Heavy duty jackup rigs are versatile and capable

John Kennedy, Contributing Editor

THE FUTURE OF HEAVY duty jackup rigs looks strong because they offer operators a desirable option in a number of different offshore environments.

In the North Sea, both environmental conditions and drilling conditions can be severe. Today's heavy duty jackups can operate there in depths to 350 ft year 'round while providing the advantages of operating with a surface BOP stack.

In other areas such as Southeast Asia, where the environment is less severe, the units can operate in deeper water and provide a design option for operators that previously considered only platforms designed for tender-assisted drilling or platform mounted rigs.

That's the view of **Charles N Springett**, Vice President and Chief Engineer, **Santa Fe International Corp**.

APPLICATION RANGE

Santa Fe moved its Monarch jackup into the Central North Sea in 1987 in 305 ft of water because they were convinced that, with the right design, jackups should not be limited to the southern portion of the North Sea. Monarch is a **Friede & Goldman** "Monarch" class jackup, also sometimes characterized as a Mod V.

"Successful operation of the Monarch in this environment created a market for jackups in those water depths," said Mr Springett. "Operators began to satisfy themselves that jackups were technically feasible in these depths and, because suitable rigs were becoming available, started to build their field development plans around jackups where the only previous option had been use of semisubmersibles and platform rigs."

Confidence in Monarch's performance encouraged Santa Fe to build Monitor (also a Mod V), delivered in 1989, and followed "in quick succession" by Galaxy I (a new and larger "Universe" or "Mod VI" class rig designed by Friede & Goldman with enhanced drilling capabilities) and Magellan (a Mod V also with enhanced drilling capabilities).

In addition to the demands of the North Sea's severe marine environment on hull design, drilling involves conditions of high temperature and high pressures. So a rig must also be properly equipped to drill such wells safely.

In addition, the commercial environment dictates that the drilling equipment is specified and arranged for maximum drilling productivity.

In Southeast Asia, the marine environment is less severe, making much of it good jackup territory.

Santa Fe International's heavy duty jack-up rig Galaxy III is capable of working year 'round in up to 350 ft water depths in the Central North Sea.

"The availability of jackups that can work in 400 ft of water will cause operators to take another look at their field development designs," said Mr Springett.

"In the future, we expect that platforms will be designed with both jackups and tenders in mind."

CAPABILITIES

"There are different definitions of 'heavy duty' jackups," said Mr Springett. They all offer some combination of deep water, harsh environment and high capacity drilling equipment; some of them offer all three.

Depending on how the class is defined, the global fleet includes 16-20 units and several are under construction.

Santa Fe's three Mod V Class rigs are capable of operating year 'round in 300 ft of water in the Central North Sea. Water depths greater than this are subject to site specific approval.

In 1997 and 1999 Santa Fe added two more Mod VI jackups to its fleet. The three rigs—Galaxy I, Galaxy II and Galaxy III—are considerably larger than the Mod V units and are capable of working year 'round in up to 350 ft water depths in the Central North Sea.

Galaxy III is working offshore Eastern Canada.

The company has 6 new units under construction, the first of which is scheduled to be delivered in about 18 months.

Capability of these units will be between that of the Mod V and Mod VI designs, said Mr Springett, but they "will not be configured initially for harsh environment assignments."

"The basic hull design determines if the unit will have heavy duty, harsh environment capability.

"But how well a rig is equipped is the key to drilling productivity," said Mr Springett.

Its Galaxy rigs and Magellan are outfitted with three **National Oilwell** 2,200-hp mud pumps capable of operating at 6,000 psi with standard fluid ends. Operating pressure can be raised to 7,500 psi by upgrading the fluid ends, though this has not yet been necessary.

Large pumps are not the only consideration when designing the drilling fluids system. Santa Fe's Galaxy rigs have 5-in. ID high pressure mud lines and multiple high capacity linear motion shakers.

"To get higher drilling productivity, the entire mud handling system must be designed to remove cuttings from the mud as efficiently and completely as possible at maximum flow rates." said Mr Springett.

ROWAN TO ADD GORILLA VIII

Several companies offer heavy duty or harsh environment jackups, including **Chiles Offshore Inc**, **Ensco International Inc**, **Maersk Contractors**, **Rowan Companies Inc** and **Smedvig ASA**.

Rowan has 6 heavy duty, harsh environment jackups—Gorilla II, III, IV, V, VI and VII. Gorilla VIII is under construction with a delivery date in 2003.

"We are seeing increased interest for these rigs in Eastern Canada, the North Sea and the US Gulf of Mexico," said **Danny F McNease**, President, **Rowan Drilling Company Inc**.

"The gas incentive proposed by the (**US Minerals Management Service**) MMS will create a lot of deep drilling."

