Challenges for Digital oil field applications in Hassi-Messaoud Field (HMD), Sonatrach, Algeria

by

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Outline

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- Detection of the Gas Lift well Performance Challenge
- Deployment of a Real Time Well Surveillance (RTWS) with Production Increase Objectives
- Early Production Drop Detection & Wells Ranking
- Advisors & Dashboards
- Recommendations & Actions Summary
- OLGA Modeling for Real Time Rates Estimation
- PIPESIM Modeling for Gas Lift Optimization
- RTWS Results & Way Forward
The giant Hassi Messaoud field (HMD), operated by Sonatrach is one of the largest mature fields in the world. It was discovered in 1956 and put on production in 1958. It covers an area of 3 300 km2 with a total of 1800 wells. The field is under miscible flooding as well as waterflooding. About 40 % of the oil producer wells are artificially assisted with Gas lift.

The main challenges faced with direct influence on the well candidate selection for production optimization in the field are: Reservoir heterogeneity, Flow assurance issues (salt, asphaltene, scale … ), Gas and Water Breakthroughs, Completion, Operation executions and Network facilities. Combination of these challenges makes HMD unique for production optimization and digitalization.
Detection of the Gas Lift well Performance Challenge

In 2016 Sonatrach DP asked to find a solution on the early detection of the production drop in GL wells and asked all service companies working in the field: **How to identify when a Gas Lift well is going to underperform before its production drops?**

The case of the GL well MDZ595 affected also by the salt precipitation became the test for all.
Deployment of a Real Time Well Surveillance (RTWS) with Production Increase Objective

The joint team TAO (Schlumberger and Sonatrach DP) realized a detailed transient Gas lift study taking account all wellhead parameters (WHP, WHT, FLP, GLIP, GLIR, GLNP) followed by the deployment of a Real Time Well Surveillance (RTWS) application using OLGA algorithms have been put successfully in place in HMD field to answer the Sonatrach DP concerns.

It was followed by many other applications with direct influence on the main objective: production increase. Below will be presented the update on this on going project and our objectives towards the HMD digital oilfield.
Early Production Drop Detection & Wells Ranking
Advisors & Dashboards

RTWS: Real Time / BG Total GL consumption

- ADVISOR 00: Bilan Gas Check
- ADVISOR 01: Gas Lift injection rate surveillance
- ADVISOR 02: Master Advisor for Wells Statistics
- ADVISOR 03: OLGA and PIPESIM Modeling Progress
- ADVISOR 04: Gas Lift Network Pressure surveillance
- ADVISOR 05: Recommendations & Actions Summary
- ADVISOR 06: Total Gas Lift Consumption
- ADVISOR 07: SCADA Situation & Transmission Quality
- ADVISOR 08: Gas Lift Auto Valve Surveillance
So far 70% of GL Wells have OLGA Choke Model for Real Time Rates Estimation
**PIPESIM Modelling for Gas Lift Optimization**

- **Wells modelling:**
  Assisted Gas Lift Optimization with PIPESIM Nodal Analysis

- **Network modeling:**
  More than 06 Manifold Accomplished and Models are up to date: W1C, OMJ82, OMJ82N E1C, OMP53, OMP73, ONM13
Main Results and Way Forward
Main Results: Production Increase / Test in Manifold OMJ82 - OMJ82N

Test in Manifold OMJ82 - OMJ82N
Total Oil rate increase of 6 % (182 sm2/d) and Gas Lift Reduction of -16 % (82 k sm3/d) in the manifolds OMJ82 & OMJ82N during a test period.

Oil rate increase in the selected wells, proven by production test before and after the implantation of the RTWS.
Main Results: Gas Lift Injection Reduction

Total GL Consumption reduction by more than 1 million Sm3/d
Main Results: Time / Cost Saving

- Define Targets (Qoil, GLIP, GLIR)
- Add Well to Real Time Well Surveillance

Well in Alerts List

GLIR Adjustment vs Defined Targets

GLIR Adjustment vs Defined Targets

Well Stimulation / Operation

High Investment

Techniques Puits / Operations Department

Water Treatment (BE, BDP, LAVAGE)

Low Investment

Control Puits / Gas Lift Department

Time and cost saving by selection of the optimum time for the well interventions (Clean out, ...).
RTWS Way Forward

Today the RTWS covers 50% of HMD wells; the objective is to include all the wells: Gas Lift and Natural flow.

Combine the RTWS with programmable valve technologies.

Enlarge the Closed Loop to Remotely Controlled Production, Injectors, and Separators.