ABSTRAK

DESAIN *THROUGH TUBING ELECTRIC SUBMERSIBLE PUMP* (TTESP) PADA SUMUR "L-73" DAN "L-128"

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Target produksi minyak nasional yang meningkat mendorong optimalisasi produksi melalui penerapan metode *artificial lift* yang lebih efektif. Sumur "L-73" dan Sumur "L-128" dikelola oleh PT Pertamina Hulu Indonesia saat ini berproduksi menggunakan *Permanent Coiled Tubing Gas Lift* (PCTGL) dengan kinerja belum optimal. Sumur "L-73" menghasilkan 125 BFPD (*watercut* 75%) dengan PI 1,02 bpd/psi dan Sumur "L-128" menghasilkan 450 BFPD (*watercut* 85%) dengan PI 1,39 bpd/psi. Rendahnya produksi disebabkan oleh *pressure drawdown* yang kecil dan ketidakstabilan laju injeksi gas pada sistem PCTGL, sehingga penelitian ini mengkaji konversi ke metode *Through Tubing Electric Submersible Pump* (TTESP) yang mampu menghasilkan *pressure drawdown* lebih besar tanpa memerlukan rig untuk pemasangan maupun perawatan.

Penelitian menggunakan pendekatan kuantitatif berbasis studi literatur dan data lapangan. Analisis diawali dengan penyusunan kurva *Inflow Performance Relationship* (IPR) metode Vogel metode Vogel karena kedua sumur memiliki mekanisme pendorong *solution gas drive* dengan kondisi reservoir *saturated*, dilanjutkan perhitungan *Pump Setting Depth* (PSD), *Pump Intake Pressure* (PIP), dan *Total Dynamic Head* (TDH), pemilihan pompa, motor, serta peralatan permukaan TTESP. Tahap akhir berupa analisis keekonomian mencakup *gross revenue*, *net revenue*, dan *Return on Investment* (ROI).

Hasil kajian menunjukkan bahwa pada Sumur "L-73" kandungan gas bebas 52% melebihi batas AGH (45%) sehingga digunakan gas separator, sedangkan Sumur "L-128" dengan gas bebas 29,58% masih dapat menggunakan AGH. Penerapan TTESP meningkatkan laju produksi Sumur "L-73" dari 31,25 menjadi 86,38 BOPD dan Sumur "L-128" dari 67,5 menjadi 104,03 BOPD. Dengan biaya investasi dan operasional Rp854.980.000,00 selama 31 hari, ROI Sumur "L-73" sebesar 2,45 dan Sumur "L-128" sebesar 3,16, sehingga konversi PCTGL menjadi TTESP pada kedua sumur layak dilaksanakan secara teknis maupun keekonomian.

Kata kunci: *Artificial Lift, Productivity Index*, *Permanent Coiled Tubing Gas Lift*, *Through Tubing Electric Submersible Pump*.

ABSTRACT

DESIGN OF THROUGH TUBING ELECTRIC SUBMERSIBLE PUMP (TTESP) IN WELLS "L-73" AND "L-128"

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Increasing national oil production targets have encouraged production optimization through the implementation of more effective artificial lift methods. Wells "L-73" and "L-128", operated by PT Pertamina Hulu Indonesia, currently produce using the Permanent Coiled Tubing Gas Lift (PCTGL) system however, their performance remains suboptimal. Well "L-73" produces 125 BFPD with a watercut of 75% and a Productivity Index (PI) of 1.02 bpd/psi, while Well "L-128" produces 450 BFPD with a watercut of 85% and a PI of 1.39 bpd/psi. The low production rates are attributed to insufficient pressure drawdown and unstable gas injection rates in the PCTGL system. Therefore, this study evaluates the conversion of the existing lifting system to a Through Tubing Electric Submersible Pump (TTESP), which is capable of generating greater pressure drawdown without requiring a rig for installation or maintenance.

This study employed a quantitative approach based on literature review and field data analysis. The analysis began with the construction of Inflow Performance Relationship (IPR) using the Vogel method, selected because both wells have a solution gas drive mechanism under saturated reservoir conditions, followed by the calculation of Pump Setting Depth (PSD), Pump Intake Pressure (PIP), and Total Dynamic Head (TDH). Subsequently, the appropriate pump, motor, and TTESP surface equipment were selected. The final stage involved an economic evaluation based on gross revenue, net revenue, and Return on Investment (ROI).

The results indicate that Well "L-73" contains 52% free gas, exceeding the Advanced Gas Handler (AGH) limit of 45% therefore, a gas separator was selected. Meanwhile, Well "L-128" contains 29.58% free gas, which remains within the operating range of the AGH. The implementation of TTESP increased the oil production rate of Well "L-73" from 31.25 to 86.38 BOPD and that of Well "L-128" from 67.50 to 104.03 BOPD. With total investment and operating costs of IDR 854,980,000 over a 31-day production period, the ROI values were 2.45 for Well "L-73" and 3.16 for Well "L-128". These results demonstrate that the conversion from PCTGL to TTESP in both wells is technically feasible and economically viable.

Keywords: Artificial Lift, Productivity Index, Permanent Coiled Tubing Gas Lift, Through Tubing Electric Submersible Pump.