ZESZYTY NAUKOWE POLITECHNIKI ŚLĄSKIEJ 2009
Seria: GÓRNICTWO z. 287 Nr kol. 1814

Ján PINKA, Gabriel WITTENBERGER
Fakulta BERG, TU Košice, SR

DRILLING RIGS FOR OFFSHORE DRILLING

Summary. Mobile see drilling rigs are used for drilling in offshore shallow waters. Among them we include the rigs with support poles, submersible towboats, semi-submersible drilling rigs and drilling boats. Initial drilling is usually carried out by some of stable drilling/oil platforms.

WIERTNICE STOSOWANE W WIERCENIACH PRZYBRZEŻNYCH

Streszczenie. Do wierceń przybrzeżnych, szelfowych stosowane są mobilne urządzenia wiertnicze. Zaliczają się do nich platformy z podporami słupowymi, holowniki zanurzalne, częściowo zanurzalne holowniki i łodzie wiertnicze. Wiercenia wstępne zwykle są przeprowadzane za pomocą stabilnych platform wiertniczych.

1. Mobile sea drilling rigs

The set with support poles consists of a towboat mounted on large steel supports which float, or are towed to the drilling area of interest (figure 1 on the left). When the spot is reached, the crew anchors the boat to the sea bottom by supports. The towboat is then lifted on the supports until it is completely about water surface. The drilling rig itself is usually mounted on telescopic tilting tower, so drilling is carried out from outside the towboat or from one side of the boat. The drilling rigs with support poles can be used on the for the sea depth not exceeding 110 m. submersible onshore towing rigs (figure 1 on the right) can be used in the flooded areas and marshland with quiet water. They are mounted on a raised platform exceeding floor area of the towboat. At the drilling spot, the towboat lies submersed on the bottom. [1], [3].

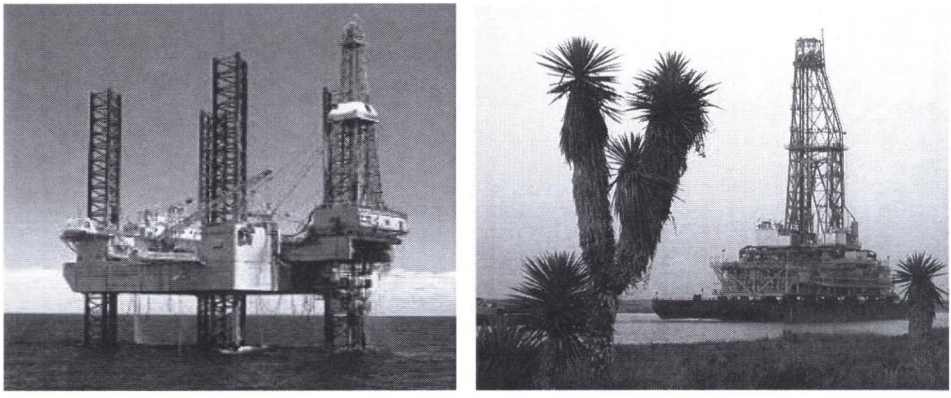


Fig. 1. Mobile drilling rigs for shallow waters (Offshore Rigs).
Towboat with support poles (on the left) and submersible towboat (on the right)
Rys.1. Mobilne urządzenia wiertnicze stosowane na płytkich wodach.
Po lewej – holownik z podporami słupowymi, po prawej – holownik zanurzalny

Inland/onshore towing drilling rigs are limited by depth of water (3-5 m).

A semi-submersibles rig (figure 2 on top) has two or more air-filled floaters, carrying the drilling rig when it is towed to the drilling area of interest (some drilling rigs of this kind have their own driving system). In fact, the semi-submersible rigs do float partly submersed, so rough sea has relatively small influence on their stability. The semi-submersible drilling rigs are used for drilling to the sea depth of 90-760 m [1], [3].

