Challenge and Solution of PanYu35-2 Subsea Manifold Design Fabrication and Testing

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ABSTRACT
As one of the main equipments of South China Sea Deep Water Gas Development project, PanYu35-2(PY35-2) subsea manifold provides a support for the connection of 6” and 10” pipeline in the pipeline route, and also provides a support for the field pigging and pressure test. The manifold is connected with two production wells, and considering the commercial benefit of client, one spare hub and four spare valves are provided in the manifold system for the future wells. During the design fabrication and testing, there are lots of challenges. In the paper the design fabrication and testing of PY35-2 subsea manifold were presented, and the challenge and solution during the manifold development were presented as well. These can provide a good reference to the subsequent project in South China Sea.

KEY WORDS: South China Sea, Subsea Manifold, Design, Fabrication, Testing, Challenge, Solution

NOMENCLATURE

CM = CENTRAL MANIFOLD
CP = Cathodic Protection
EDB = Electrical Distribution Box
EFAT = Extended Factory Acceptance Testing
FAT = Factory Acceptance Testing
PLEM = Pipe Line End Manifold
PLET = Pipe Line End Termination
PTT = Pressure Temperature Transducer
ROV = Remotely Operated Vehicle
FRP = Fiber Reinforced Plastic
AMI = American Megatrends Inc
CVC = Cameron Vertical Connection
FPS = Fishing Protection Structure
HFL = Hydraulic Flying Lead
EFL = Electrical Flying Lead
XT = Christmas Trees
PL = Pig Launcher
PR = Pig Receiver

INTRODUCTION
The PY35-2/35-1 currently focuses on the development of gas fields located in the South China Sea, People’s Republic of China. It is the first deep water gas field used subsea production system which was developed by China independently. Design water depth of the field is 500m and the design life is 20 years. PY35-2 CM is a three slot production manifold, it contains the following features:
- One 10” & one 6” Production Header and three 4” Branch Headers
- ROV operable Production & Branch valves (ball & gate) that allow selection isolation of wells and installation of Pig Launcher,
- Hydraulic and Chemical Tubing for onward distribution to the UTH and future Trees
- Electrical EDBs for onward distribution to current Trees.
- 2 x 10” & 5 x 6” CVC hubs
- Subsea Structure with fishing/ dropped object protection and MUDMAT.
- PTT in 10” Production Header.

PY35-2 CM is comprised of a structural steel frame, a piping system, houses control systems, Corrosion Protection System and Connection system.

The frame structure is fabricated from structural steel beams, tubular members, and plate. Contained within the CM frame is a dual production header which includes one 10” production header, one 6” production branch header, and three 4” production well branches. The CM also serves as a hub for hydraulic fluid, chemicals, and electronic communication systems to interconnect within the subsea field.

The CM is tied back to PLET3 and INLINE MANIFOLD via the downstream hub (CM1-OUT) on the 10” production header. The 10” production header consists of two manual isolation ball valves, three production branch tee fittings, and a PTT sensor while providing an access point for launching pigging equipment. The upstream hub (CM1-IN) is for tying in PY35-2 PLEM and is comprised of one manual isolation ball valve which then splits off to the parallel 10”production header via tee fitting and 6” tie-in branch containing one 6” manual gate valve. The 6” line continues on through two additional