

Working of centrifugal pump without using foot valve

#¹Mr. Rohit Gupta, #²Mr. Gunwant Biradar, #³Mr. Krishna Gade
#⁴Mr. Shubham Dighe



¹rg48202@gmail.com
²biradargunwant@gmail.com
³sshubhamdighe@gmail.com
⁴krishnagade91@gmail.com

#¹²³⁴Department Of Mechanical Engineering
G.H.Raisoni College of Engineering and Management, Pune.

ABSTRACT

The paper reviews the literature available on the improvement of efficiency of centrifugal pump through modification in suction line. The paper discusses the available material of performances improvement through various parameters and mainly focuses on research relates to modification in suction line.

Key Words: Centrifugal pump, foot valve, Priming

ARTICLE INFO

Article History

Received: 7th June 2019

Received in revised form :
7th June 2019

Accepted: 9th June 2019

Published online :

10th June 2019

I. INTRODUCTION

Pumps

A **pump** is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work for moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.

Priming

Most centrifugal pumps are not self-priming. In other words, the pump casing must be filled with liquid before the pump is started, or the pump will not be able to function. If the pump casing becomes filled with vapors or gases, the pump

impeller becomes gas-bound and incapable of pumping. To ensure that a centrifugal pump remains primed and does not become gas-bound, most centrifugal pumps are located below the level of the source from which the pump is to take its suction. The same effect can be gained by supplying liquid to the pump suction under pressure supplied by another pump placed in the suction line

Vacuum

Vacuum is space devoid of matter. The word stems from the Latin adjective vacuus for "vacant" or "void". An approximation to such vacuum is a region with a gaseous pressure much less than atmospheric pressure .

II. LITERATURE REVIEW

The task deals with optimization and analysis in suction of centrifugal pump so in related to this following papers have been studied.

Vibha P.Pode, Shylesha Channapattanna[2014] have proposed a study to be done on the suction side of a centrifugal pump, the objective of the study was to improve the performance and provide the best alternative design for the suction side.

Sumit N.Gavande, Prashant D.Deshmukh, Swapnil S.Kulkarni[2014] have studied the various methodologies to increase the discharge of the pump. Some methodologies relate to the change in design of the suction side and some relate to change in design of pump.

Bin Cheng al.[2012] the objective of this study was to analyze the inlet flow characteristics of the lateral diversion and intake pumping stations and access the capacity of flow adjustment of the guide splitter with numerical simulations, based on turbulent model and SIMPLER algorithm. The main conclusions was, the inlet flow pattern is more complex than single lateral division or lateral intake pumping station and the flow pattern in the lateral diversion part is similar with bend flow.

Honggeng Zhu al.[2012] have investigated the internal flow patterns of a volute type discharge passage, in a mixed flow pumping system based on the Computational Fluid Dynamics(CFD). Analysis shows that the internal flow pattern of volute-type discharge passage is very complex; there is vortex and flow separation in typical cross-sections.

Problem statement:

These are some difficulties faced in centrifugal pump Open Type Centrifugal Pump:-

- Cavitations: - the net positive suction head (NPSH) of the system is too low for the selected pump
- Wear of the foot valve can be worsened by suspended solids
- Corrosion inside the pump caused by the fluid properties
- Overheating due to low flow
- Lack of prime: - centrifugal pumps must be filled (with the fluid to be pumped) in order to operate

III.METHODOLOGY

1. First we will be building a tank for the water storage. Where the water will be circulated.
2. The design of the tank will be as per the pump rating and so the amount of water.
3. We will be then introducing the vacuum unit in place of foot valve.
4. With the help of vacuum unit, we will be reducing the cavitation's caused during the priming of the centrifugal pump.

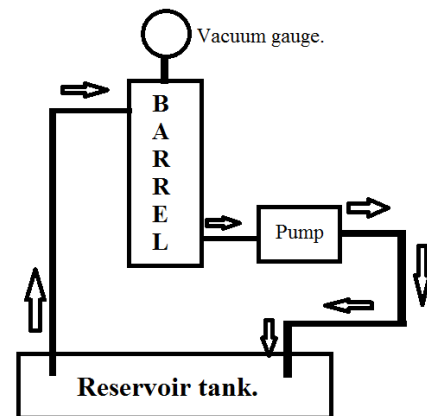


Fig. Block diagram

IV. RESULT



Fig. Actual setup

V. CONCLUSION

On the basis of all the information gathered and fulfilling the industry need for the project till now. We can conclude that the cost is the much bigger and one of the most important parameter to be taken under consideration .in industry we learned how the time, cost, accuracy and efforts are important.

If investing a little now is going to pay later then a right move likewise we made that with an increased of speed of the pump it will cause the properties to varied accordingly which in turn effect the overall efficiency.

REFERENCE

1. Vibha p.pode, shylesha channapattanna, evaluating performance of centrifugal pump through cfd while modifying the suction side for easting discharge, international journal of research in engineering and technology eissn: 2319-1163 | pissn: 2321-7308, jan-2014
2. Sumit n.gavande, prashant d.deshmukh, swapnil s.kulkarni, a technique to enhance the discharge of a multi intake centrifugal pump, international journal of advanced engineering research and studies e-issn2249-8974, volume: 03 issue: 01 | jan-2014.
3. S. Bin cheng, yonghai yu, cfd simulation and optimization for lateral diversion and intake pumping stations, 2012 international conference on modern hydraulic engineering, procedia engineering 28 (2012) 122 – 127.