Fig. 2. Mobile drilling rigs in deep waters (Offshore Rigs)
Rys. 2. Mobilne urządzenie wiertnicze głębokowodne

A drilling boat (fig. 2) can float too. The drilling boat looks identical to any ocean-going liner; only the drilling equipment and the other modifications make it special. Drilling boats have the highest mobility from all sets intended for drilling at sea; they are often used for drilling of exploration wells in deep waters far from the shore. The drilling boats can operate in waters deeper than 2 800 m [1], [2].

2. Stable rigs for a drilling at sea

The largest/oil platforms are made of steel. Another ones, called „Condeep" are made of alloys and ferroconcrete (fig. 3). The platforms made by this technology are limited by depth and are intended for drilling in sea depths around 300 m .

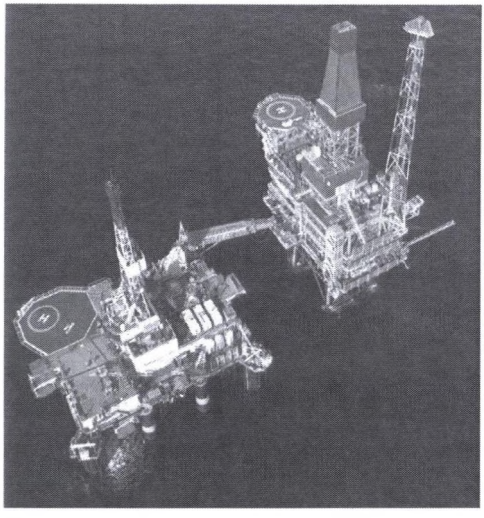
Their load-bearing structure is built on ground and then put on water to be brought to the given spot by towboats. The platform is then firmly attached to the sea bottom by piles, or it is submersed until it touches the sea bottom.

Huge cranes mounted on towboats serve for lifting of drilling equipment on the platform. Up to 50 deep wells can be drilled from one platform (most often directional wells).

Latest technologies allow drilling under the sea bottom in waters deeper then 300 m. There are several technical solutions [1], [4].

Example:

- Light steel structure of tower is anchored by radial anchoring cables.
- Platform with extended arms consists of semi-submersible boat serving also as a drilling/oil platform. The boat is attached/anchored to the seat bottom by vertical iron drawbars under constant pressure.



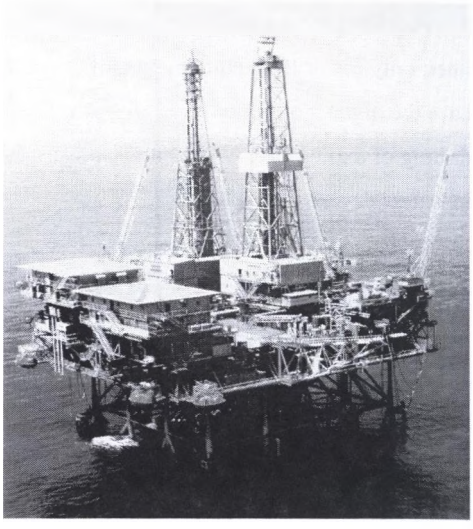


Fig. 3. Stable drilling platforms for drilling at sea
Rys. 3. Stabilne platformy wiertnicze na otwartym morzu

3. Conclusion

Technology engineer chooses the drilling set based on the required depth, load bearing capacity of its hook (considering the heaviest drilling string to be used for drilling) and suitability of the chosen type for the area of the future well; of course, economical aspect is very important to.

BIBLIOGRAPHY

1. Pinka J., Wittenberger G., Engel J.: Borehole mining, Vysokoškolská učebnica, Edičné stredisko/AMS, F BERG, TU v Košiciach.
2. www.camerondiv.com
3. www.bakerhughes.com
4. www.worldoil.com

Recenzent: Doc. Ing. Dalibor Kalus, CSc. HGF, VŠB-TU OSTRAVA