WellTempo™ pumpjack monitoring and optimization

This case study demonstrates significant correspondence with pump off detection results on several marginal wells in the Permian Basin between a conventional load cell based controller and a much simpler and less expensive beam mounted device.

Business need: Oilfield producers face many factors impacting production and manage their wells accordingly to maximize revenue and minimize costs. For example, they attempt to optimize pumpjack run time with one of three methods:

1. Manual start and stop of the well (aka running on hand)
2. Timer based start and stop. Two devices are commonly used an hourly timer and a pin timer for "fixed" pump cycle timing
3. Pump Off Controller (POC) for continuous run time adjustments

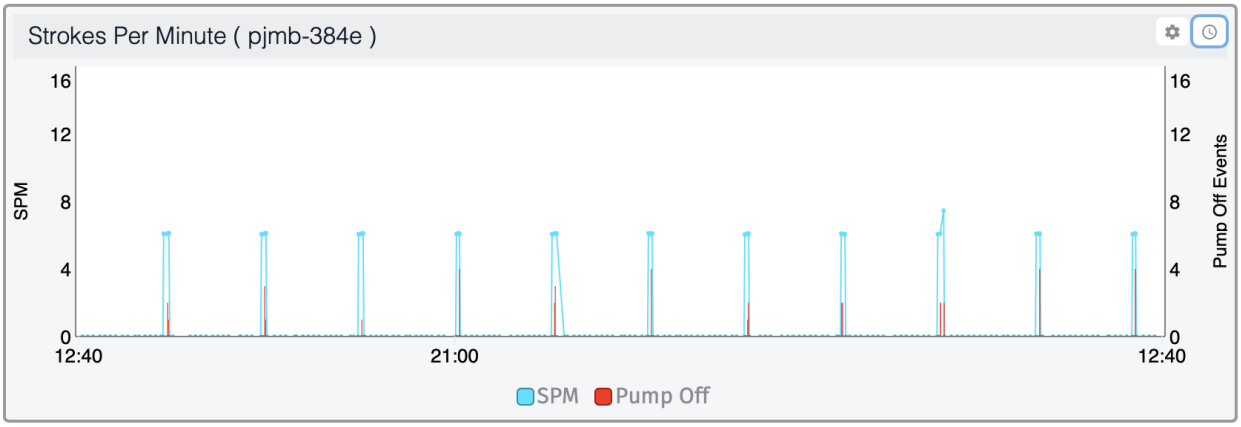
The goal is to run the pumpjack just enough to lift all of the fluids that the reservoir will provide each day and no more, so the well produces all that the reservoir will yield and operations are optimized (electrical power is not wasted and the equipment is protected from excessive wear and/or damage). Getting this balance wrong can result in downhole pump or rod string failure (added expense and downtime due to over pumping) or on the other hand missed production (under pumping).

On a well with sufficiently high production (typically 50 bbls/day or more) producers will often install a conventional load cell based POC. These devices are offered from over a dozen distinct manufacturers and typical installed costs can exceed $10,000 per well. They are also subject to high maintenance and support costs often supplied by hiring specialized in-house personnel to manage the devices and supporting software. The high initial and operating cost prohibits their use on marginal wells.

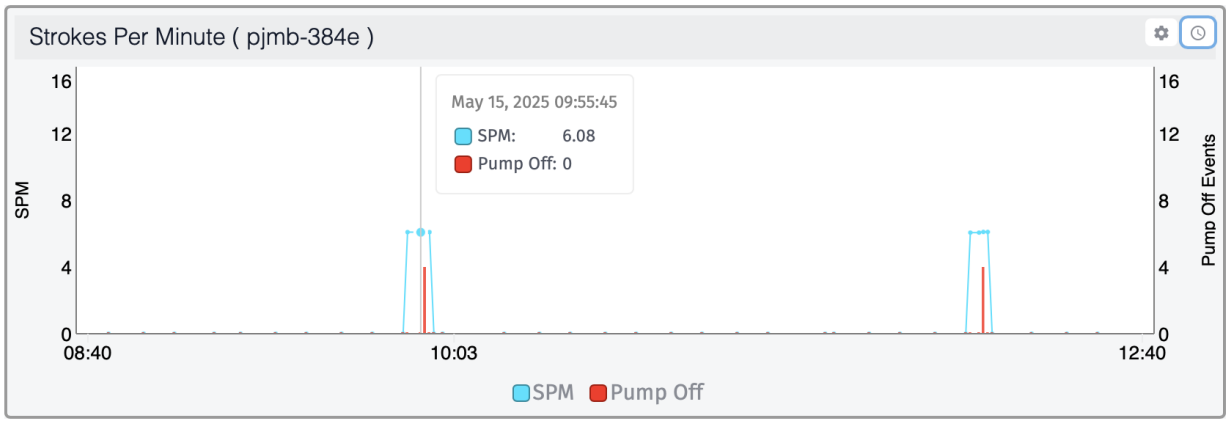
Installation details and results:

