



World Energy interviews Earl Broussard Principal of Nautilus Marine Technologies, Inc.

World Energy: I've not heard of Nautilus before. Who are you and what do you do?

Broussard: Nautilus Marine Technologies was formed in January 2005. A group of principals had been hoping to acquire a company with capabilities in product manufacturing and product development in order to enter the subsea manufacturing market, and a deal was struck in January to acquire such an entity. Work commenced on subsea-tree development in April 2005.

The principals involved in the company's development include a number of recognized industry and subsea experts who collectively have more than 100 years of experience with all types of products. The company's principals include:

- Curtis Burton, 25 years of experience with subsea engineering and applications
- Earl Broussard, 30 years of experience with subsea projects and applications
- Ron MacInnes, 15 years of experience with operations and finance
- Greg Otten, 30 years of experience with engineering, design and quality systems
- Curtis Huff, 25 years of experience with corporate management and law

World Energy: What type of next-generation subsea tree has Nautilus designed?

Broussard: In excess of 90 percent of all deepwater reserves that will be produced over the next seven years will include the application of subsea-tree technology – a subsea tree being a series of valves, components and connections complete with a tubing hanger designed to route produced oil or gas into a subsea flowline or riser system.

Nautilus has designed a next-generation subsea tree that is fully functional at water depths down to 6,000 feet, but that is also cost-effective in depths as shallow as 300 feet. The tree is of a modular hybrid mono-bore design. It is designed to use tubular sizes from 3.5 to 4.5 inches allowing working pressure levels to 10,000 psig. It also incorporates downhole electrics for pressure and temperature monitoring. Our new design has stainless-steel valves for long service life, and all valves will be API 6A, 17D PR-2 and USV tested for sandy service. Installation of the tree is achieved through conventional IWOC systems and can take place with drill pipe or tubing as a running/installation string. The tree uses field-proven designs, particularly improved in critical areas such as tubing hanger seals

and lockdowns, flow-line connections, gate valves and umbilical connections. The centerpiece of the tree is a tubing hanger design that renders the wellhead virtually invisible to the completion process. This capability shortens the amount of time between drilling and production and allows operators a level of flexibility unheard of before.

World Energy: Subsea trees, both vertical and horizontal, all have interfaces with the wellhead system. The manufacturer of wellhead equipment typically designs the vertical trees and tubing hanger systems that interface with the wellhead. Horizontal trees also have an isolation sleeve that must interface with wellhead internals for redundant sealing of the wellhead gasket. How does your product manage to be compatible with the wide array of wellhead systems and manufacturers out there today?

Broussard: The wellhead and tree market is a multibillion-dollar market that is currently held by five manufacturers. Of the five manufacturers, each has at least two to three wellhead systems. This means that to interface with one of these systems, a newcomer to the subsea-tree business faces 10 to 15 different tubing-hanger designs that he must interface with his new tree. It would be a monumental task to attempt to reconcile a tree's design with all of those various tubing hangers. It would be impossible to get the data required to do this from manufacturers, which is the prime reason subsea-tree manufacturing is an industry with five manufacturers.

Nautilus' new designs for trees and tubing hangers are groundbreaking in that they do not function within these historical "standard systems." Our designs will open up the subsea-tree industry, so it can become more of a commodity-centered business like the surface-tree industry.

To enter the market, Nautilus needed a universal tubing-hanger system that would be compatible with all wellhead systems. This was our first design goal, and patents were filed in August 2005. We were able to accomplish this using field-proven sealing and lockdown technology available on the market. Nautilus' universal tubing-hanger system uses the casing's I.D. to effect a lockdown and seal area. As the top of the tubing hanger is smaller than the 18.625-inch bore in current wellhead systems, it is not required to interface with the wellhead. The only level of interface is in the casing, which is built using geometric configurations and specifications that are well known. Without having

to interface with the wellhead, the universal tubing hanger can be short enough that height is not a factor in the interface that must occur between the wellhead and the tree.

World Energy: There are a lot of standards that must be met in order for subsea equipment to be used in the Gulf of Mexico. What steps are you taking to ensure that your product's design and manufacturing meets those standards?

