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FIELD DEVELOPMENT PROJECTS

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AND SAND CONTROL

FEATURES

Shale Challenges Artificial Lift

The Value of Customization

University R&D



Seismic Wave of Change

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Cover: Seismic survey boats working in the Forties Field in the North Sea for Apache Corp. *Photo courtesy of Apache Corp.*

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The big data approach will allow new types of data-driven models to bypass traditional bottlenecks. It is also expected to lead to different views of standard models, thus providing new and valuable insights in the process.



How I Stopped Worrying and Learned to Love Customization

Gary Flaharty and Noman Waheed, SCLinx Incorporated

The boom was great while it lasted, and the bust, at least in North America, has largely played out. Oil and gas companies and service companies have executed their traditional cyclical playbook, cutting staff and squeezing vendors to protect margins. With no quick recovery in sight, attention is now focused on more substantial, systemic cost cutting to improve finding and development costs and service company margins.

One area of potential savings is the standardization of equipment used to complete and produce oil and gas wells. While all the equipment is “round with a hole in it,” the degree of customization evident today is staggering. Conventional wisdom says that if we could agree on and implement standard tools for oil and gas wells, we could drive unnecessary costs out of the system. However, customization of completion and production equipment can add significant value by improving efficiency and increasing production. While some standardization makes sense, it is important for the industry to implement cost-effective supply chain practices to efficiently deliver customization when it improves efficiency and increases production.

Origins of Customization

The current level of customization did not happen overnight. Service companies introduced simple tools and simple processes to design, manufacture, and install these tools. Initially, each tool had a few defined features such as “size” or “threads,” and a few options within each feature. Over time, we added additional features and expanded the number of options within each feature. The industry rarely did this in an organized,

systematic manner. A new well chemistry required a different material, so a new material option was born. A customer wanted a new setting mechanism, so the setting mechanism feature expanded with another option. Features were added to handle high-temperature and high-pressure conditions.

Service companies invested in R&D to develop differentiated technology, so the designs of tools to meet the same downhole conditions varied from company to company. Eventually, the simple tools had given rise to families with thousands of possible configurations to accommodate specific customer needs. Service company’s costs to deliver from a catalog of diverse low-volume products rose and lead times extended as every order became a special.

Customization is Not the Problem

Customizing downhole and production tools may be costly, but it is not in itself the problem. Each reservoir is unique, and an option that improves ultimate recovery by a fraction of a percent can have a significant impact on the financial performance of a field. So customization matters.

However, when each well becomes a one-off engineering project made up of a string of customized components, the conventional oilfield supply chain—which is designed to handle large volumes of standard equipment—is overwhelmed. Each tool configuration must be specified, designed, ordered, and manufactured as a unique product. Soon job shops are full of one-off tools, everything is made to order, set-up or changeover costs soar, and inventories increase. And as configurations pro-

liferate, oilfield service companies are required to support thousands of tool iterations, with myriad drawings, bills of materials, and routings. Few, if any, of the tool configurations drive enough volume to enable reliable forecasting. Costs and lead times inevitably increase.

We see the proliferation of expensive, low-volume configurations of tools and ask why don’t service companies standardize? Why don’t companies identify the most popular configurations of each tool and produce them in bulk? Better yet, why not produce them in low-cost markets? Manufacturing volumes will increase, one-off orders will decrease, and costs will be reduced.

But, we must also ask what if adopting the low-cost, high-volume standard produces tools that limit our ability to meet performance expectations? The danger in standardization is that we may fail to perceive that some of the customization we are targeting for elimination creates value for the customer and that incremental well productivity is driven by many of these one-off solutions.