Telemetry Insight recently installed a WellTempo device on three different wells on different leases, all utilizing beam lift and controlled by Lufkin POCs. The wells had a variety of depths and formation geology. While the situation of having both devices on the same well would not be typical, the results suggest the WellTempo data (red) corresponds closely with the measurements made by the traditional load cell based controller (blue).

On the graphs below the blue bars represent well run time and the red spike represents when the WellTempo device detects strokes that are pumped off (ie. No longer moving fluid). Notice that the WellTempo device is detecting pump off at the same time or just prior to the Lufkin POC shuts the unit down.



Well #1 24 hours of pump off data



Well #1 6 hours of pump off data

Well #1 above is a vertical in the Bone Springs formation of New Mexico. The attached pump off controller runs the well approximately 12 cycles per day for about 10 minutes at a time.

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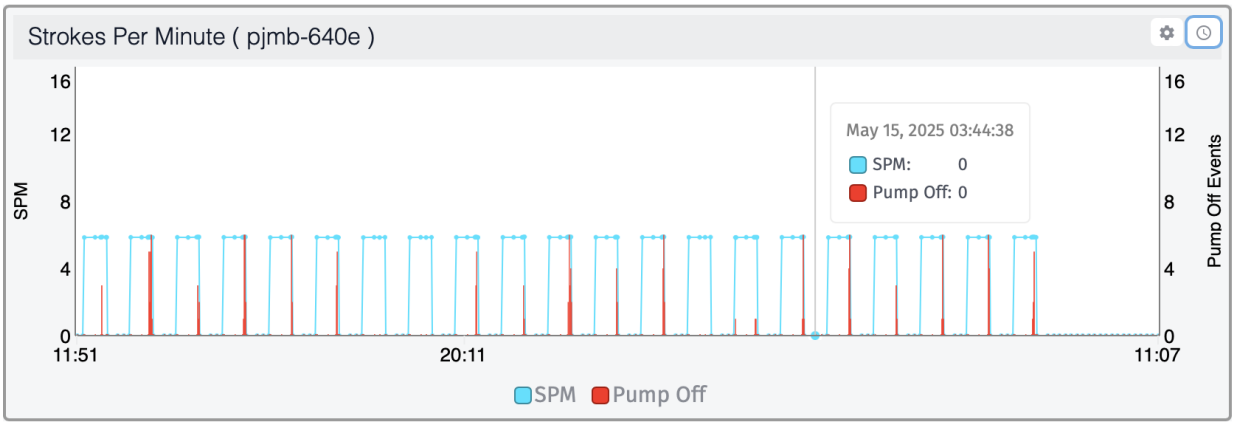
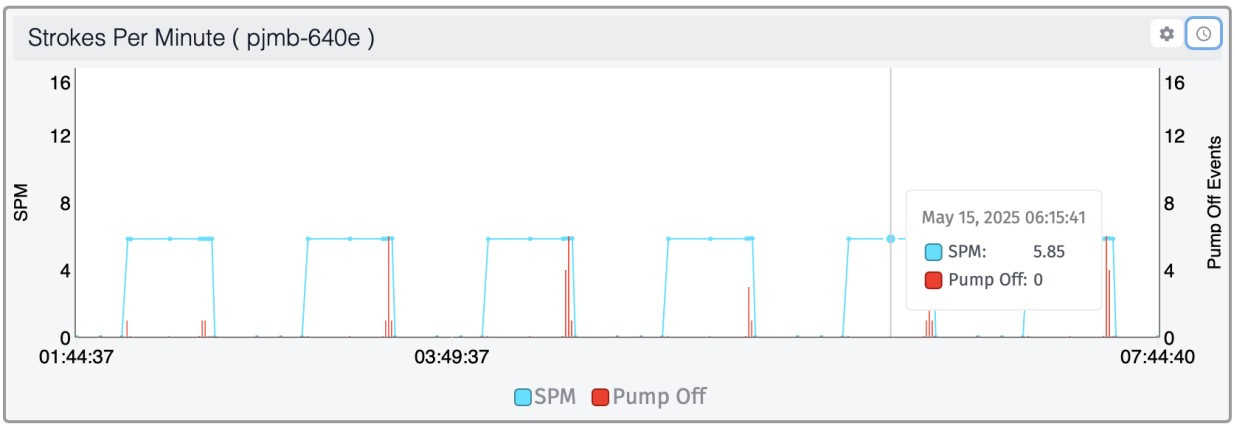


