METHODOLOGY OF THE GEODETIC PROCESS FOR STATIONARY MARINE PLATFORMS, DELIVERY AND INSTALLATION ON SITE

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DƏNİZ STASİONAR PLATFORMALARI, ƏRAZİYƏ ÇATDIRILMASI VƏ QURAŞDIRILMASINDA GEODEZİK TƏMİNAT METODİKASI

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Abstract
Stationary offshore platforms are hydrotechnical facilities consisting of support blocks and topside modules that are fixed on the seabed to exploit the oil and gas deposits in the seas and oceans. One of the biggest challenges in this process is the effective management of the geodetic aspects. Various factors need to be considered during implementation to ensure accurate placement and alignment of the equipment. Conducting a comprehensive geodetic survey prior to installation is essential to gather accurate site information. This information plays an important role in the execution of geodetic work that must be carried out during the execution of processes by planning the placement of equipment in relation to the environment and existing structures.

Xülasə
Dəniz stasionar platformaları dəniz və okeanlarda aparılan neft və qaz ehtiyatlarının istismarı üçün dənizin dib quruntuna bərkidilən dayaq blokları və üst moduldan ibarət hidrotexniki qurğulardır. Bu prosesdə əsas problemlərdən biri geodeziya aspektlərini effektiv idarə etməkdir. Bu, cihazların dəqiq yerləşdirilməsi və hizalanmasını təmin etmək üçün müxtəlif amillərin icra prosesinə alınmasını nəzərdə tutur. Quraşdırmadan əvvəl hərtərəfli geodeziya tədqiqatlarının aparılması sahə haqqında dəqiq məlumatların toplanması üçün vacibdir. Bu məlumatlar ətraf mühitə və mövcud strukturlara nisbətən cihazların yerləşdirilməsini layihələndirməklə proseslərin icrası zamanı görüləcək geodeziya işlərinin icrası üçün mühüm rol oynayır.

Keywords: Geodesy, fixed offshore platforms, field delivery, installation of platforms
Açar sözlər: Geodeziya, Dəniz stasionar platformaları, Əraziyə çatdırılma, Platformaların quraşdırılması

İntroduction. Fixed offshore platforms are devices fixed to the seabed, which are divided into several types depending on their design. They are rigid support blocks, flexible support blocks and floating dsp. Global satellite systems GPS and GNSS receivers are used to determine the current position of the oil rig and to position the platforms precisely. In addition, the use of navigation systems based on different principles through ground-based radio-based systems and additional sensors is important to ensure accuracy. The use, processing, analysis and visualisation of data from GNSS receivers during positioning by the MariNAV software will facilitate the work process and thus increase efficiency in overcoming geodetic problems during the placement of hydrotechnical installations. [1].p. (66-68), [2]

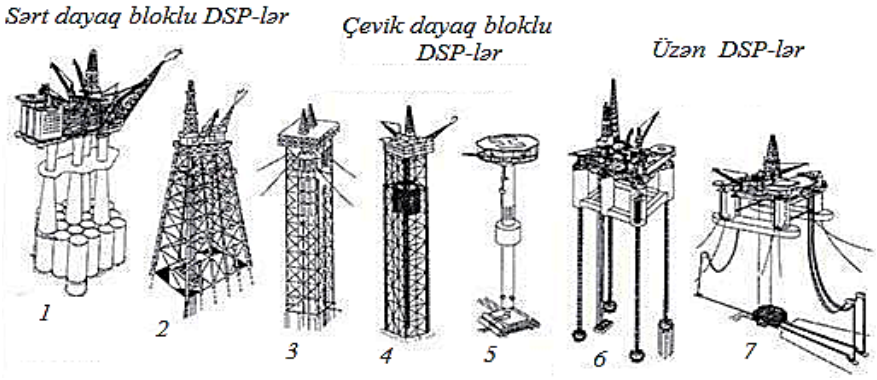

Figure 1: Fixed offshore platforms
1-gravity concrete platform; 2-fan rigid cage metal platform; 3-point tower; 4-flexible tower; 5-hinged tower; 6-platform with tension connectors; 7-semi-submersible platform.

SOP can be categorised into different types based on the features mentioned. According to the deployment phase: devices used in reconnaissance-search operations; devices used in the development part. These include platforms, piers, dams, artificial islands, etc.

SOP by location of use. earthquake resistant, ice resistant, wave resistant; those that are resistant to multiple external influences simultaneously.

Based on the depth of the seawater, these systems are divided into: shallow water up to 50 metres, medium depth between 50 and 150 metres, deep water between 150 and 350 metres and extremely deep water over 350 metres.