Broussard: Nautilus' subsea tree has been designed and tested in accordance with API 6A and 17D standards and is manufactured within the ISO 9001:2000 quality system.

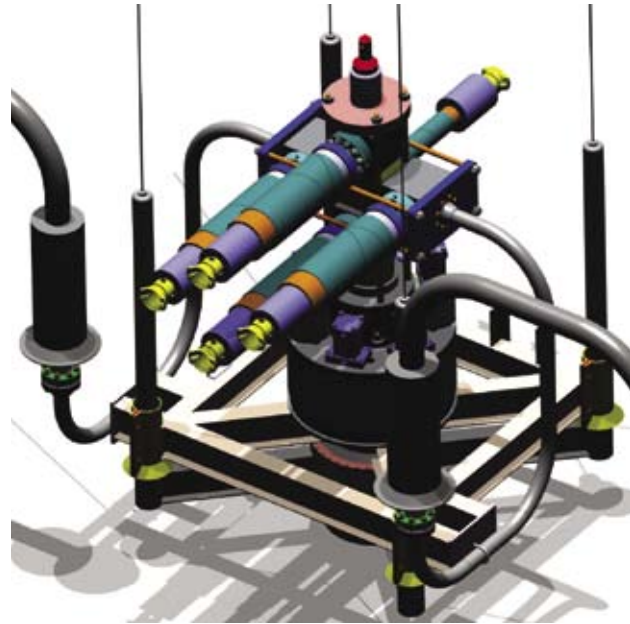
World Energy: Another major concern for most operators is price. Will your product be cost competitive?

Broussard: Currently, deepwater operations such as completing a well costs operators around \$600,000 a day when one considers the full rig spread rate in a deepwater completion. Between the amount saved on rig time and the lower expenses involved with the cost of our tree, a substantial savings can be realized on each completion. When using current mono-bore tree designs, our tree can save operators \$2 to \$9 million; for a horizontal tree, the savings can range between \$6 and \$11 million. This is the type of saving that can alter the commercial viability of a prospect.

World Energy: It seems as though your new subsea tree could dramatically change the market for subsea producers and small-to-midsize operators. How soon will you be able to bring the new trees to market?

Broussard: We expect to be able to release our first tree during the first quarter of 2006. Nautilus' strategy is to provide hardware within 10 days or off the shelf. Subsea trees generally have a long delivery time – six to 12 months on average – and that means it can take one to two years to start producing oil. With off-the-shelf hardware and universal tubing-hanger systems and subsea trees, a well can be tested and completed much more quickly; production can occur one to two years faster.

World Energy: Despite everything you have said, the five main operators in the industry claim there is already plenty of capacity in the market and no new players are needed or welcome. How do you plan to handle that problem?



Broussard: Most major manufacturers tend to focus on large projects that allow them to use the same product repeatedly. It's difficult for them to change designs and maintain inventories for the small operator. It's always hard for major manufacturers to focus on small projects that consist of one or two trees. The products on the market today have evolved over years, and were mainly developed by major operators and manufacturers. In many cases, small operators are forced to use complex gear to solve simple problems. New designs that are faster and cheaper to use need to come to the market, but that doesn't mean quality has to be affected. We adhere to API and ISO standards in our manufacturing and quality processes. For Nautilus, streamlining the process in terms of time and cost means that instead of requiring 37 tools to run and install a horizontal tree or 24 for a mono-bore tree, we can install and run a tree using five tools. Some of the big horizontal trees made today weigh 50 tons! They weigh so much they have to be broken apart to be lifted up on to rigs. By way of contrast, a Nautilus tree will weigh 14 tons or less.

Size, weight, the complexity of the running and installation operation – all these things cost big dollars, and when you are working on small projects that might not have such resources, universal systems that are easier to install are a better option. High-quality products that are easier and less expensive to install will drive us in subsea-tree market. Nautilus' product offering in the subsea-tree market fits those requirements to a tee – small, light, inexpensive to install and to acquire.