

Bombas de Cavidad Progresiva en Pozos Horizontales y Crudo de 2000000cp: Yacimiento Llanquanelo, Mendoza

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Abstract

This article describes the techniques and tools using Progressing Cavity Pumps (PCP) that allowed the development of Llanquanelo Field, in southern Mendoza, Argentina, where heavy oil with 12° API is produced through 13 horizontal wells. In addition they were able to overcome many technical and environmental challenges, such as adverse weather conditions and being located in an ecological reserve.

Some adverse characteristics were:

- Viscosities up to 2.000.000cp at environmental temperature (10°C).
- Pumps installed at different depth conditions. (Example, the 2019 NLL-well with pump landed at 1197 m inside 5.5 pulg liner, and 90° from the vertical reference.)
- Sucker rod centralizer limited use by flow restriction caused.
- Wide operational temp range, below -15°C in winter, plus 35°C in summer.

Different applications are described, with particular advantages and high performance in each case. Main topics analyzed:

- Viscosity and hydrodynamic wedge reducing the contact between sucker rods and tubing, preventing accelerated wear and final failure event.
- Using pipe heating wire for viscosity reduction in tubing production.
- Installation of relief and recirculation valves in production wellhead as protection regarding high back pressure blocked pipelines.
- Monitoring and automation systems with downhole pressure & temperature sensors.
- Low operating costs / reduced pulling ratio.
- Technical feasibility to develop reservoir exploitation with PCP as ALS.

The results are presented case by case, and then an overall balance for entire field, where based on initial performance with 5 wells and 7600 m³ production in 2005, was possible to increase production until 21,727 m³ with 13 wells in 2013.

In conclusion the working methodology applied is shown for those applications, proving efficiency and recommendations for potential similar fields; that represented in an average run life of 1800 days, or examples as NLL-2001 well (3621 days) and NLL-1003 well (4000 days) both still operating, which becomes the longer runlife for a PCP application registered in Argentina.

The principal contribution is sharing experiences, solutions and working methodology among Operator, Services Company, and even an educational institution as the National University of Cuyo where rheological studies and oil characterizations were performed.