

CASPIAN SEA PRODUCER PUMPS UP THE VOLUME IN MATURE FIELD WITH MULTIPHASE SYSTEM



THE CHALLENGE: UNLOCK STUBBORN OIL FIELD RESERVES

Oil production at an offshore well pad in the shallow waters of the Caspian Sea dipped well below 500 bpd. Gas injection soared to stem the production decline. These two realities meant a producer was looking for new thinking on options to stimulate a field that had been in operation since the 1950s.

The pad was connected to a local separation and takeaway battery located onshore six miles from the project field. Natural pressure had declined and gas lift was employed to facilitate flow of the 34° API oil. Continual fluid volumes were above 98.4% gas volume fraction (GVF) with intermittent 100% gas slugs. Was a meaningful increase in production still possible under these conditions?

FIELD SEPARATION



THE SOLUTION: STIMULATE PRODUCTION WITH TWO-SCREW MULTIPHASE PUMP SYSTEM

As believers that improving surface facilities can be a direct route to their optimization, CIRCOR analyzed existing production data and recommended installing a positive displacement multiphase pump system (MPS) at the wellhead. The primary operating principle of a positive displacement pump (as compared to a centrifugal pump) is fluid transfer, not pressure creation. Combined with the compression properties of production gas, the speed of the pump becomes the determining factor in the pump's inlet pressure and the resultant wellhead pressure.

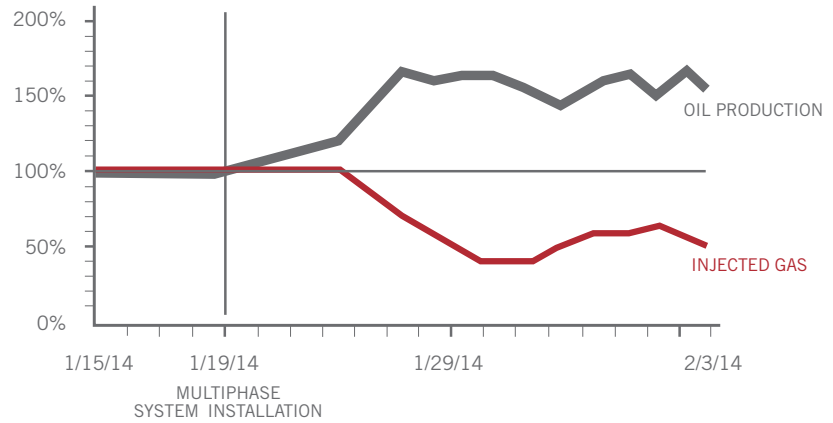
The multiphase pumping system can provide the flexibility to reduce wellhead pressure while boosting the pure well fluid (oil, gas, sand and impurities) to the pressures required by the existing facilities. In the case of high GVF (70-100%) flows, the design can be especially effective. The pump casing includes an embedded temperature-controlled reservoir that releases liquid into the screw mechanisms to maintain internal sealing and dissipate the heat generated from compressing the gas portion of the flow. Thus the screws remain properly wetted without recirculating fluid back to suction. Volumetric output of the high GVF fluid can significantly improve.

At the wellhead, the operator elected to install a CIRCOR MR 250 multiphase pump system to drive a wellhead pressure drop of about 120 psi. The centerpiece of the system was a versatile API 676 3rd edition two-screw pump capable of handling a broad range of liquids, gases, pressures and temperatures. At 50 psi of desired wellhead pressure, the pump has a flow range of up to 5Mscf/d of gas with as little as 1000 bpd of liquid.

The wellhead facility exerts required pressure on the well to drive production fluid through a local separation/ takeaway battery.



CASPIAN CASE STUDY:
Improvement in oil production and injected gas volumes with introduction of MPD



MPS increased oil production 70%,
Decreasing gas lift required by 50%

THE RESULTS: PRODUCTION UP, INJECTED GAS DOWN IN 3 WEEKS, ROI IN LESS THAN 2 MONTHS

Commissioning, startup and onsite training of operators occurred in early 2014. In the first few weeks of continuous operation, the company recorded an approximate 70% increase in oil production and a 50% reduction in injected gas, with production returning to levels about the desired 500 bpd. Payback on the investment occurred in under two months. CIRCOR estimates eight years of extended well life.

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