

Proposal and Performance Evaluation of adjustable stroke radial piston pump

Virendra R Mithari , Prajakta S Bange, Prem I Machara ,Aaryan H Gulve

Prof.A.R.Nadaf, Prof.P.S.Khade

¹Diploma Student, Department of Mechanical Engineering, Dr. Babuji Salunkhe Institute of Engineering and Technology, Kolhapur, Maharashtra, India.

²Head of Department, Department of Mechanical Engineering, Dr. Babuji Salunkhe Institute of Engineering and Technology, Kolhapur, Maharashtra, India.

³Lecturer, Department of Mechanical Engineering, Dr. Babuji Salunkhe Institute of Engineering and Technology, Kolhapur, Maharashtra, India.

Abstract - A centralized lubrication system, is a system that delivers controlled amounts of **lubricant** to multiple locations on a machine while the machine is operating .The advantages of this new technology are clear although the heart of the automated lubrication system is the pump . The conventional pumps used are of fixed displacement type , thus the volume flow cannot be controlled hence they are not useful for the ALS.

The Proposed precision control variable displacement pump is an innovative kinematic link base stroke changing mechanism that is controlled using an floating eccentric mechanism that can precisely vary the stroke of the mechanism and thus the pumping unit volume flow rate can be controlled. Project work will include the kinematic linkage design . The strength analysis of the kinematic linkage parts will be done using theoretical method . Pump developed will be tested to determine the performance characteristics of the pump and there by determine the maximum and minimum volume flow rate of the system , volumetric efficiency and precision of flow control .The pump will be tested for fixed input speed and for multiple control positions .

Key Words: ALS , Kinematic link pump , Precision control , variable displacement pump

1.INTRODUCTION (Size 11, Times New roman)

Axial piston pumps with constant pressure and variable flow have extraordinary possibilities for controlling the flow by change of pressure. Owing to pressure feedback, volumetric control of the pump provides a wide application of these pumps in complex hydraulic systems, particularly in aeronautics and space engineering.

The major obstacle in application of the bent axis piston pump is extremely high cost (minimum Rs90000/-) over that of the radial piston pump , it ranges in the range of 5 to 6 times the cost of radial piston pump. Hence there is a need to develop a modification in the radial piston pump design that will offer a variable discharge configuration in addition to the advantages of high efficiency and maximum pressure.

OBSERVATION TABLE:

SR. NO.	SPEED (RPM)	VOLUME IN BEAKER (ml)	TIME (SECONDS)	FLOW RATE (LPM)
01	100	100	189	0.0317
02	200	100	94	0.063
03	300	100	65	0.092
04	400	100	49	0.122
05	500	100	40	0.15

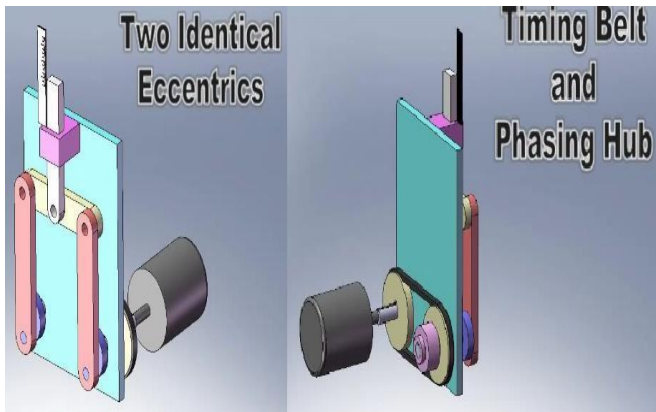
SR. NO.	SPEED (RPM)	ACTUAL FLOW RATE (LPM)	THEORETICAL FLOW RATE	VOLUMETRIC EFFICIENCY
01	100	0.031	0.035	86.76
02	200	0.061	0.071	85.4
03	300	0.089	0.107	83.3
04	400	0.12	0.143	83.7
05	500	0.146	0.179	81.68

Result Discussion

1. Pump shows maximum discharge at 500 rpm in both 0 and 45 degree configuration
2. Pump shows maximum volumetric efficiency at 500 rpm in both 0 and 45 degree configuration
3. Pump discharge can be varied easily from 0 to maximum.

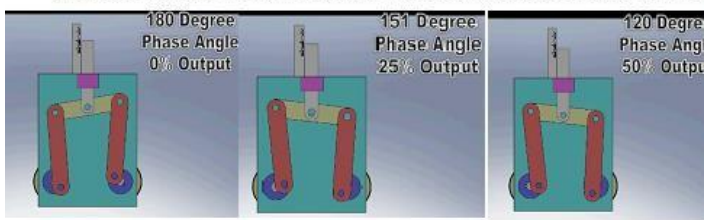
CONCEPT & IMPLEMENT OF ADJUSTABLE STROKE MECHANISM

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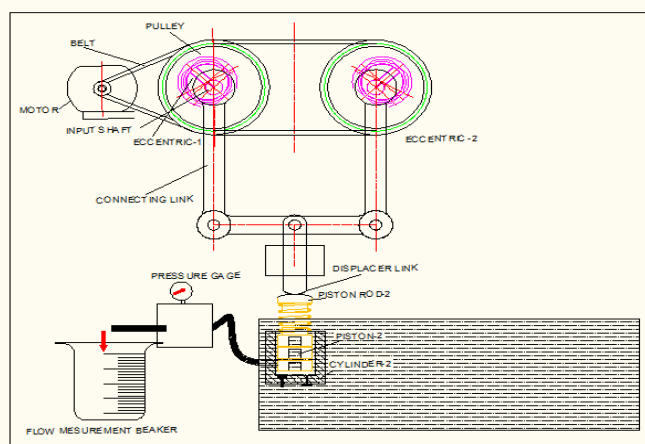


This mechanism shown above is to convert rotary motion of eccentrics into reciprocation of slider near scale, note that this reciprocation of the slider is input to the piston pump ...thus if we are able to vary the displacement of piston then we can vary the discharge from the pump thus converting a fixed displacement piston pump to variable discharge pump at a very very low cost as compared to the bent axis piston pump available in market.

HOW THE OUTPUT FROM ADJUSTABLE STROKE MECHANISM CAN BE CHANGED FROM



Performance Evaluation of Developed pump



3. Conclusion:

The radial piston pump was modified to developed as a replacement to axial piston pump, the kinematic linkage was designed and the fabrication of pump was done. Test and trial was conducted on the pump and the results revealed that Pump shows maximum discharge at 500 rpm in both 0 and 45 degree configuration. Pump shows maximum volumetric efficiency at 500 rpm in both 0 and 45 degree configuration Pump discharge can be varied easily from 0 to maximum

ACKNOWLEDGEMENT

The adjustment stroke refers to the mechanism that changes the stroke length of the pistons, which directly affects the output flow rate and volume of the pump. By adjusting the stroke:

Longer stroke = more displacement = higher flow

Shorter stroke = less displacement = lower flow

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