

Rig competes with new, refurbishment rig costs

THE IDEAL 1500, a new generation land rig with mobility and safety features designed into it, is priced to fit the economics of today's drilling contractors. **National Oilwell's** newest generation of rapid deployment rigs is aimed at competing not only with new rig costs but also with refurbishment costs of older rigs with a price tag of just over \$7 million. The two-piece mast and the substructure are raised hydraulically via remote control with the operator safely at ground level. Rig up requires about 15 minutes to raise and pin the rig floor and mast once they are in place at the

tion time and rig up and rig down time.

The large capacity mud pumps can be expanded to two-motor drive for increased pumping capacity. Only two tanks provide the necessary total volume.

The drawworks, traveling block, rotary table and optional top drive remain mounted in the mast during transportation and assembly. The 1,500 hp drawworks is remotely controlled and mounted at ground level to maximize usable drill floor space. The drawworks disc brake system provides for maximum

the driller's side of the substructure.

Both sections of the 142 ft mast are transported to the rig site on separate mast dollies. The upper section includes the traveling block and drill line spooler while the optional top drive travels in the lower section. The mast sections are joined, positioned, aligned and pinned together using National Oilwell's adjustable crown kingpin, which allows side-to-side alignment, and adjustable lower mast section dolly, allowing vertical and horizontal alignment. If a top drive is included, the track sections are simultaneously aligned and linked.



With the substructure in the low position, the mast is pinned to the middle drill floor section. The mast cylinders are pinned to the lower section of the mast and then hydraulically telescoped. With the mast in the vertical position and the hydraulic raising cylinders still in place, mast support legs are swung out and pinned to the floor. The mast-raising cylinders are then disconnected and retracted.

rig site. The rig also includes a large enclosed driller's cabin with a full view of the rig floor, ground and mast. The rig is designed for a small footprint, requiring only an 85x263 ft area.

RIG FEATURES

The rig, available in standard DC/SCR power or optional AC power and controls, features numerous design innovations aimed at reducing rig up time. Only 25-27 loads are required to move the rig to the wellsite, about half the loads of a typical rig. The substructure and mast are raised hydraulically via remote control, reducing the number of crew required to rig up. Additionally, the mast can be configured to lay down over either the V-door or drawworks.

An innovative secure pinning system makes structural connections safe and easy. No cranes are required for drilling module or mud system assembly. The modular mud system requires only four truckloads, further reducing transporta-

tion time and rig up and rig down time.

Deployable booms utilized with the electrical system minimize connections and result in easier hook up and longer service life. An optional Smart Drilling Rig Information System enhances remote monitoring capability.

ASSEMBLY

Assembling the mast and substructure is a straight forward operation. The substructure consists of three pieces, the off-driller's-side (ODS) box, a drill floor middle section and the driller's side (DS) box. The ODS and DS are placed and the drill floor middle section is slid between and pinned to the ODS and DS. The drill floor section slides into place on a rail system. Pin lugs are then flipped up and pinned when the drill floor is in the correct position. The pins for the substructure and the mast assembly are accessible at ground level for easier and safer assembly.

The driller's cabin is then connected to

The mast assembly's lower section is then disconnected from the tractor's fifth wheel and backed up to the mast base. Utilizing the adjustable crown kingpin and adjustable mast dolly, the mast assembly is elevated and maneuvered with the mast base to align the pin lugs and the pins are installed.

The mast's racking capability includes 208 stands of 5 1/2-in. drill pipe and ten 90 ft stands of 8-in. DC's.

MAST AND SUBSTRUCTURE

Both the mast and substructure are raised by utilizing a portable hydraulic system. The hydraulic cylinders are extended to align with and pin to the mast, and the mast is then disconnected from the second tractor's fifth wheel.

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and the hydraulic raising cylinders still in place, mast support legs are swung out and pinned to the floor. The mast-raising cylinders are then disconnected and retracted.

The drill floor is then hydraulically raised via the telescoping cylinders. Telescoping braces prevent the substructure from rotating past the vertical position. The braces are extended when the floor is at ground level, and as the substructure rises, the braces retract and “bottom out” on a stop and are secured with pins.

