Challenges and Solutions for Dry Dock Life Extension to a Semisubmersible FPS
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ABSTRACT
This paper is related to the only FPS (Floating Production System) in China, a 35 year old semisubmersible “NANHAI TIAOZHAN” in South China Sea. In order to extend the field life for another 15 years, the FPS is due for dry dock repair and life extension. The paper presents the main challenges and the solutions during the project execution.

The FPS dry dock overhaul lasted for six months. — We faced challenges from 4 elements of a typical project: — safety, quality, schedule and cost. Major difficulties are related to the full dock scaffolding erection and dismantling, column and pontoon repair, docking; inclination test, etc. The addition of new power generator sets was also challenging since it was the first time to use domestic made crude oil engine generator sets as main power supply on the offshore platform in China. The special requirements of pitch and roll angle, the new requirements for NOx discharging, platform space constraints, power integration of different power engines were coped with. To tackle all these challenges, there have been four technical advances utilized during the project execution.

KEY WORDS: FPS dry dock ; field life extension ; schedule driven.

INTRODUCTION

The FPS Profile
The “NANHAI TIAOZHAN” FPS was first built in 1975 as a SEDCO 700 series drilling rig with total 8 columns, 2 pontoons and 2 transverse cross pontoons. It was converted into a Floating Production System in 1995 with 10 years design life. Hull structure forms: 8 leg floating drilling production support platform; Main dimensions: length: 89.9 m, width: 74.6 m height: 39.6 m (including derrick 100.5 m) (figure 1); Light ship weight: 16735 metric tons; m. Classification: ABS. Main functions of the fps: subsea production system installation, maintenance, daily operation (two fixed ROV) to 25 subsea well heads; Drilling, completion, work-over; providing power, control and chemical injection for subsea wells.

After another 16 years in service at South China Sea as a permanent moored FPS, it is due to dry dock repair and life extension for further 15 years service life. The dry dock main work scope includes additional of two new engine generator sets, renewal of corroded structural members and most of the pipelines, Renewal of drilling mast and port side crane, addition of top side equipment for a new tie in oil field Liuhua 4-1.

The Background of Capacity Expansion for FPS Main Power Generator.
As the Liuhua 4-1 oil field and surrounding area of future development will tie back to Liuhua 11-1, there will be a power shortage to meet the oilfield long-term development plan. Therefore, CNOOC decided to expand the FPS power station. The proposal is to demolish one of four original 3300 kw crude oil generators on Liuhua FPS and add two new sets of 5500 kw crude oil generator sets, which increases a total 7700 kw power capacity. Engine delivery from abroad vendors was typically 18 months which won’t meet our dry-docking schedule. After several rounds evaluation and communication with domestic engine vendor, the final decision was to purchase local made engines which were the first time for offshore platform application for main power at the time.