Depending on their ability to move and their mobility, SOP are: stationary mobile,i.e. self-propelled and towed.

SOP are based on the ability to store in drilling coordinates:

(a)Anchored to the seabed - gravity, pile on foundation, gravity pile

b) Floating special fixings (TLP, SPAR), SOP that are dynamically held in position by means of an anchor system.

Based on the preparation material, SOP. Steel, Concrete, Combined. SOP according to their structural characteristics: Monolithic or fan-shaped support block, submerged, self-shielded floating offshore rigs, semi-submersible floating offshore rigs.

Gravity type SOP: As the name suggests, these platforms provide stability through their own weight and the anchoring of their lower parts to the seabed. These devices are considered to be able to withstand high underwater currents, waves, ice and seismic effects.

Platforms with a pile foundation (shaft): Pile or shaft foundation platforms differ from other platforms in that they consist of three main parts. The first part is known as the pile foundation, the second part is the load-bearing shaft structure and the third part is known as the upper part. The pile foundation is driven into the ground and the shafts of the load-bearing shaft system are mounted on top of it. The shaft system is a construction resulting from the vertical and inclined arrangement of shafts reinforced with transverse anchors that provide overall rigidity. [1p.66-68, 73]

The object and methodology of the research. The construction of marine hydrotechnical facilities to solve the unique challenges of working in the marine environment involves complex methods that must ensure the safety, efficiency and effectiveness of the construction processes from the initial preparation of the field to the final utilisation of the facility. [3] Most of Azerbaijan's hydrocarbon reserves are located in the Caspian Sea and are exploited by drilling on offshore platforms. The proper organisation of logistical support to meet modern requirements. [4]

Are of great importance. The logistics chain used here has been developed over many years and is well established. However, at the present time, the drilling work is higher the factor of implementation of technologies, the placement of platforms at great depths, created complications make it necessary to update the logistics concept.Geodetic measurements initially play a crucial role in determining the topography of the seabed, analysing the location for the supply and installation of hydrotechnical installations, and the information obtained is an important feature in relation to the construction and sustainable stability of hydrotechnical installations in the sea. By considering factors such as pre-installation surveys, coordinate systems, real-time tracking, geodetic networks and software tools, project teams can ensure accurate placement and alignment, which ultimately increases the functionality and longevity of the facilities. This accuracy is necessary to ensure the correct placement of equipment for effective operation. It also allows for earlier intervention in the event of platform tipping or collapse. Stationary offshore platforms are based on geodetic grids and reference systems that ensure accurate positioning and constant tracking of the upper modules or support blocks. Geodesy optimises the delivery and installation of the site by calculating the height, tilt, gravity effect, positioning, placement and other parameters of the platforms. GPS, a global satellite system, ensures precise integration with the GNSS system, which receives instantaneous data transmission in real time. However, in some cases, terrestrial radio systems are used as backup systems with lower accuracy. It can also be used in various global positioning systems (e.g. GLONASS, GALILEO). During the construction and operation of the platforms, depending on the type of hydrotechnical installations at sea, it is necessary to develop a positioning system that ensures navigation and placement at the intended well target during the safe transport of the lower support blocks and the upper modular part by ships and allows the position of this platform to be tracked. Firstly, the support sections are delivered to the site and fixed to the seabed. Then the upper part is delivered to the area and placed precisely on these support blocks to obtain highly accurate positions in real time. In order to carry out the processes, the sources and transmission paths from which the correction data is received must be studied and a reference station must be set up that can be used in the region where the research is to be carried out.

Figure 2: Delivery and installation of the top module of an offshore platform

Geodetic surveys help to create detailed topographic maps of the study area, including depth information. This information is crucial for understanding the terrain, identifying potential problems and planning the installation process accordingly. The most important component of the positioning system is the MariNAV programme, which immediately calculates the coordinates of the central axis of the platform and, depending on the case, the drilling rig. In addition to these values, it displays the platform in a graphical interface with a spatial and geographical information system approach, allows the management and navigation of the platform's location and stores the collected data in a database for further investigation and analysis. [2]

Result. Geodetic methods play a critical role in the accurate delivery and installation of hydrotechnical equipment. Using advanced geodetic techniques such as GNSS technology, experts can accurately determine the locations and heights required for hydrotechnical projects. Geodetic surveys provide important information, such as seabed surveys, that enable engineers to make informed decisions about the placement of hydro-engineering equipment. Accurate measurements obtained through geodesy help to optimise the operation of hydrotechnical facilities. Consequently, dealing effectively with geodetic issues is critical to the successful delivery and installation of hydraulic systems. Experts can utilise geodesy to achieve the best results, reduce risks and ensure the long-term success of hydrotechnical projects.

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