The Challenge of Standardization

Oil company and service company executives agree standardization could simplify solutions and lower industry finding and development costs. Options that drive little or no value need to be eliminated through standardization. The danger in standardization is that many of the custom features were originally justified because they reduced operating costs or improved well productivity. How do we achieve the cost advantages of standardization while preserving customization that drives value? Oil company executives and

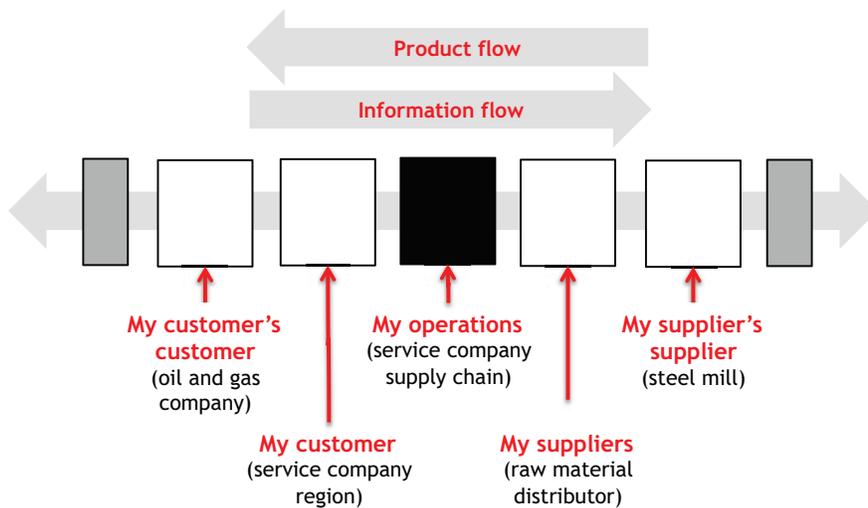


Fig. 1—The broad energy supply chain from the perspective of the service company supply chain.

procurement specialists see the potential in volume buying while they also reward their asset teams on field performance. If the asset managers believe that field performance will be enhanced by implementing a non-standard solution, they will not, and should not, support complete standardization.

A strategic approach to standardization must recognize that many custom features drive better well performance and lower finding and development costs. The industry must implement supply chain practices that embrace—and not eliminate—the custom configurations that create this value.

Start by Thinking Holistically

The first step toward achieving this objective is to broaden our view of the supply chain. We are all part of a broad energy supply chain that extends from the reservoir to the gas pump and from the iron mine to the wellbore. Every member of the broad energy supply chain must take ownership of their portion of the supply chain from their suppliers' suppliers to their customer's customers. When we take ownership of the whole, we take on responsibility and accountability for the results of the whole. It is therefore critical that every organization in the supply chain understands what its customers' customers need to excel, and hone the ability to communicate this with their suppliers, and their suppliers' suppliers. We call this anchoring the supply chain

in the customer. Regarding standardization, the company must be able to distinguish between the options that the customers' customers value and are willing to pay for, and the options that carry little or no value.

Another useful approach is for service companies to segment their business into "customer applications"—groups of customers with similar buying behavior participating in an application with similar requirements—to simplify the process. By developing insight for customer applications such as "independents in the oil shales" or "majors in deep water," the service company can determine when standard products will suffice and when specific custom features are required. With an understanding of what the customer-application values, the company can look at the cost and the profit contribution of each option.

If the customer undervalues the option, i.e., it creates value that the customer does not understand or appreciate, there is an opportunity to educate the customer and increase the value associated with the feature. If the oil service company and the customer agree that the option creates little value, or if there is a low-cost substitute, the option can be eliminated. If the customer believes the option contributes real value but is too expensive, the oil service company must look for ways to lower the cost of providing the option.

Once desired custom configurations are identified, manufacturers can take

three steps to improve their ability to customize while also controlling costs.

Apply lean manufacturing techniques.

Historically, large lot sizes have allowed manufacturers to allocate the setup or changeover costs over more parts. For years, business schools taught the economic order quantity (EOQ) model for lot sizing, and that setup costs should be treated as fixed. Applying lean manufacturing techniques, we recognize that setup costs are not fixed and can be reduced dramatically. Lower setup costs drive lot sizes to one allowing manufacturing plants and vendors to deal with more variation and smaller lot sizes at lower unit costs and in shorter lead times.

