The Study and Application of the Gravity Type Atmosphere Pressure Dry Cabin Technology for the Sub-sea Pipeline Repairing

Dongmin Pan, Hu Feng, Hongxin Ma and Qiuming Zheng
Offshore Oil Engineering Co., Ltd.
Tianjin, China

ABSTRACT

There are some methods to repair damaged and distorted sub-sea pipelines, including gripper connector reparation, pipeline lifting and flange welding reparation and gravity atmosphere pressure dry cabin (GAPDC) reparation etc. Different methods can be applied in different scopes: gripper connector can be used in both shallow and deep sea, pipeline lifting and flange welding reparation can only be used in shallow sea which is less than 30 meters, and GAPDC can be used in special occasion in shallow sea that can not lift the pipeline or need welding under gravity atmosphere pressure.

The writer of this paper, as the project manager, presided the Dongfang 1-1 landing pipeline repair project. Taking all the circumstances into consideration, such as the nearshore pipeline buried 9 meters under the rubble mound, the pipeline tip 24 meters to the rubble mound, can not lift the pipe to weld the flange and booking a ball flange need a long term, a new method-GAPDC, was developed and applied in the Dongfang 1-1 landing pipeline repair project successfully. This paper specifically introduced the pipieline repair scheme design, GAPDC structure design and operation procedures, including the prospecting of the damaged pipelines, the manufacture of the GAPDC, the clearance and cutting of the damaged pipeline, the fishing operation of pipeline, the emplacement of the GAPDC, flange welding in the dry cabin etc.

At the same time, it also introduced new technology innovation and application in this project, and provided some experience to the similar project for the future.

KEY WORDS: Sub-sea Pipeline; GAPDC; Repair Technology; Development and Application

OVERVIEW

On 6th November 2007, the landing pipeline of Dongfang1-1 oil field leaked. The total length of damaged pipeline was about 90 meters, with an explosive breakpoint. The worst part bended upward 9 meters, and departed away original route to north for 19 meters.

This sea field is shallow, so some large operating vessels can not be used. The rubble mound structure crossed the pipeline, and mound stones would impact the pipeline. During the project, a caliper pig should be run through the 1.5 Km nearshore pipeline after cutting the damaged part, to check the pipeline damage condition.

CONSTRUCTION SCHEME DESIGN

According to the damage condition and local operating circumstances, three schemes were designed.

Connector Repair Scheme

Fig 1 Gripper Connector