaboration solutions, and estimating and formal risk analyses will lead to a competitive advantage and better company and project

performance for those organizations that embrace it.

Standardized and modular design.
Another key trend being driven by the energy industry is the standardization and reuse of designs. These one-of-a-kind engineering approaches, which have been used for decades, are increasingly viewed as a problem in a marketplace where spiraling capital project costs can create significant friction. Energy firms are looking for E&C companies to lead the way in proposing standardized rather than "gold-plated" designs.

The same integrated solutions can be applied, in contrast to the traditional workflow, to capture standard repeatable (or modular) design components as building blocks for projects that can be designed and engineered much more efficiently and with higher quality. E&C companies that adopt integrated project modeling techniques and flexibility into their risk management or project changes will help energy companies. This can provide enormous value, and will support large-scale projects more effectively. When an E&C firm reduces the cycle time of a project by a significant amount (i.e., 10%–30%), it can help the client deliver results more quickly.

Additionally, by using the same software between the owner-operator and E&C company, especially when applied with a transparent software system, the scope and resource requirements are clearly communicated. The owner uses this to evaluate bids on a "like for like" basis and ensure that all requested scopes are included. Owners such as ConocoPhillips have demonstrated improvements in project timetables, capital predictability and E&C oversight through the transparent use of the same model-based software system.

Effective decision-making.
The E&C industry is rapidly changing. Customer demands are increasing. Being able to adapt strategy and equip engineering expertise with a cutting-edge economic evaluation software platform throughout the engineering cycle will help to capitalize on project opportunities. By providing cost estimators and project managers with the right tools, project uncertainty and risk can be reduced, thus enhancing the capability for effective decision-making to control capital costs. In the quest for bid-to-win contracts, better and faster designs mean better value for customers, which underpins a successful strategy for E&Cs to survive and thrive in a rapidly developing market. **HP**

NOTES
[1] The SADARA petrochemical complex's cost estimations and project planning was aided by applying the Aspen Capital Cost Estimator estimating system.

[2] Estimating groups, including S&B Engineers, Linde Engineering, Technip USA and Suncor's engineering organization, have reported a 3:1 to 5:1 estimator productivity gain.

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