Schlumberger

PEMEX Uses Integrated Asset Models to Improve Production Forecasting

Avocet software provides common platform for improved technical and economic decision making for Veracruz asset

CHALLENGE

- Modernize and improve production forecasting methods
- Accurately account for compression and water-management costs
- Improve decision making

SOLUTION

- Use the Avocet* platform to integrate reservoir simulation, well, and pipeline network models
- Evaluate multiple scenarios to explore the recovery factor of every reservoir, accounting for all economic variables
- Generate medium-to-long-term exploitation plans

RESULTS

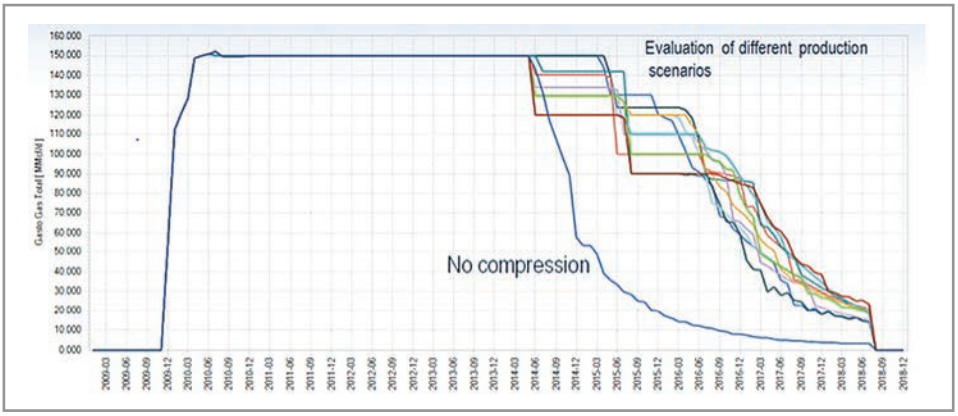
- New, integrated approach allowed the team to generate exploitation plans for the next decade, accounting for different technical and economical parameters
- Avocet platform delivered an integrated, up-to-date operational picture and improved decision making
- Majority of competitive scenarios forecast predicted production gains of over 30%

"The Avocet platform allowed us to integrate models from ECLIPSE, PIPESIM, and Merak Peep software to deliver an up-to-date picture of our operations."

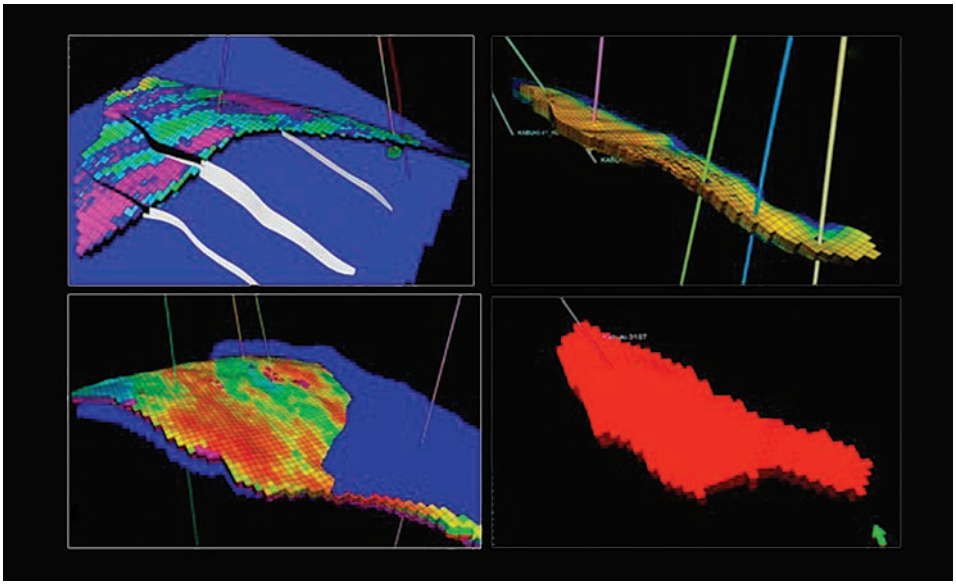
Francisco Martinez Mendoza
Exploitation Design Coordinator

