Thesis

Mechanical and Industrial Engineering Department

Analyzing the Failure and Improvement of Progressive Cavity Pump in Chevron Indonesia Company by Using Lean Sigma Method

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ABSTRACT

Progressive cavity pump (PCP) is currently used in Chevron Indonesia Company as artificial lift. Based on well planning and budgeting (WP&B) 2012 and 2013 that there are 33 PCP wells which have been scheduled for workover. Currently there are 13 wells using PCP as artificial lift and the whole wells get failure even faster than the standard life cycle. Chevron Indonesia Company found that the life cycle of PCP is only 3 to 6 months even the standard life cycle is two years. The failure in PCP spends more cost for repairing it which amounted to USD 600,000/well in every year and the production loss is 80-200 BOPD.

Based on the field experiences, there are some parts that get serious failure in progressive cavity pump (PCP), so the failure is divided to be three problems; they are problem A, problem B, and problem AB. Problem A is the failure in the rod-tubing string, problem B is the failure in the rotor-stator, and problem AB is the failure in the rod-tubing string and rotor-stator. There are three wells getting problem A, four wells getting problem AB, and six wells getting problem B.

Dogleg severity (DLS) is the change of inclination and/or azimuth which is described in every 100 ft, so the unit of DLS is degree/100ft. The assumption in this research is the influence of dogleg severity in the failures because DLS causes bending to the rod-string and rotor-stator. The dogleg distribution will influence the failure rate; there will be analysis for the comparison of each failure.

In this research, the used method is lean sigma which correlated with the statistics analysis. There are some statistics items used in this research; they are maximum point, mean, median, dangerous rate mean, unsafe DLS percentage, and distribution of DLS in made range. After that, there will be average point used to compare all wells of each failure in out of it. The percentage will prove that the dogleg severity influence mostly the failure in PCP and it will be used as mirror for the next same job. Besides that, the dogleg severity causes the failure in rotor-stator. In this research, there will be analysis for the DLS in rotor-stator position and the recommendation for change in PCP position. After all analysis is conducted, there will be analysis for the next same jobs in two wells to prevent the same failure.

Keywords : progressive cavity pump (PCP), workover, failure, problem A, B and AB, rod-tubing string, rotor-stator, dogleg severity (DLS), lean sigma, statistics.