Customized separators helped high-GOR wells flow at 40,000 bbl/d in Mexico's HPHT Quesqui Field

An agile response helped PEMEX bring four wells online, flowing ~40,000 bbl/d of oil and 215 MMcf/d of gas. After a second solution package was deployed, total field production increased by an extra 14,000 bbl/d of oil and 49 MMcf/d of gas.

The objective

In early 2020, the government of Mexico announced major discoveries in the Quesqui Field (state of Tabasco). With estimated proven, probable, and possible (3P) reserves up to 700 million BOE, it was the country´s single largest oil discovery since the late 1980s. From the start, field development surpassed the carrying capacity of existing facilities and pipelines, creating bottlenecks in the production process. While PEMEX worked to build more production pipelines and upgrade its facilities, it needed a fast way to handle the additional field production without disrupting operations.

Flowing at ~12,000 psi and ~160 degC, the Quesqui wells presented significant engineering challenges. In addition to high flow rates, a major challenge was the high-GOR content, which required robust separator capacity on site. The operator already had an onsite separator that could temporarily handle the production, but significant modification and retrofitting was required to avoid creating additional bottlenecks in the production process.

The solution

At this point, PEMEX deployed Production ExPRESS™ rapid production response solutions to help with the debottlenecking process. Production ExPRESS solutions are a suite of services focused on the wellhead and surface facilities to help operators maximize production and improve cash flow through rapid diagnosis and intervention.

Working as a team, Production ExPRESS solutions engineers partnered with the operator to redesign, reengineer, and retrofit the legacy separator. Work started soon after the Quesqui announcement and was implemented during the spring of 2021. The engineering and design phase covered all technical modifications of the equipment while addressing safety concerns and creating strong operating procedures and guidelines.

As part of the challenge, the operator needed to monitor production from four wells connected to the separator and allocate the hydrocarbons produced by the individual wells. A flowmeter equipped with Vx™ multiphase well testing technology was used to measure flow rates for each well without interrupting production. Agile response and equipment upgrades over a six-month period enabled PEMEX to bring the four wells to production, flowing at ~40,000 bbl/d of oil and ~215 MMcf/d of gas.

After successful startup of the first project, to deliver additional production from the field and debottleneck its facilities, PEMEX asked for another temporary solution at a nearby pad where the production separator could not handle the higher flow rates. To meet the operator's goals for early production access, the Production ExPRESS solutions team studied the well parameters and export criteria and performed multiple flow simulations to find a reliable solution. After implementation of the second Production ExPRESS solutions package, total field production increased by an additional 14,000 bbl/d of oil and 49 MMcf/d of gas.

Next, PEMEX requested a solutions package at a third site to pilot new well production and use the acquired data for additional facility design upgrades.

The Production ExPRESS solutions team then designed and delivered a customized set of well testing equipment specifically for PEMEX needs.

The results

These state-of-the-art solutions met the challenge in record time—with one package delivered in as little as 10 days. After successful startup, the project was handed over to the operator with proper procedures put in place. As part of the handoff, SLB shared its knowledge on how to operate separators in high-pressure, high-flow rate environments and assisted the operator with troubleshooting to solve operational issues. Assistance from SLB helped the operator bring new wells online rapidly and achieve major increases in production for this important new field.

The PEMEX legacy separator was augmented by this rapid-response, fit-for-basin separator provided by Production ExPRESS solutions.