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Development Of Multi-Purpose Mechanical Pump for Refilling And Recovering Liquid Form of An Auto Engine

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ABSTRACT

In the automotive sector, lubrications, fuels, engine oils and other liquids are very essential for the different parts of an auto to function properly. In feeding those engines they always use funnel that consumes time in using it and there is always spillage. The other one is a pump that is powered by an electricity. This pump cost expensive for the purpose of just feeding and draining. In draining process, the used oil cannot be used again for other purposes. Due to this problem the researchers find ways to make some innovations the multi-purpose mechanical pump. This project functions like a small hydraulic pump but the difference between this two is that the Multi-Purpose Mechanical pump functions without using electric power or electricity. It can be used for recovering oils because of the oil filter and feed liquid forms inside the differential and transmission.

The different parts of the mechanical pump are made up of scrap materials. When shaft rotating wheel rotated clockwise the mechanical source convert into hydraulic energy. It generates flow with enough rotating power to overcome pressure induce by the load at the container and pump out to the outlet/inlet hose. Then when it is rotated counter clockwise the MPMP will serve as recovery.

A full factorial design of experiment is selected for experimental planning and the analysis of variance (ANOVA) has been employed and Based from the results and observation gathered. The researcher found out that the Multi-Purpose Mechanical Pump is an effective manual mechanical pump.

Keywords: *Draining, feeding, hydraulic pump, mechanical, pressure.*

INTRODUCTION

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 by moving the fluid.

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Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power.

Mechanical pumps serve in a wide range of applications such as pumping water from wells, aquarium filtering, pond filtering and aeration, in the car industry for water- cooling and fuel injection. The fuel feed pump is an integral element of any car or truck that performs pumping of a vehicle's fuel from its tank to the engine. A fuel pump is a frequently essential component on a car or other internal combustion engine device.

The paper presents the experimental study; to investigate the performance of the project when it comes to feeding and recovering of the liquids. Full factorial experimental design and analysis of variance has been employed to determine the effectiveness and acceptability of the project.

The objectives of the study are the following: To lessen the difficulties in recovering and refilling gear-oil or any liquid forms to the differential and transmission, to avoid spillage of any liquid when refilling, to save usage of power electricity by using this Multi-Purpose Mechanical Pump, to produce a product that is useful to the automotive NC I and NC II.

METHODOLOGY

The method used in this study was the experimental method with the used of outcome-based form, which will provide sample information to have our in-depth analysis and interpretation of the outcomes of "MULTI-PURPOSE MECHANICAL PUMP''

Table 1.

Proportion of materials used in testing the average speed of the ''MPMP'' in a water.

Materials
Gear oil
Fuel
Gasoline
Diesel
Kerosene

Speed of Rotation/second $360^o/2s$	Volume of Liquid
10s	100ml-120ml
20s	220ml-250ml
30s	375-400ml

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Table. 2

This table presents the flowing speed of different liquids tested by the MULTI-PURPOSE MECHANICAL PUMP''. As the higher the level of viscosity of the fluid the lesser it transfers.

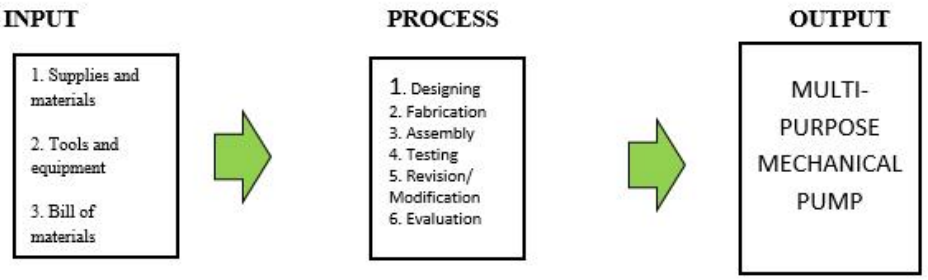
Liquid Materials	Quantity	Speed of Rotation/second 360º/3s	Time per rotation	Filled liquid
Gear oil	**1000 ml**	**360ºx15rt**	**3s**	**975 ml**
Gasoline	**1000 ml**	**360ºx15rt**	**3s**	**998 ml**
Diesel	**1000 ml**	**360ºx15rt**	**3s**	**995 ml**
Engine oil	**1000 ml**	**360ºx15rt**	**3s**	**978 ml**

360º is for the whole cycle of the rotating wheel, **rt** is for the times where the rotating wheel rotates and **s** for seconds.

Conceptual Framework of the study

This research project focused on the development of the multi-purpose mechanical pump. The figure shows the conceptual model that guided this research study. As it is developmental in nature, this study followed the **input, process and output** model. The input of this study includes ideas on the design of the project taken from related literature and studies and trainings, available supplies and materials, tools and equipment and bill of materials. The process focused on the development of the pump which consist of the design, fabrication, assembly, testing, revision/modification, and evaluation.

FIGURE 1



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The significance of the study is to produce a product that is effective and cost efficient that can be helpful in recovering and refilling different kinds of oil into the differential, transmission and fuel into the fuel tank using the multi-purpose mechanical pump. The findings of the result will be a great help to land and transport sectors, automotive shops and car owners.

Different Parts of the multi-purpose mechanical feed-pump, 1 A capacity of about 1-12 gallons. Used for a variety flow able material, 2 oil filter Is a filter designed to remove contaminants from engine oil, transmissions oil, lubricant oil or hydraulic oil, 3 vacuum pump It is the heart of the Machine. It provides the vacuum or pressure to transport the liquid through the hose or inside the container. Inlet/outlet (io) hose It is connected to the Vacuum pump, shaft a mechanical component for transmitting torque and rotation, to connect the shaft rotating wheel to the vacuum Pump, base it is used to hold or support the machine, shaft rotating wheel which is the brain of the Machine

FIGURE 2
Actual photo of the Mechanical Feed Pump

Figure 3
Refilling Process

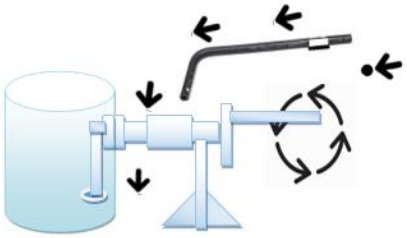

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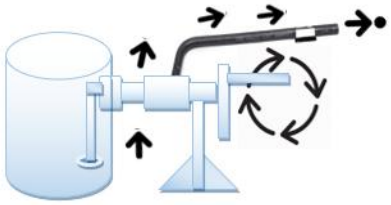
FIGURE 4

Feeding Process



RESULTS AND DISCUSSIONS

The actual result of the project was shown in Table 2. It shows that the project is functional and serves its purpose. As higher the level of viscosity of the fluid the lesser it transfers.

RECOMMENDATIONS

On the basis of the findings and conclusion of the study, the following recommendations were given. 1 The refilling process is good but the materials should always be cleaned thoroughly before and after using it because it could contaminate the fuel that would cause clogging. 2 Different containers may use for different fluids.

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