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Production Forecasting Using Integrated Asset Modeling

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Arnaud Hoffmann
Petrostreamz AS

Abstract

Oil and gas production systems are complex. They usually consist of several production elements and corresponding models: (1) reservoir(s), (2) wells and surface production network(s), and (3) surface processing facilities. The traditional approach ("silo" approach) to forecast production consists of modelling each part of the system independently from the others without considering upstream and/or downstream interactions. Forecasted production profile from an upstream model is passed as input to the model downstream to ensure its feasibility and to exploit potential optimization opportunities. Additional guidelines (e.g. target rates or minimum wellhead pressure) are sent back to reservoir engineers for the next reservoir simulation. This iterative process is manual, requires transfer of massive amount of data between departments and is usually time consuming (4-5 iterations are required to reach a satisfying forecast).

Integrated Asset Modelling (IAM) aims to integrate all models of the value chain (from the reservoir to the point of sales) into a global model capturing the interaction between all elements of the production system (e.g. reservoir – well – surface network). It enables to perform numerous sensitivity analysis by changing any parameter across the value chain and investigate its influence on the entire system. In particular, IAM is a very efficient approach for production forecasting as it allows to automatically and systematically generate feasible and optimized production profiles for a given asset.

This presentation shows the benefits of using IAM for production forecasting. It also gives best practices and guidelines for IAM implementation. It especially focuses on three very important issues faced when dealing with IAM: (1) software and model integration, (2) PVT consistency across the value chain and (3) optimization. Several case studies from the industry are used as illustration: (1) Full value chain integration for a multi-field asset in Middle East, (2) optimized production forecast for an offshore asset in Angola, (3) production forecast for a complex offshore multi-field asset in Norway and (4) final product forecast for an onshore multi-field asset in Egypt. The different case studies show that benefits of implementing an IAM approach for production forecasting are significant and immediate.

ADDRESS

Skonnertvegen 7
7053 Ranheim
Norway

LANDLINE

+47 73 10 02 60
FAX
+47 73 84 80 81

EMAIL

info@petrostreamz.com
WEBSITE
www.petrostreamz.com

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In the current market situation, IAM approach is a cost-effective solution to optimize oil and gas production. By bringing together existing information and models from all parts of the production system, IAM breaks barriers between disciplines and enables an asset-scale overview that leads to more informed decision-making and ultimately higher profits for operators.

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