

Integrated Production System Modeling of the Bahrain Field

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Two separate IPM models were built, one for gas and one for an oil producing system. This paper describes; how they were built, the challenges maintaining and creating these models and their value creation. The models were used for day to day production management and long term field development planning.

The oil producing model changed how the wells and system analysis were performed on the asset. In other words, the operational and development decisions were implemented based on the model recommendations resulting in more visibility and credibility for the model's use.

The gas producing model was used for optimisation and development planning of the Khuff surface network to calculate the system capacity. Long term field scenarios are being run to find the most cost effective steps. The objective for these models was to generate an optimum field development plan allowing investments to be made in a phased manner. This was achieved by observing the following steps:

1. Surveillance

Compare the field measurements against the model and analyse any discrepancies.

2. DESIGN AND OPTIMISATION

Perform gas lift design optimisation and optimum gaslift gas allocation.

3. Field management

Optimising field production through the choke size and gaslift optimisation while still observing the gas capacity constraints.

4. Field development

Design and optimisation activities eg. Optimum well locations (accounting for connections to field network and existing system), debottlenecking, acid stimulation, perforation design and optimisation.

Added Value from the Models

Each month, short and medium forecasts are run which include the known system constraints. This realistic forecast is used to inform management of the current ability to meet daily demand. The system capacity predictions are compared to gas demand forecasts and if the demand is too close to the system capability then the operating group can reschedule the maintenance activities or increase the capacity so that demand can be met. The well models are used to analyse the well performance changes and identify potential gains from the wells if the surface equipment is bottlenecked so that and economic justification is provided before the actual job is carried out.