

# Automation central to Oseberg Sør rig

Dr Friedrich Schneider, Bentec GmbH

**THE OSEBERG FIELD** spans block Nos. 30/6 and 30/9 in the Norwegian sector of the North Sea, approximately 130 km northwest of Bergen. The field is named in commemoration of one of Norway's most significant archeological discoveries—the excavation in 1904 of a 9th Century Viking ship from a burial mound at the Oseberg Farm south of Oslo. The oaken vessel was 22 m long, with a beam of 5 m.

The Oseberg Sør platform will be installed in a water depth of 101 m some 13 km south of the established Oseberg Field Centre, and is expected to go onstream during August 2000. The platform comprises a 125-m tall steel jacket supporting a total topside dry weight of approximately 14,000 t, including a 100-bed capacity living quarters, 1st-stage separation facilities, power generation and utility systems, and a high-performance drilling package.

The installation's design capacities are:

- Oil production: 14,900 cu m/day;
- Water production rate: 12,800 cu m/day;
- Water injection capacity: 41,500 cu m/day;
- Gas injection capacity: 3.8 M cu m/day;
- Gas production rate: 3.4 M cu m/day.

With oil and gas reserves estimated at 53.5 M cu m and 11 G cu m respectively, and a projected production life of at least 20 years, operator **Norsk Hydro** sought to incorporate the highest possible levels of operational efficiency and safety in the Oseberg Sør platform design.

**Bentec Norge AS** is a relatively new company in the Norwegian market place. However, as a subsidiary of **Bentec GmbH** in Germany, who in turn are wholly owned by **Deutsche Tiefbohr-AG, Deutag** (a member of the **Preussag Group**), they have a well-established track record in drilling facilities and system design. Direct access to a wealth of operational experience has enabled Bentec to develop a wide range of innovative rig design concepts and control systems over the years, many of

which have been adopted by the Oseberg Sør project.

Following a brief but intense concept development period during the latter part of 1996, Bentec was invited by Norsk Hydro to compete to design and supply the complete platform drilling rig for Oseberg Sør under an EPC Contract. Subsequently, Bentec was pleased to be awarded a direct purchase order from Norsk Hydro in January 1997 and con-



**Oseberg Sør: This highly automated rig for offshore Norway is the result of 2 years of design, engineering and fabrication. The unit can operate with a crew 20% smaller than a comparable "standard" rig, manufacturer Bentec says.**

tinued with the concept development in conjunction with the prospective main topside EPC contractors. 6 months later this purchase order was, as planned, reassigned to **Aker Stord AS**, selected as the main topside EPC contractor.

Norsk Hydro's selection of the main topside EPC contractor effectively "froze" the overall platform design concept and enabled Bentec Norge AS to commence their detailed engineering phase in July 1997. Despite very high levels of activity worldwide, Bentec were able to specify and procure all main equipment for delivery within the schedule.

The Oseberg Sør drilling rig is designed to operate over a 32-slot well pattern and is of a conventional configuration, comprising a skid base assembly substructure with 4 main levels and a drilling derrick. (Total dry weight approximately 1,800 ton.)

The main drilling equipment ratings and capacities are:

- Drilling derrick: 650 t (50 m clear working height), base 12.85 x 12.50 m;
- Setback capacity: 2 stands 30 in. LP riser, 2 stands 18 ¾ in. HP riser, 4 stands 9 ½ in. DC, 165 stands 6 ⅝ in. DP, 1 stand 9 ⅝ in. Core Barrel, 1 stand in doubles finger latch, (DC make-up);
- Traveling block/top drive: **Hydralift** HPS 650, 650-ton capacity;
- Drawworks: **Wirth** GH2500EG, 532kN line pull;
- Vertical racking machine: **Varco** PRS-4I, 12.5 t lifting capacity;
- Power slips: **Varco** PS-30;
- Mousehole spider: Tubulars up to 14-in. diameter;
- Iron Roughneck: **Varco** AR4000 (new tool);
- Central HPU: 500 l/min at 207 bar;
- Rotary table: **Wirth** 49 ½ in. /650 t;
- Diverter assembly: 34.5 bar (fixed housing);
- BOP stack: **Cameron** 18 ¾ in./5,000 psi;
- Cutting slurrification unit: **Bentec**, sized for 100 m/hr ROP;
- Rig jacking system: Hydraulic rams (2 x 425 ton/2 x 385 ton);
- Shale shakers: 6x **Thule/Rigtech** VSM 300;
- Passenger & goods life: **Alimak** 1,500 kg (serving all main decks).

