

# LOC250 rig uses technologies to increase well value

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**SEVENTY PERCENT OF** today's worldwide oil and gas production comes from fields discovered before 1970. The continued infield development of these areas challenges the industry to economically exploit smaller and smaller pockets of recoverable reserves. Casing While Drilling (CWD) is the perfect solution for these types of wells in difficult drilling circumstances, such as depleted zones and unstable formations.

**Huisman Special Lifting Equipment BV and Drillmar Inc**, through technology development joint venture, have developed an innovative new rig concept: the LOC250, Land and Offshore Containerized 250 ton hookload rig. The LOC250 is designed to take advantage of today's emerging CWD technology to reduce the costs as well as the environmental impact of drilling a well. Two LOC250 rigs are currently being built, with the first to be operational by mid 2005.

The LOC250 drilling depth capability of 5,500 m with 4 1/2-in casing, 4,500 m with 7-in casing, and 3,500 m with 4 1/2-in drill pipe. It is acknowledged that CWD is not the solution for all wells, therefore the LOC250 has been designed to drill with conventional drill pipe as efficiently as with casing using the same automated pipe handling and tripping processes.

## TRANSPORTABILITY

ISO containers are the most standardized and cost effective method to transport any type of equipment or material. They can be found at the most odd locations, downtown New York, offshore in the North Sea, a jungle in South America, or a desert in Saudi Arabia. To reduce mobilization and rig move costs, the complete LOC250 rig can be transformed from a functioning land or offshore platform rig into 17 ISO containers. This has been accomplished by designing the rig in a manner whereby its load bearing components are either in the shape of, or can be pivoted, rotated, or connected into, an ISO container.

For example, the sea transportation fee to move a LOC250 from Rotterdam to Houston is \$1,800 per container—approximately \$35,000 vs \$500,000 for a similar capacity conventional drilling rig.

The LOC250's modular design enables it to be used for multiple purposes: single well land locations, multiple well pad land locations, offshore platforms or floating/posted barges for drilling in lakes or in-land waters. The LOC design can also be combined with a wheel mounted skid base to allow very efficient rig moves in a remote desert local. With a special moving package the rig can be moved in the desert within a few hours (depending on the distance) with only two loads. However local circumstances may require different options.

The LOC250 can be released from a well location, move to the next location and be able to spud the well within 24 hours in most land environments.

## CASING HANDLING

Well designs and drilling activities in general are very heterogeneous in nature. They require versatility and the ability to use the right tool for the right job. At times, CWD enables significant advantages while other times the use of drill pipe is the right solution. Offshore, a drilling rig is typically also required to run completions and production tubing.

The LOC250 has been designed to handle range III and range II pipe from as small as 2-3/8-in to as large as 13-3/8-in in diameter with the same automated pipe handling system. This system includes hydraulic pipe rack/indexing arm, a horizontal to vertical handling machine, a pipe stabbing arm, automated slips integrated into a rotary table, and a tubular drive system with automated elevators that is attached to the bottom of the top drive.

The top drive/tubular drive system is utilized to spin in and torque up or break out the connections with the specially designed rotary holding back up. The drilling process is normally hands-off

with most connections but when tripping coupled casing out of the hole, manual back up tongs are required. The system will be able to trip casing, drill pipe, or tubing at a rate in excess of 2,000 ft per hour when using range III pipe. When running completion tubing, the LOC250 design requires the use of industry standard power tongs.

The operating philosophy is that the drill pipe handling is identical to the casing



This rendering shows the Land and Offshore Containerized 250 ton hookload rig LOC250 in the land configuration. The rig has been designed to drill with conventional drill pipe as well as with casing while drilling technology using the same automated pipe handling and tripping processes.

handling enabling well site team to transfer operational experience from CWD to drill pipe drilling and vice versa. This is especially valuable when training local rig crews.

## OFFLINE EFFICIENCY

To reduce flat time activities the BOP's are pressure tested offline on a dedicated test stump that also serves as a mouse hole. After testing, the control hoses do not have to be disconnected to move the

BOP onto the wellhead, thus only the wellhead has to be tested in the critical path of the rig operation. Also, BHAs can be made up and broken out offline using the crown-mounted service crane as a stand builder. The BHAs can be racked back at the side of the mast ready to run into the hole or broken and laid down off the critical path of the well operation.

## **SAFETY AND ENVIRONMENT**

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Statistics show that pipe and material handling leads to almost 35% of the recorded accidents. The automated pipe handling process removes personnel from the rig floor and catwalk an overwhelming majority of the time, eliminating the potential for many of these accidents.

Together with the simplified rig up and down process, the smaller, well-balanced loads of the LOC250 effectively reduces the risk for accidents during rig moves, which are the second largest contributor to lost time accidents in the industry.

Adverse impact to the environment is minimized by reducing the hydrocarbon emissions per well by up to 65% and the location foot print by 50%. Further, the cascading shaker system provides dryer

cuttings that can reduce solids disposal wastes by up to 30%. Since the total height of the rig is only 125 ft, the silhouette does not pollute the horizon, which in some areas can prohibit a well program altogether.

When casing drilling, the noise generated from the operation is significantly less since the rig's drawworks is used less than 25% of the time required during a conventional drilling process.

## **FULL PACKAGE**

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The LOC250 is a fully balanced operational rig. All components such as the top drive, drawworks, mud pumps, mud system, BOPs, etc, are fully commissioned and tested. A fully integrated control and monitoring system is included that allows remote trouble shooting support (mechanical rig as well as wellbore operations) with the goal of enabling quick diagnosis of any type of problem minimizing operational non productive time.

This system is an open system format and web-based (video cam/phone) to allow the user to take advantage of local communication providers and new emerging electronic technology with the goal of keeping these operating costs as

low as possible. This system allows Huisman-Itrec to technically support the rigs remotely anywhere in the world.

## **PLUG AND PLAY CAPABILITY**

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With additional plug and play modules (ISO containers) the capability of the LOC250 can be further increased. The following modules are available: additional mud pump, additional mud tanks, arctic-pack and a silent-pack. The LOC 250 has also been designed to easily integrate standard available underbalanced drilling packages from various suppliers.

The LOC250 is an extremely versatile well construction rig that can be transported around the world for much less money than simply moving a local rig from one location to another. The rig can drill and complete wells very safely and cost effectively both on and offshore with either casing or drill pipe.

The use of the rig enables the environmental impact of drilling a well to be cut in half with proper planning. The LOC250 was conceived as an entire drilling strategy that many times may enable sub-marginal fields to become profitable as a result of a step change in drilling performance. ■