The versatility of heavy-duty jackups makes them able to work in severe environments or in deeper water where conditions are less severe.

Rowan's Gorilla VIII, now under construction, will be able to work in water depths to 550 ft in the Gulf of Mexico, for example.

And high horsepower and high mud pumping capacity make these rigs suitable for drilling deep wells on the continental shelf, where strong activity is expected.

Rowan's Gorilla class rigs have hook load capacities ranging from 1.3 to 2.5 million lb.

Cantilever reach of the Gorilla units ranges from 52 to 100 ft, the longest reach of any jackups.

Rowan is also building a shallow water, deep drilling unit in the Tarzan class.

Scheduled for delivery in 2004, it will have the same horsepower and pumping capacity as the Gorilla class rigs.

As far as the overall market for offshore drilling, "After the first of the year, it should be better," said Mr McNease.

"With gas prices low, operators are switching from marginal development programs to an exploration mode."

Operators put exploration projects on hold when gas prices were high to concentrate on development drilling that brought quick cash flow.

MORE UNITS

Ensco's Rig 101 is rated for a nominal water depth of 350 ft and has a rated drilling depth of 30,000 ft.

Leg length is 540 ft; cantilever movement is 70 ft. It is equipped with three 2,200-hp mud pumps rated to 7,500 psi and a derrick with a capacity of 1,960,000 lb that is equipped with a top drive.

Maersk describes its Gallant jackup as "ultra harsh environment." It is rated for 350 ft with wind speed of 86 knots, wave heights of 98 ft and a 1.9-knot current.

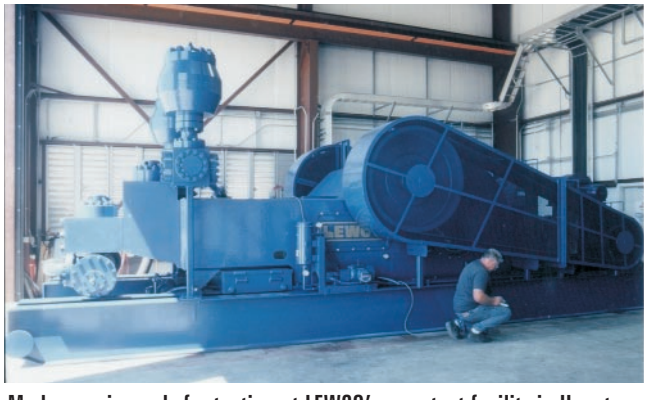
Rated drilling depth is 25,000 ft; hook load capacity is 1.5 million lb with top drive. The cantilever allows the well center to be placed 60 ft aft of the stern and 15 ft on either side of centerline.

The Smedvig West Epsilon is a deepwater jackup for unrestricted North Sea service up to 120-m water depths. Derrick is rated for 2 million lb static load and equipped with a top drive. Three mud pumps can deliver 1,900 gpm at 5,000 psi with 6 ½-in. liners. Cantilever reach is 60 ft and 15 ft on either side.

LEWCO opens unique new mud pump test facility

A PUMP TESTING facility opened by **LeTourneau Ellis Williams Company** (LEWCO) in Houston is the only one of its kind that is owned by a pump manufacturer, making the $1 million full load testing facility unique in the oil and gas drilling industry, according to LEWCO.

The company insists that each pump be full load tested prior to shipment to ensure that the customer receives the pump it selected.



Mud pump is ready for testing at LEWCO's new test facility in Houston.

The new facility enables LEWCO to conduct testing at horsepower up to 3,000 and pressures to 7,500 psi on pumps that are driven by either AC or DC electric motors.

Other special tests can also be performed.

A purpose-built computerized instrumentation system monitors the test, displays information in real time and provides a hard copy of results. The monitoring system records temperatures, pressures, sound levels, strokes per minute, horsepower and vibration.

The facility is located at LEWCO's 110,000 sq ft manufacturing plant in Houston.

LEWCO will also test other pump brands, if requested, when the facility is available.

LEWCO recently introduced its new W-3000 mud pump, designed to handle up to 3,000 input horsepower. It has a maximum working pressure of 7,500 psi and a maximum output of 1,044 gal/min at 100 strokes per minute.

Like other LEWCO pumps, it can be factory adapted for use with most major brands of fluid-end modules.

Also like all models, the W-3000 has an inherently balanced crankshaft that minimizes vibration, reduces wear and provides quieter operation.

LEWCO recently received an order from **Atwood Oceanics Inc** for three 2,200-hp triplex pumps and drives to be installed on its new jackup being built in Singapore and scheduled for completion in 2003.

The pumps have a maximum working pressure of 7,500 psi and operate at up to 100 strokes/min.