ABSTRACT

The SZ36-1 is the largest oil field in Bohai Bay, which has been in production for over 20 years. To increase the field production, more wells are going to be drilled at the site of the WHPJ jacket platform, and a new method for adding slots was designed for such a marginal field development. Two new legs are added for supporting the new decks, and special connections are designed to avoid underwater operation during the whole process of installation. This paper presents the design considerations, including structure transportation and installation. The ultimate strength analysis, earthquake analysis, fatigue assessment and impact strength calculation are performed and the results show that new structure and the existing platform meet the minimum requirements for yielding, fatigue criteria during the service period of another 20 years.

KEY WORDS: Adding slot; Clamp; Docking; Jacket.

INTRODUCTION

The investment in offshore oilfield development is a new area of energy industry which is full of high risk and high-tech-intensive. At present, thousands of steel jacket offshore platforms are widely employed in offshore petroleum activities throughout the offshore areas of the world. These facilities have created enormous wealth. As the oil prices keep rising, lots of countries paid more attentions to digging the potential of these platforms. The function expanding and transforming of the active service platforms will revitalize old oil fields. In China, lots of the jacket platforms were built in eighties last century. Although reached their design life, most of them still remain in service. The production drop problem is severer with the increase in production years. In order to compensate for the production capacity shortage, additional production wells must be added to the platform. But the new wells face the problem of inadequate space on the old platform. SZ36-1 oil field was found in 1987, it is the first big oil field found in Bohai Gulf which has more than one billion tons of oil reserves. For further developing, the China National Offshore Oil Corporation (CNOOC) decided to adjust the phase I of SZ36-1 oil field based on the encryption method which learned from land-based oil field experience, and add eight slots to the WHPJ platform.

In this paper, a new “external adding slots” method is proposed, based on the combination factors including the basic designing data, on-site conditions and construction technology for SZ36-1 WHPJ platform. And the relevant structural mechanics analysis, transport and installation analysis were conducted. This method was first introduced in China, and will provide a new development mode for the redevelopment of large old oil fields.

THE SELECTION OF ADDING SLOTS METHOD

Types of adding slots on jacket platform

There are two methods for offshore jacket platform to adding slots: “external adding slots” method and “internal adding slots” method (as shown in Figure 1). There are not strictly distinctions between the two methods, usually determined by the location relative to the legs of original platform structure. If new slots placed in the rectangular area surrounded by the legs of platform, it is called “internal adding slots”. On the other hand, if new slots placed outside the rectangular area surrounded by the legs of platform, it is called “external adding slots”. SZ36-1 WHPB platform and WC 13-2 platform used “internal adding slots” method, WZ 11-4D-A platform used the “external adding slots” method.

Fig. 1 The methods of adding slots for jacket platform