PEMEX—the national oil company of Mexico—had been using a combination of single reservoir simulation models and material-balance equations for production forecasting for its Veracruz asset. However, these solutions could not account for all subsurface and surface element interaction, especially with several reservoirs of differing geological and dynamic characteristics simultaneously producing through the same surface facilities. Therefore, the uncertainty on early water breakthrough, liquid loading, and timing to initiate the compression phase was still high.

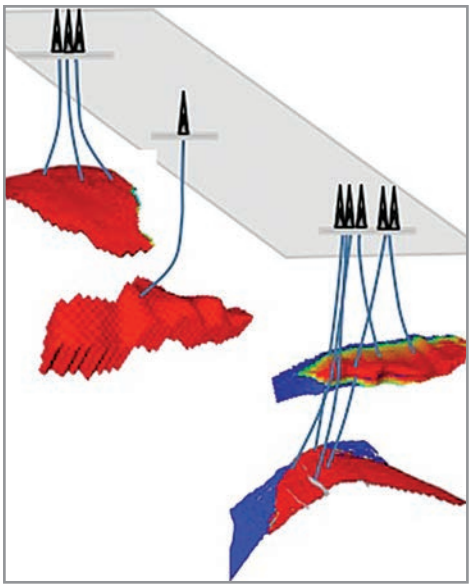
PEMEX met with Schlumberger to discuss these issues and design a new exploitation strategy for four dry-gas reservoirs. The new strategy would need to provide an optimum exploitation plan for the next decade, determining the best production rate per reservoir and well. This was necessary to ensure that a planned compression stage benefited the four reservoirs, as well as take into account all interaction among surface and subsurface production system elements. PEMEX also wanted to define individual well productivity and understand which wells presented a high-water production-rate risk.



Production behavior under first and second compression stages versus a case without compression.



Integration of reservoir simulation models.



Complex scenario: four reservoirs with different geological and dynamic characteristics sharing surface facilities.

Integrated models

The team built reservoir models using the ECLIPSE* industry reference reservoir simulator and history matched them to recent production information. The various well and network models were then created using PIPESIM* production system analysis software. Merak* Peep economic evaluation software was used for fiscal modeling and forecasting.

Schlumberger and PEMEX designed and evaluated multiple exploitation plans using the Avocet production operations software platform to integrate reservoir, well, and network simulation models. The team was able to solve models simultaneously at every time step, allowing for boundary conditions downstream and upstream through the entire simulation. This allowed PEMEX to apply global production constraints to the integrated system.

Multiple scenarios were built to explore the recovery factor of every reservoir, taking into account all economic variables, such as the rental or purchase of compression machinery and equipment. Production engineers could also integrate KPIs to further support the decision-making process. Wells with the potential to produce significant amounts of water were also identified.

"By integrating critical information with data in one platform we have optimized our production."

Jose Ramon Ramirez Cuacenetl
Leader, Reservoir Engineering Gas Group
PEMEX AIV

An integrated picture

The new integrated system allowed the team to generate several possible exploitation plans for the next 10 years. All scenarios were evaluated taking into account various technical and economic parameters to help select an optimum strategy. Cumulative production versus net present value was established to determine which scenarios would be most competitive. In all scenarios, the compression equipment rental option was found to be best—with production gains of over 30% forecast.

The Avocet platform allowed PEMEX to unite data with models in a single environment, identify problems more quickly, minimize downtime, and optimize production.

E-mail sisinfo@slb.com or contact your local Schlumberger representative to learn more.

www.slb.com/avocet

*Mark of Schlumberger
Other company, product, and service names are the properties of their respective owners.
Copyright © 2012 Schlumberger. All rights reserved. 12-IS-0448

Schlumberger