

Oil Pump Test Bench

¹Kankariya Rishab, ²Yesade Priyanka & ³Rajeshirke Praphulla

⁴Prof. Sheetal.V.Kulkarni (*Project guide*).

¹⁻⁴*Instrumentation Engineering Department,
AISSMS IOIT, Pune, India.*

Abstract

The life and reliability of the hydraulic systems are heavily dependent upon how the fluid flows through the system. In past, fluids were used primarily for energy transfer and control of hydraulic components. However, as the enhanced performance was the need of environment, hydraulic systems assumed a new role and one which is not as easily understood as transfer of energy. Oil pump is primarily responsible for initial regulation of hydraulic fluid in the system.

Testing the pump for its desired specifications in terms of flow, pressure and temperature requires a test equipment namely Pump Test Bench. There is substantial cost in the repair and maintenance of pump test benches and also its sluggish, hence the use of pump test bench for evaluation of performance of pump is costly. In addition, repeatability and reproducibility is also of concern.

Keywords: Hydraulic, Performance, Oil pump, Analytic, Testing, Specification, Flow, Pressure, Temperature, Repeatability and Reproducibility.

I. INTRODUCTION

The oil pump is an essential component of any vehicle with an internal combustion engine, principally cars and trucks. With the job of forcing the fuel from the fuel tank towards the engine. Doing the bench tests can tell you whether or not the pump meets Manufacturers Specification Evaluation of pump performance using test bench increases the reliability and reproducibility of the pump. The purpose of this test bench is to perform long endurance test (normally about 1000 Hrs.) on oil pump for automotive combustion engines .Pump requirements:

- 1) Its own separated tank of oil. Tank has to have a heater and oil control devices integrated on it.
- 2) A fixture block support, which it is an interface between the bench and fixture that holds oil pump.
- 3) Tank is open.
- 4) A Hydraulic circuit that takes oil from tested pump, it regulates flow and measure oil pressure
- 5) Motor that drives the pump monitoring torque
- 6) A control system to manage the entire device.

