

New branches in tree technology means savings

Alan Christie, Schlumberger

IN THE ENERGY industry, a “tree” has always had only one connotation—but not any more.

The well-known Christmas tree that marks oil and gas well installations on land, platforms and seafloor has an upscale counterpart capable of a host of expanded applications not associated with the traditional production tree.

The new test trees are not permanently fixed to the seafloor, but are deployed inside the marine riser by a landing string, run through the BOP stack, connected to the production tubing hanger and then retrieved.

Combinations are derived to suit a variety of completion and well testing applications.

Control systems in the test tree system perform 24 functions, one being a 15-second disconnect.

Based on field-proven openhole logging and drillstem testing (DST) technologies, the modular system has a 10,000-psi working pressure, a 300°F temperature rating and an OD of 18 in.

The modular design allows simple integration with subsea BOP stacks and third-party hanger systems, and by increasing safety and efficiency aspects, enhances reliability and service quality.

As the offshore industry has progressed from drilling wells in shallow plays to exploring and developing the inky depths of subsea canyons, technology requirements have evolved.

Atypical of traditional production Christmas tree functions, the latest subsea completion tree technology is being applied in management of well operations during temporary and permanent completions, well-cleanup operations and as an alternative to traditional subsea intervention methodology.

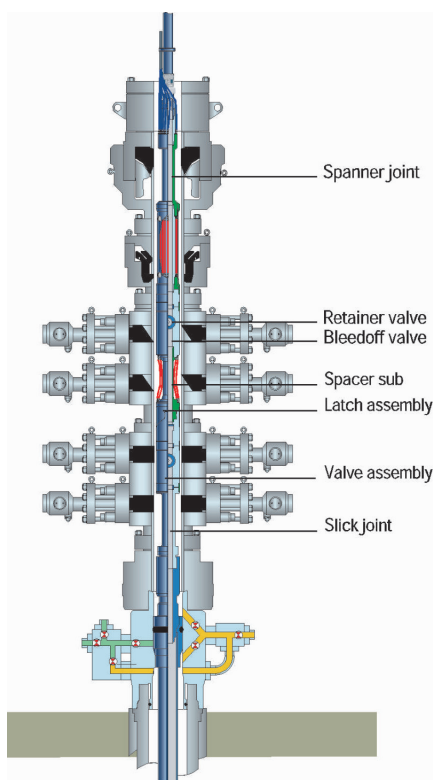
The need for such comprehensive capabilities is particularly emphasized in deep and ultra deep subsea operations.

What might seem a minor difficulty on land looms large in the deepwater environment.

Crushing water pressure, combined

with an essentially blind environment, create enormous difficulties.

Equipment failures can potentially reduce the production rate and dramatically increase operating expenses. Cost analysis focuses on the potential of unforeseen events as well as capital expenditures and operating expenses.



SentREE's test tree completion configuration. The tree can also be configured for DST operations. The test tree telemetry control system provides a 15-second response time

The open water environment available to the hardware industry is not available to the completion well control sector.

Development of a well control device suitable for ultra deep water has the added constraint of needing to fit inside a drilling BOP and have a large bore (7 3/8 in.).

Operators in these challenging environments seek safer, more effective methods and technologies that include:

- Effective management of operations

before and after the well is drilled and permanent installations set

- Well control
- Real-time feedback on downhole conditions and functionality of operational equipment
- Experienced support specialists from program design to project completion to troubleshoot and maintain the highest levels of reliability
- Flexibility for operating efficiently from either anchored or dynamically positioned vessels.

More than 25 years of development reaching back to the first offshore safety systems deployed from early semi-submersibles has brought advancements that emphasize the key drivers for deepwater success—performance, risk and cost.

With these advances, the industry can increase or accelerate recovery from reservoirs while minimizing risk and lifting costs.

TREE AND VALVE TECHNOLOGY

Record-breaking operations using the Schlumberger SentREE* 7 well control system and TRC-DH deepset surface-controlled subsurface safety valves for a major operator in the Gulf of Mexico exemplifies industry progress and how service companies have risen to the challenge of technology, installation and expanded application.

With the successful completion of six wells in a deepwater field from a dynamically positioned vessel using the SentREE well control system and Commander* telemetry control system technology, Schlumberger extended its own world record water depth for subsea completion tree services to 7,200 ft.

Breaking another record, a 4 1/2-in. deepset safety valve was set in 9 5/8-in. casing at 9,801 ft where the shut-in pressure is 6,500 psi and reservoir pressure is rated at 7,400 psi. Temperatures at setting depth range from 75 to 150°F.

REALLY REMOTE WELL CONTROL

Setting tubing hangers with the push of a computer key was only a dream five



The SentREE test tree is ready to run in West Africa.

years ago. Now, with 13 of these operations having been successful, first-time fears over reliability are being overcome.

Use of information technology (IT) and associated technologies will only increase in the ultra deepwater plays. Not long ago, such technology would have been laughed off the offshore platform.

UP THE DEVELOPMENT CHAIN

Value is being seen in new relationships. Advancements in tree technology have transformed what was once deemed dumb hardware into intelligent solutions.

Design of these systems involves closer technical interaction between operators, equipment providers and oilfield service companies.

Now that we can confidently sense, measure and manage events as they happen between the rig and the wellhead, the next technology frontier lies in the well itself.

IT and associated technologies will play a key role in the future health of the offshore subsea industry.

The full potential of these systems is not being realized due to minimal, poor quality data and the inability to do something meaningful with it.

These issues are being addressed. The winner in this field will be the one who manages to act on the information provided.

Failure to embrace this technology will lead to loss of competitive edge. Today, as we doubt the use of a PDA to control a well offshore, we send people into space supported by fuel cell technology alone.

It is hoped that technology branching off from the Christmas tree of the past will continue to develop into a forest of smart technologies that will safeguard the subsea industry's future. ■

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