Although conventional in its overall configuration, the Oseberg Sør drilling rig is very highly automated, and can be operated with a drill crew approximately 20% smaller than that required to operate a "standard" modern rig. Horizontal and vertical pipe handling is fully automated and remotely controlled from an enclosed Drilling Control Room (DCR), designed and supplied by Bentec. The ergonomically arranged DCR provides an uninterrupted view of the whole drill floor and upward into the derrick. All pipe handling equipment can be operated and viewed from a comfortable seat-

ed position using joysticks and other simple control mechanisms. There are 2 operator chairs in the DCR, one each for the driller and assistant driller. Each is equipped with swivel/recline facilities, and all major controls are mounted on the chair arms. The DCR is also fitted with closed circuit televisions (CCTV) monitors and controls which enable the driller/assistant driller to view operations on other levels of the drilling rig, and those being carried out in other drilling areas. The operating status of all drilling equipment can be displayed as required on three 20-in. monitors, arranged conveniently in front of the 2 operator chairs. The overall drilling operation is controlled and managed via a sophisticated Drilling Control and Data Acquisition system (DCDA), which though complex is user friendly and extremely efficient.

All pipe handling sequences are programmed into PLC units, and can be executed on demand with usually no more than a single command from the DCR. The software which governs all of the derrick-mounted drilling equipment will ensure that drilling and tripping operations can be undertaken at high

speed without the risk of equipment collision. It is also possible to make up stands while drilling.

Handling of the LP and HP drilling risers is also remotely controlled from the DCR as these are stowed vertically in the setback area when not in use and the running of casing can likewise be remotely controlled with casing joints being fed to the drill floor via an automatic belt conveyor equipped with a multi-joint side loader.

The handling of heavy tools, subs, down-hole motors, drill bits, etc. can also be undertaken without any direct manual intervention using a newly developed pick-up tool and Iron Roughneck. Bentec maintains that the extent of "hands-free" operation achieved in the design of the Oseberg Sør drill floor and derrick will set a new target for the industry to meet.

The "hands free" operating philosophy has also been applied to the equipment and systems installed on the lower levels of the drilling rig, with safe havens and remote control facilities being provided for the spacious shale shaker

arrangement and the cuttings slurrification unit.

Maintenance access and working environment requirements have been closely attended to during detailed engineering, with particular emphasis on exposure to noise and fumes. Separate mud logging and MWD rooms are provided, both of which are very spacious and well insulated. Experience transfer from the Esso Jotun drilling package recently delivered (in record time) by Bentec has been used to verify and enhance many aspects of the Oseberg Sør drilling rig design.

Bentec Norge AS is confident that the completed drilling rig will represent the state of the art for a long time to come in terms of safety and efficiency in offshore drilling from fixed platforms.

AS Nymo in Grimstad on the south coast of Norway were selected by Bentec to undertake the drilling rig fabrication and outfitting work, and the first steel was cut in May of 1998. The rig sailed from Grimstad in August 1999 as planned and will be installed together with the Mud Module onto the platform at Aker Stord. ■

## HAVE YOU CONSIDERED PATTERSON FOR RISER PIPE SERVICES?



We can Internally Coat, Assemble, Store and Barge to the GOM up to 90 ft. Riser Pipe

**Patterson's "ONE STOP SHOP"  
can provide all services to your:  
DRILL PIPE, LINE PIPE, OCTG & RISER PIPE**

Coating CK-54    Inspection EMI/UT    Storage 125 Acres    Threading API/Premium    Barge Terminal GOM Access    Maintenance Brush/Roll/Spray

***Our Water Access  
means Real Economic Savings  
by eliminating  
expensive surface transportation.***

**To learn more about the cost saving advantages  
contact your PATTERSON representative.**



### **PATTERSON COATING SERVICES PATTERSON TUBULAR SERVICES**

539 South Sheldon Road, Channelview, Texas 77530  
Phone: 281-457-8757    Fax: 281-452-0295

[scampassi@pattersoncoatings.com](mailto:scampassi@pattersoncoatings.com)