INNOVATIVE MUD SYSTEM

The rig’s mud system includes several



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innovations that reduce transportation time and rig up and down time. Only four loads are required to transport the mud system compared with the typical 14 loads due to the modular skid design that also eliminates removing handrails.

Accelerated fluid unloading from the tanks is performed using vertical centrifugal pumps and a sump located in each compartment. The wash down system provides a safe and fast clean up of the tanks after fluid unloading while minimizing crew time in closed compartments.

The rig also features three of National Oilwell’s patented high performance dual motion shale shakers that offer the option of either linear or balanced elliptical motion. The shaker also features Posi-Loc Screen Clamps for quick and easy screen changes.

LIGHTWEIGHT GEN SETS

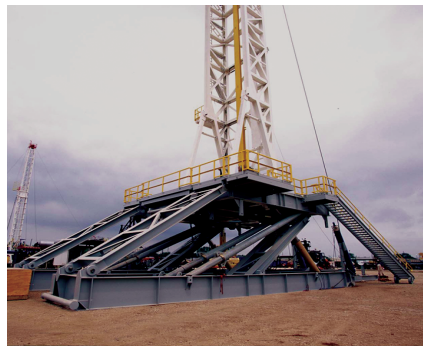
The Baylor generator sets are powered with Detroit Diesel MTU 16V20000

engines supplied through **Stewart & Stevenson**, providing 1,350 brake hp at 1,800 rpm. The Detroit Diesel engines are about 8,000-9,000 lbs lighter than the Caterpillar 3512 engine, according to **Jim Embry**, the **Detroit Diesel** Business Manager for Stewart & Stevenson.

The smaller engines are more portable and can fit into tighter envelopes, helping with the rig’s small overall footprint.

The engines are electronically controlled to provide better fuel efficiency, safety shutdowns and self diagnostics such as mapping horsepower requirements.

RIG AUTOMATION



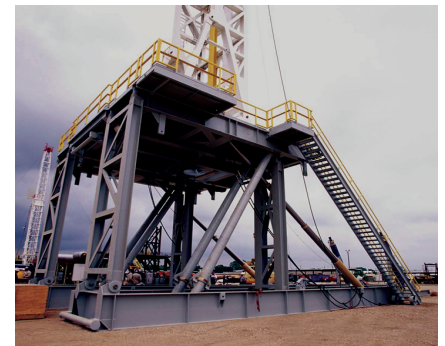
Several optional automatic systems are available for the rig, including the IDEAL Auto Driller and Brake Control Safety System and a data acquisition system.

With the Auto Driller, a joystick control means the driller can move from the drawworks to an optimum position on the rig floor, negating fatigue factors associated with operating a brake handle. The driller is provided information on block height, ton mile and other operating parameters, resulting in safer rig floor operations and lower risk of block collision, improved rate of penetration and longer bit life.

The system features floor and crown saver with soft stop and maximum speed control, band brake pad adjust and wear alarm, spring-operated safety backup and ton miles indicator, all readily viewable on a multi-function display panel.

Another optional feature is the Sdi 25/50

Data Acquisition System that provides a digital alternative to conventional analog instrumentation. This system includes a driller’s display panel; a full-function PC workstation; safe aware workstation complete with system software configured to display, log and print drilling information; signal conditioning unit to collect sensor information and distribute it to the system PCs; driller’s meter panel fitted with gauges, meters and bar graphs that operates independently from the system processors to provide display redundancy; Drill-Graph to produce a continuous printed record of key drilling and mud parameters; and Drill-Log that involves a software module coupled to a storage device to record



a continuous and retrievable log of all Sdi parameters.

The system incorporates separate display pages for drilling parameters, mud information, pump parameters and trend analysis throughout the drilling cycle. Additionally, the operator can construct and store custom display pages with parameters and layouts to suit particular well operations.

The system uses a touch screen interface for all display pages and operator functions and allows for easy configuration of value ranges and alarm settings using on-screen menus that can reduce operator training requirements. Additionally, the various screens offer both analog and digital displays. The display can also be custom configured and changed to suit the operator, including position, size and color of the graphics. Descriptive graphics can be incorporated where appropriate to facilitate the understanding of the drilling process for less experienced operators. ■