Well #2 24 hours of pump off data



Well #2 6 hours of pump off data

Well #2 above is a vertical well in Reagan County TX. The attached controller runs the well approximately 25 cycles per day for about 30 minutes each.

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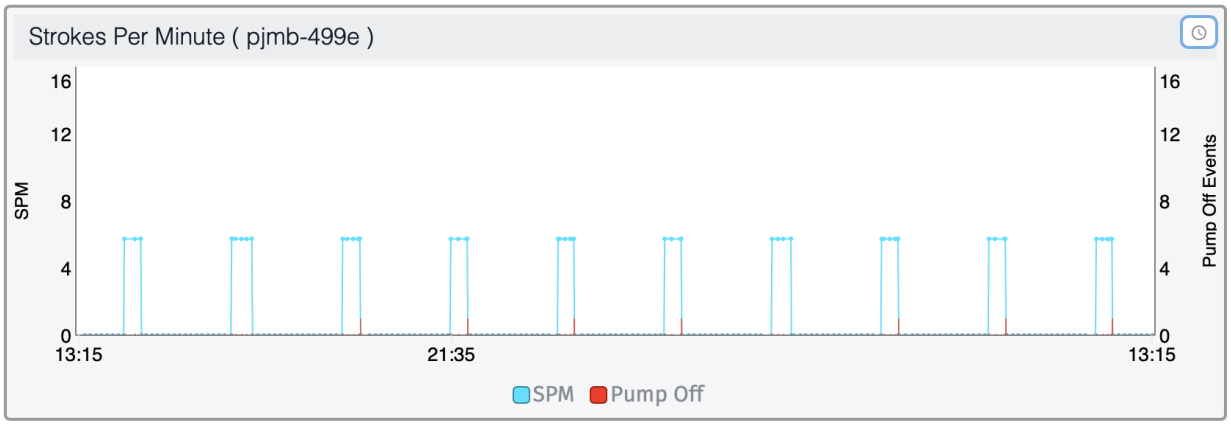

Well #3 24 hours of pump off data.

Well #3 is a vertical in Ector County TX. The attached controller runs the well approximately 10 cycles per day for between 15 and 20 minutes per cycle. These results were confirmed with observations on location when the card on the Lufkin controller indicated the well had pumped off along with a change in the flowline pressure indicating the same condition. The WellTempo device consistently reported the pump off condition just prior to the Lufkin's determination.

These results suggest that a simple beam mounted device can provide similar pump off detection capability to a traditional load cell based controller at a fraction of the cost traditionally required. This innovation will bring continuous pump off detection into the toolkit of marginal well producers by utilizing the normal timer controlling the well but tuning it with pump off data.

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Appendix A WellTempo information

Telemetry Insight's WellTempo system permits simple wireless installations that monitor and control pumpjacks. The inexpensive traditional timers controlling wells typically have small motors running a clock drive and do not detect pump off. A load cell-based pump off controller is much more expensive (up to $10,000 including installation) and thus well out of reach for marginal wells. As a third alternative the WellTempo continuously monitors the well for pump off condition and reports any such events which appear as red spikes during the run cycle. These results can permit optimal adjustments to the traditional timers resulting in substantially improved economics.

TYPICAL INSTALLATION CURRENTLY DEPLOYED:

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