

RINGKASAN

PERENCANAAN ULANG *ELECTRICAL SUBMERSIBLE PUMP* UNTUK OPTIMASI PRODUKSI SUMUR “WR” LAPANGAN “ANR”

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Sumur WR di Lapangan Kawengan saat ini menggunakan Electric Submersible Pump (ESP) sebagai sistem *artificial lift*. Produksi aktual sumur ini mencapai 639 bfpd dengan tingkat watercut yang tinggi, yaitu 98%. Untuk mengevaluasi produktivitas sumur, dilakukan perhitungan *Inflow Performance Relationship* (IPR) menggunakan metode Vogel. Hasil analisis menunjukkan bahwa masih ada potensi peningkatan laju produksi. Namun dari *Pump Performance Curve*, pompa masih didalam *optimum range* tetapi sudah mendekati *downthrust*.

Metodologi penelitian dalam penulisan skripsi ini meliputi beberapa tahapan, dimulai dari pengumpulan data yang diperlukan seperti data sumur, data produksi, dan karakteristik fluida. Selanjutnya dilakukan pembuatan kurva IPR (*Inflow Performance Relationship*) menggunakan metode Wiggins untuk menentukan laju alir optimum dari sumur. Berdasarkan hasil tersebut, dilakukan perencanaan desain Electric Submersible Pump (ESP) dengan mempertimbangkan laju produksi, penentuan kedalaman pemasangan pompa (*Pump Setting Depth*), perhitungan Total Dynamic Head, serta pemilihan tipe pompa, jumlah stages, dan analisis sensitivitas terhadap frekuensi yang optimal. Selain itu, ditentukan pula kebutuhan surface facilities pendukung kinerja ESP, seperti switchboard, kabel, motor, dan transformer.

Setelah ESP terpasang, laju produksi fluida dari sumur WR meningkat menjadi 850 bfpd dari 639 bfpd. Berdasarkan hasil analisis, pompa yang paling sesuai untuk laju produksi optimum sumur ini adalah tipe IND1300/38Hz/185 Stages, dengan *Pump Setting Depth* pada kedalaman 1877 ft. Motor yang digunakan adalah EJP 456 Series, dengan daya 25 HP, tegangan 410 volt, dan arus 39 ampere. Dalam sistem kelistrikan, digunakan kabel EJP T07100007 Series No. 4 Galvanized type, sementara transformator yang dipilih adalah EJP 39222223034485 Dual Wound, OISC Type, 60 Hz. Selain itu, switchboard yang digunakan adalah EJP 45 A (Max), 46.7 kVa, 600 V Max 39222223618131 Series, Size 3.

Kata kunci: Perencanaan, *Electrical Submersible Pump*, Laju Produksi.

ABSTRACT

REDESIGN OF ELECTRICAL SUBMERSIBLE PUMP FOR PRODUCTION OPTIMIZATION OF WELL “WR” IN “ANR” FIELD

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Well WR in the Kawengan Field is currently utilizing an Electric Submersible Pump (ESP) as its artificial lift system. The well's actual production reaches 639 bfpd with a high water cut of 98%. To evaluate the well's productivity, an Inflow Performance Relationship (IPR) analysis was conducted using the Vogel method. The results indicate that there is still potential for increased production rates. However, based on the Pump Performance Curve, the pump is still operating within the optimum range but is approaching the downthrust limit.

The research methodology in this thesis consists of several stages, starting with the collection of necessary data such as well data, production data, and fluid characteristics. An Inflow Performance Relationship (IPR) curve is then developed using the Wiggins method to determine the optimum flow rate of the well. Based on the results, the design of the Electric Submersible Pump (ESP) is planned by considering the production rate, determining the recommended Pump Setting Depth, calculating the Total Dynamic Head, selecting the appropriate pump type and number of stages, and conducting a sensitivity analysis for optimal frequency. In addition, the required surface facilities to support ESP performance—such as the switchboard, cables, motor, and transformer—are also identified.

After the ESP was installed, the fluid production rate from well WR increased to 850 bfpd from the previous 639 bfpd. Based on the analysis, the most suitable pump for the well's optimum production rate is the IND1300/38Hz/185 Stages type, with a Pump Setting Depth of 1877 ft. The motor used is the EJP 456 Series, with a power rating of 25 HP, voltage of 410 volts, and current of 39 amperes. In the electrical system, the cable used is the EJP T07100007 Series No. 4 Galvanized type, while the selected transformer is the EJP 39222223034485 Dual Wound, OISC Type, 60 Hz. Additionally, the switchboard used is the EJP 45 A (Max), 46.7 kVa, 600 V Max 39222223618131 Series, Size 3.

Keywords: Planning, Electrical Submersible Pump, Production Rate.