Postpone operations driving variation.

Another approach to lowering costs and cutting lead times is to postpone or defer the features subject to variation until the end of the manufacturing process. For example, it may be possible to build and store a threaded part as a "blanked for thread" component and then thread the blank to order once the thread is specified. Postponement allows more of the operations to be completed in larger lot sizes and at lower costs before the order is received while also reducing the lead time required.

Configure tools to order.

Configuring tools to order has tremendous potential for the oil service industry. The configure-to-order approach establishes a base tool with features and options that can be added to create a variety of custom configurations. The planning bill of materials is structured so that any combination of features and options results in a valid configuration of the tool meeting all engineering requirements. Forecasts are made for the parent tool and all the components for possible configurations of the tool. When an order is placed, it is "configured" from a menu of pre-determined features and options derived from the planning bill.

Empower Sales Staff to Customize Tools

The sales staff can use the same planning bill to configure orders in the customer's location. Each option can be linked

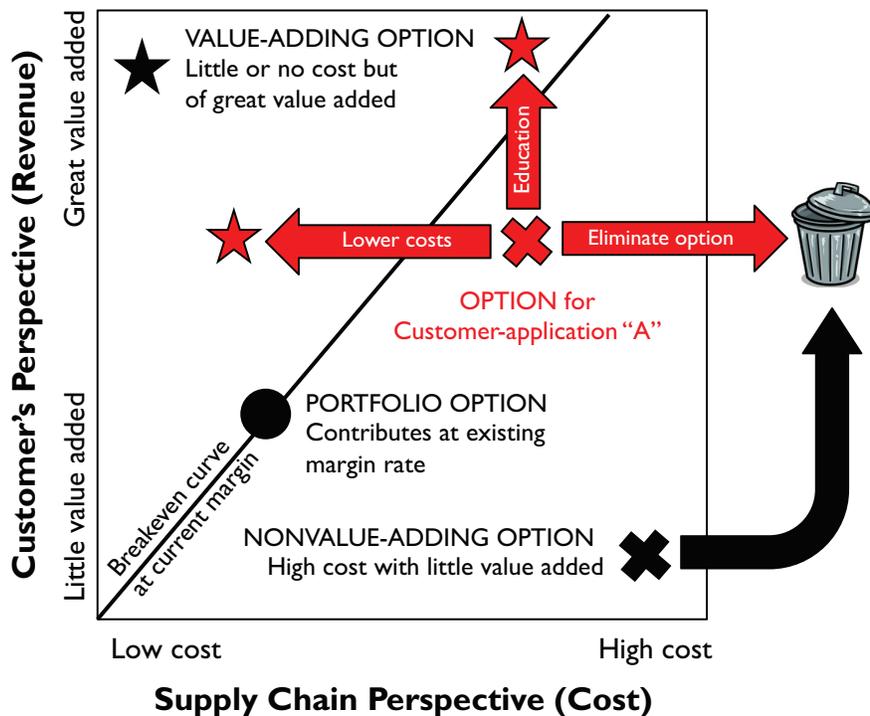


Fig. 2—The customer-anchored approach to standardization.

to its cost, its availability from stock or capacity, its lead time, and its price, empowering the sales staff to quote with confidence and understand the profit contribution of the tool.

Even as we push for standardization, the oil and gas industry needs to embrace customization using lean principles,

postponement, and configure-to-order. Equipment suppliers must give their customers all the options they can economically justify at costs and lead times that make sense. They should be ruthless in eliminating customization that does not create value and learn to love customization that adds value. **JPT**



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Flaharty and Waheed recently published the book *Customer-Anchored Supply Chains, An Executive's Guide to Building Competitive Advantage in the Oil Patch*.