Endurance Testing of Engine Oil Pump

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Abstract: ***Test benches are used to verify the correctness or soundness of a design or model. In the context of hardware engineering, a test bench refers to an environment in which the product under development is tested with the aid of software and hardware tools. This machine enables to conduct performance test of Oil Pump for given test parameters. Special fixture is designed for quick mounting/clamping of pump under test. The Motor RPM is varied using VFD to change the pump speed.***

Keywords: Endurance Test, HMI (Human Machine Interface), Impulse Test, Oil Pump Test Bench, PLC(Programmable Logic Controller), RPM (Revolutions per minute), Speed swipe, VFD(Variable Frequency Drive).

I. INTRODUCTION

The machine consists of – Electric drive unit, Oil reservoir, Heating arrangement, Recirculation unit, Cladding, Pressure, RPM and Control panel. This machine has PLC/HMI based control system. It has VFD, push buttons, display, relays, hooter and emergency stop etc. PLC shall record indications for – flow, pressure, RPM and temperature. This will repeat till highest preset rpm. If pump under test is 'OK' i.e. pressure & flow parameters are within limit, for all RPM ranges then "OK" lamp will glow on the panel. If pump under test is detected 'Not-OK' during any stage of testing cycle, i.e. pressure, flow or any of these parameters are not within limit, then the "NOK" lamp will glow on the panel and the cycle is aborted.

II. LITERATURE SURVEY

A. study of Vane Pump Test Rig [1]

The face of modern industries has change by leaps and bounds in the recent times. This calls for a need to develop a simple & intelligent solution for every problem. Many types of vane pumps are being developed and are manufactured. Thus, it becomes necessary to ensure the customers satisfaction that these pumps are meeting the performance conditions for which they have been purchased. The paper aims at making a working test rig for testing of such pumps. It aims for testing the discharge head, flow and power between the extremes. Performance testing can help reduce energy costs by identifying poor efficiency and also decrease maintenance costs by diagnosing chronic pump problems. It helps us understand how often do pumps operate away from their design point, How much power is being wasted, and how do these conditions impact pump reliability and maintenance costs.

III. BLOCK DIAGRAM

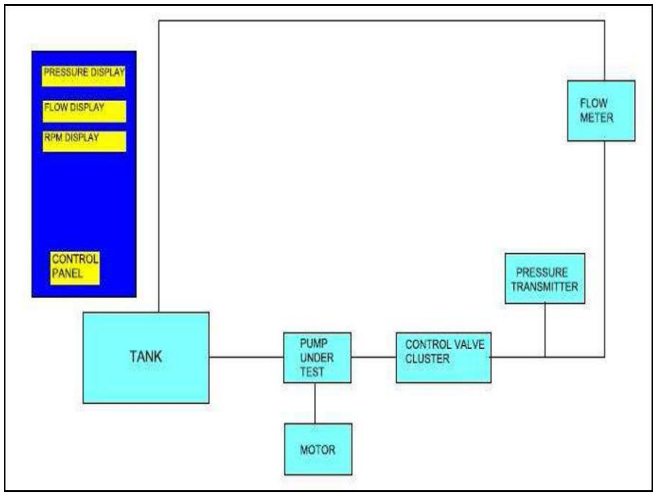

Fig. 1 Block Diagram of Endurance Test Bench

IV. PROPOSED SYSTEM WORKING

The objective of Oil Pump Endurance Test Bench is to monitor the performance of the Oil Pump in varying conditions of Temperature and Pressure. The flow of the oil will be varied as well. The pump is coupled to a 100HP motor which has maximum 1681 RPM. The motor is controlled by the VFD.

V. METHODOLOGY

The following tests are carried out on the pump:-

1. Speed Swipe Test- Here, the speed of the motor is varied. Results are noted with a pump engine rpm table.
2. Endurance Test- The test bench is kept ON for 1000 hours. Pressure restriction in the system is about 8 bar.
3. Fatigue Test- Pressure restriction in the system is varied in the form of impulse pulses.
4. Pressure Restriction Test- Pressure restriction is varied from 0-10 Bar. Pressure settings are done with a manual valve.

VI. RESULT

Hence we have controlled the operation of Oil Pump as desired and monitored the pump characteristics with required safety parameters.

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