SPE 124514

An Intelligent Platform to Manage Offshore Assets

C. Piovesan, APO Offshore, and J. Kozman, CLTech Consulting

Copyright 2009, Society of Petroleum Engineers

This paper was prepared for presentation at the 2009 SPE Annual Technical Conference and Exhibition held in New Orleans, Louisiana, USA, 4–7 October 2009.

This paper was selected for presentation by an SPE program committee following review of information contained in an abstract submitted by the author(s). Contents of the paper have not been reviewed by the Society of Petroleum Engineers and are subject to correction by the author(s). The material does not necessarily reflect any position of the Society of Petroleum Engineers, its officers, or members. Electronic reproduction, distribution, or storage of any part of this paper without the written consent of the Society of Petroleum Engineers is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of SPE copyright.

Abstract

For offshore platforms and other facilities, intelligent asset management must include proactive monitoring of surface equipment. Studies (Athens Group, 2009) show that up to 20% of the non-productive time (NPT) experienced by a deepwater rig can be the result of control system failures on drilling or production equipment. But similar failures can impact the fixed surface equipment on the rig floor that can also shut down drilling or production operations. Timely management of the complex, software-dependent control systems from multiple equipment vendors on the rig floor can therefore be a major determinant of productivity for intelligent oilfield implementations. The primary goals of the Intelligent Platform (or I-Platform) are to reduce equipment downtime and personnel-on-board (POB) requirements while increasing reliability, safety, regulatory compliance and environmental responsibility. This requires defining operating envelopes that optimize equipment usage for costs and efficiencies, allowing early identification and intervention for pending equipment outages and enabling root-cause failure analysis that takes into account multiple environmental factors. The use of intelligent platform technology has already been proven for subsurface drilling and production data streams and has reached a competent level of capability maturity (Heiberger, 2009). The I-Platform solution applies best practices derived from numerous digital oilfield case studies to fixed surface equipment in order to reduce NPT. This solution is an end-to-end implementation for surface equipment that brings together mission-critical capabilities developed and already being deployed for downhole operations. It utilizes unique data analysis tools with artificial intelligence algorithms for codifying existing equipment expertise into business rules such as neural networks and self-organizing maps. Results of the data mining and analysis are delivered in a role-based and easily configurable visual dashboard for multiple aggregated data streams. A recent prototype installation utilizes data streams from a major offshore drilling contractor with a versatile fleet of mobile offshore drilling units and an operational performance center at a leading oilfield service company to demonstrate the viability of this approach for both offshore and remote onshore operations. The success of this proof of concept demonstrates that disparate data from multiple equipment vendors can be gathered from remote locations, analyzed and distilled into actionable items, and displayed in order to support proactive decisions by a distributed pool of subject matter experts.

Introduction

The goal of information technology implementations in the oilfield industry is to improve productivity. While intelligent well and smart field technologies have made great strides in intelligent management of the reservoir (Oberwinkler and Stundner, 2005), the bottleneck for oilfield data flow up until now has been the transfer of real-time data to the engineers' desktop in a clean, timely, and useful fashion. Engineers typically have seen only a subset of data including daily production volumes and/or rates (Figure 1), along with isolated gauge pressures and temperature settings. Aggregating data from surface equipment provided by multiple manufacturers is still often a manual process on the rig floor (Eustes, 2007). With databases updated only periodically from real-time historians, production engineers and analysts have lacked sufficient insight into the dynamics of the platform and its impact on field operations, depending instead on general purpose tools such as spreadsheets to track production data and trying to make inferences about relationships to equipment performance. This type of point solution is one of the indicators of a low level of data management maturity for equipment data compared to other data streams in the industry (Kozman and Ripley, 2008). What is needed in order to properly evaluate, manage and mitigate the impact of equipment downtime on production is an alarm system to inform instrument and control engineers of under-performing or critical conditions on equipment before it begins to degrade production and the revenue stream. Oilfield operations need to move beyond the familiar data management mantra of the "right data to the right person at the right time"