

Optimized Methodology to Build an Integrated Solution to Offshore Topside Process Engineering

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ABSTRACT

An optimized methodology to build integrated solutions to offshore topside process engineering is described. The method relies on the concepts and procedures of FEED (Front-End Engineering Design), as well as those of basic and detailed process engineering. For the purpose of verifying the efficiency of the proposed methodology, which changes process data processing from manual to automated and integrated, was applied to a condensate stabilizer unit. That simulation indicated that offshore business would benefit from the increase in engineering efficiency as costs, schedule periods, and errors would be reduced. This optimized methodology proposed by Samsung Heavy Industries (SHI) would contribute to performing successful offshore projects in the future.

KEYWORDS: Optimized methodology; Integrated solution; Offshore topside process engineering; FEED; Basic process engineering; Detailed process engineering; Automated and integrated data processing

INTRODUCTION

Offshore oil and gas field development is increasing relative to onshore field developments. Production from offshore fields now exceeds that of onshore fields. Recent production percentages are 60% offshore and 40% onshore, whereas the percentages in the 1990's were 30% offshore and 70% onshore. The demand for floating or semi-submersible offshore platforms (floaters) when developing deep sea oil and gas fields, located off West Africa, Central and South America, the United States, and in the Gulf of Mexico, is expected to increase. In particular, the demand for FPSO (Floating, Production, Storage and Offloading) projects will grow with the greater demand for natural gas. Therefore, offshore market prospects are bright in the medium and long term. (International Maritime Associates Inc., 2005)

With such a bullish outlook on the offshore market, the method of contract completion of an offshore project has changed to EPIC (Engineering, Procurement, Installation and Commissioning) from the more traditional AFC (Approved for Construction) contract type. That has meant that the contractor must assume responsibility for all controversial points, from the engineering phase through to the construction phase. What is more, the application of Engineering Management (EM) as a part of the Project Management (PM) is being

requested by many major oil companies because the concept of life cycle management, connected to Enterprise Resource Planning (ERP), is widely used when contractors prepare bids for offshore projects. (Infield Co., 2005 and Mather, 2002)

Based on the increase in offshore projects and the increase in the use of EPIC, conventional engineering methods have limited use when efficiently undertaking engineering projects. Accordingly, the introduction of an EM system, which automatically processes an enormous amount of process data without the human errors, is necessary. EM systems can fundamentally prevent exorbitant costs and reduce unnecessary man-hours by applying systematic work execution during the FEED (Front End Engineering Design) stage, basic and detailed process engineering stage. This paper describes an inherently optimized methodology in order to prepare the trend of the future offshore market, using commercially available engineering tools

OFFSHORE TOPSIDE PROCESS ENGINEERING

The general sequence of phases in offshore project development consists of FEED, basic and detailed engineering, procurement, installation, commissioning, and operation and maintenance (Fig.1). The main engineering fields in offshore project development phases can be divided into two disciplines: offshore topside system engineering and offshore structure and naval engineering. This study focuses on offshore topside system engineering, which consists of offshore process, piping, mechanical, instrumentation, electrical and outfitting engineering. Among the mentioned engineering areas, the concepts and the procedure of offshore process engineering phases, one of the highest priority phases, are presented in the following section.

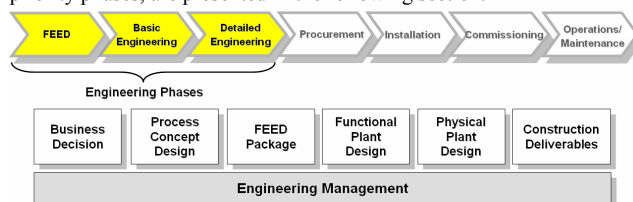


Figure 1. Offshore project phases.

Offshore Process Engineering

Offshore process engineering ensures that topside systems shall be economically configured and sized, and considers the reliability,