

SPE 167557 Integrated Production System Modelling (IPSM) as an Opportunity Realization and Optimization Tool for Improved Asset Management

Awan Eli, Ugochukwu Aboaja, Ayo Ajayi (Shell Petroleum Development Company, Warri)

IPM models (GAP, MBAL and PROSPER) were built for the Mede and Mafe field. This paper addresses the; strategy, synopsis of work done and the benefits derived from the model. The areas which IPM was used for are defined below:

- Opportunity for identification and validation
- Optimisation
- Prediction of field performance

The integrated production system modelling approach consists of a focussed team of surface and subsurface staff working together to identify opportunities based on existing field constraints and limits. To explain in further detail, using IPM allowed the integration of flow assurance with subsurface deliverability using well and reservoir operating conditions as the boundary and the separator static pressure as the topside constraint. The disciplines within the team with the corresponding tasks were as follows:

- Reservoir Engineers focus on optimal take off for producing wells and reservoir pressure management for efficient liquid withdrawal rate from the reservoirs.
- Production engineers seek out artificial lift alternatives.
- Facility/Process engineers optimise existing pipeline and flowstation layout through well re-alignments and bulking reduction effects to enhance production.

The motivation for the asset teams to use a common forecasting platform to support optimisation decisions is clear as both the subsurface and surface optimisation rely on the physical limitations of the overall system.

Having created a full field model in GAP, five quality checking steps are carried out to evaluate the model quality:

- Reality checks (do all of the model elements correspond to what is in the field?)
- Calibration checks (how closely does the model match current production?)
- Optimisation checks (how can current production be optimised?)
- Prediction checks (how confidently can we use the model for forecasting?)
- Activities checks (has the forecast accounted for all activities and deferments?)

After ensuring that the above steps were followed and the full GAP model was used to run forecasts, the following benefits were observed:

- Model output used to update and maintain the system's limit diagram.
- The GAP model was used to carry out a six month production forecast for the fields.
- The GAP model was used to quantify the oil gains from the LIO activities by ensuring that the well potentials are achievable.
- Using IPM enhanced cross-discipline learning and teamwork.