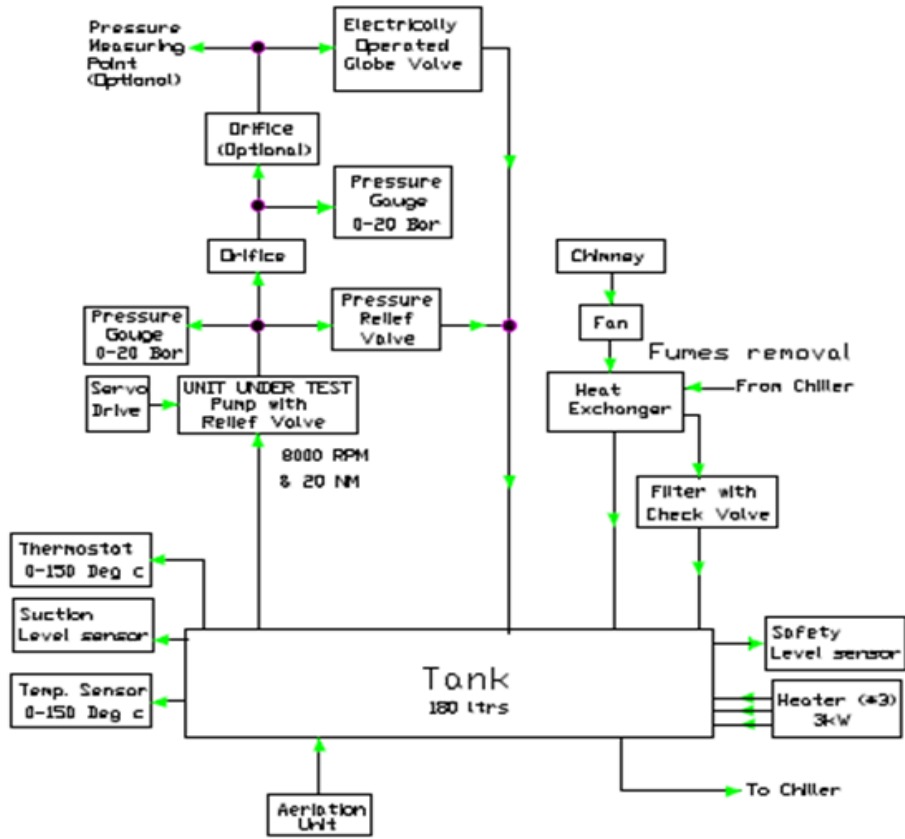
II. LITERATURE SURVEY

A Study of Fuel Pump Performance Testing and its Implications on Product Acceptability

Catherine Eileen Fratarcangeli Submitted to the Dept. of Mechanical Engg and M.I.T. Sloan School of Management

In this study, gage capability testing was conducted on the fuel pump, performance test equipment in the Engineering Test Laboratories and the Fuel Pump Production Facilities. A sequence of tests was designed to identify the sources of and quantify the measurement error while measuring the performance of two types of electric fuel pumps under numerous conditions. Some of these conditions included multiple technicians, Lab location, test fluid type, operating point, and many "noise" variables. For each of the pump types, the results from the Lab and respective Plant were analysed and compared using statistical analysis.

III. BLOCK DIAGRAM



IV. TECHNICAL SPECIFICATIONS:

Component to be checked	Oil Pump
Metal Flexible connections	1" for Delivery,
Proportional valve	With electronic actuator
Oil Temperature	ambient to 150 °C
Operating pressure	20 bar
Piping diameter	1"
Component loading	Manual
Tank Capacity	180 Litres Max
Max running hours	1000 Hours
Rate of heating oil	2 °C/minute

V. METHODOLOGY

This equipment is used to conduct,

1. Pump test bench is capable to perform long endurance test on oil pump.
2. Pump test bench has to be able to test crank driven as well as off crank driven oil pump. This requires a dedicated hardware and software.
3. Pump test bench is capable to perform long endurance test on one pump at the same time.
4. Different types of pumps can be tested by Oil Pump Endurance Test Bench :
 - Dragon1.2
 - Dragon 1.5
 - E511
 - Panther
 - Ford Sigma
 - SJTD
 - Mahindra S101
 - XSDE

VII. INTERLOCKS:

1. If Oil level in the Tank is below Low level then Heater will be OFF and test will be stop.
2. Test will be started only after reaching Preset Test Temp.
3. Heater will be ON if Current Temp is below Preset Temp.
4. Chiller will be ON if Current Temp is above Preset Temp.
5. Oil level.
6. Heater safety.
7. Optional safety if sensor fails,
8. Rrelief valve for system safety.

VIII. CONCLUSION:

The oil pump test bench is developed. Eight different makes of KSPG pumps were tested for their performance and endurance. The test rig is calibrated with theoretical values. The pumps were tested in manual as well as auto mode. The system can be used for data logging as well. The tests were carried out on one pump at a time. This automatic system was found capable to work for 1000 hours continuously. The overall performance of the oil pump test bench is satisfactory.

ACKNOWLEDGEMENT

Inspiration and guidance are invaluable in every aspect of the life, especially in the field of the academics, which we have received from my respected internal project guide Mrs. S.V.Kulkarni, .Special thanks to Mr.Uday Cherekar, Managing Director of Shree systems Pvt. Ltd. for giving us this opportunity to work on this challenging project. I would also thank my colleagues and friends for their inspiration and motivation and those who helped me directly or in indirectly for my project work.

REFERENCE

- [1] “Qualification of Hydraulic Fluidthrough PumpTesting” by Dr. Richard K. Tessmann, P.E.
- [2] ” A Study of Fuel Pump Performance Testing and its Implications on Product Acceptability”by Catherine Eileen Fratarcangeli B.S., Mechanical Engineering, GMI Engineering & Management Institute, (1992)

