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Reduction in Cleaning Time of Coolant Tanks

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Abstract: ***The main purpose of this project is to enumerate methods that are used to clean the coolant tanks in industries thereby reducing manual labour. An important and efficient method to select the appropriate time reduction process to clean the coolant tanks can be determined by the QC system which is commonly used in industries. The main three methods which can be employed are the vacuum grip method, the screening method and the two valve pump system.***
Keywords: Bur, Coolant, Screening, Vacuum grip, Two way valve

I. INTRODUCTION

Cleaning is a very important aspect of life. If things are not cleaned and maintained properly, its functioning ability will be drastically reduced and also the system can be prone to damage very easily.
A coolant is a substance, typically liquid or gas, that is used to reduce or regulate the temperature of a system. The coolant used is trim type, which is a mixture of synthetic oil and bio oil. It can be derived by using 3 litres of oil in 200 litres of water. The coolant life is 6 months. Automation is a process of reducing manual labour to carry out a purpose by the employment of automatic mechanical systems.

A. Qc System

The QC (Quality Control) system is a problem solving system which is commonly used in industries. We have used this system to find the best and most efficient solution for time reduction in cleaning of coolant tanks.
The QC system has the following steps:

1) Problem definition
2) Observation
3) Analysis
4) Action
5) Check
6) Standardisation

B. Area Of Problem

FIG.1. Coolant Tank

II. METHODOLOGY

A. Screening Method

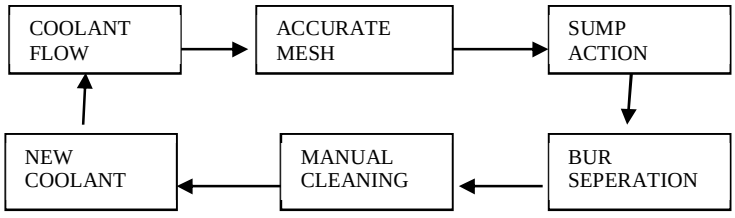

Fig.2. Screening method

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B. Vacuum Grip Method

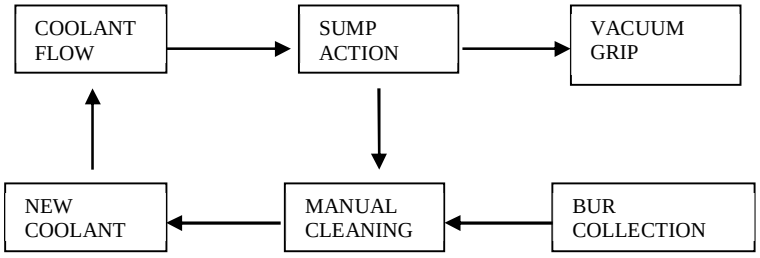
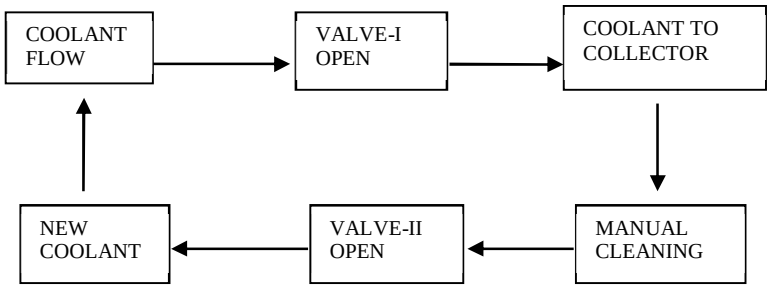


Fig.3. Vacuum grip method

C. Valve Pump System



D. Components Used

1) Sump (Model: Superior Pump 91330, Rating: 4.5, Material: Thermoplastic)
2) Steel Mesh (According to the dimensions of the tank)
3) Pipelines (PVC)
4) Vacuum grip (Derived from vacuum cleaner)
5) Bur collector
6) MS rods
7) Valves (Two way)
8) Suspension elements
9) Railing base

E. Problem Definition

The problem definition is the first step of the QC system. Almost all the costly machines employ a coolant tank for the efficient circulation of coolant across the machine. This also facilitates the need for periodic cleaning of these tanks. Usually manual cleaning of tanks is a very time consuming process and also requires the stoppage of machines for a long period of time. This causes heavy production losses. However certain methods can be employed to reduce the manual labour. One efficient method is automation. This can also be carried out by some modifications done to the machine itself.

F. Observation

This is the second step of QC system.The time consumed by the above processes are given below:

1) Coolant water draining: 40 minutes
2) Manual screening: 20 minutes
3) Coolant spraying: 5 minutes
4) Tank top cleaning: 5 minutes
5) Tank top displacement: 5 minutes
6) Manual cleaning: 10 minutes
7) Coolant pouring: 20 minutes

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G. Analysis

The analysis process is the third step in the QC system. This is done with the help of cause and effect diagram.

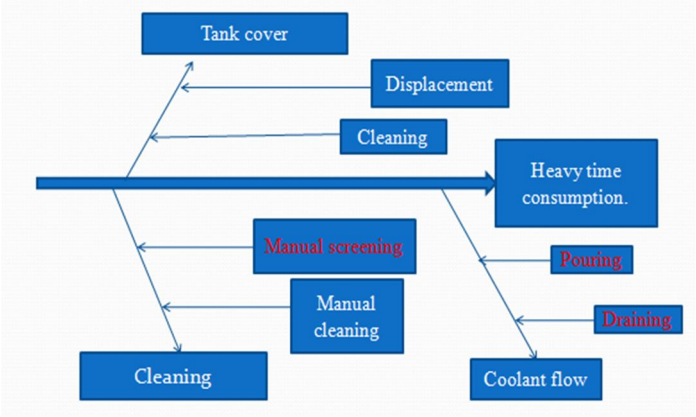

FIG.2. Fishbone Diagram

H. Action

This is the fourth step of the QC system. The three methods are explained below in terms of their working procedure. The procedures can be understood with the help of the methodologies as given above.

I. Check

This is the fifth step of the QC system. This is the stage where the comparisons are made for the previously mentioned techniques. This comparison can be made by comparison tables. The following table shows the various parameters that are required to compare the three methods. Once these comparisons are made and observed, we can get a clear picture of the best possible methodology.

S.no	Parameters (processes that consume time)	Screening method (in minutes)	Vacuum grip method (in minutes)	Two valve pump system method (in minutes)
1.	Coolant water draining	15	15	10
2.	Manual screening	10	10	15
3.	Coolant spraying	5	5	5
4.	Tank top cleaning	5	5	5
5.	Tank top displacement	5	5	5
6.	Manual cleaning	10	10	7
7.	Coolant pouring	15	15	10
	Total	70	65	47

Table.1

III. STANDARDISATION

This is the sixth step in the QC system. In this step, discussion about the major design changes is going to be made. However, there are not much design changes within the machine itself as two methods include external sources. In the third method however, we include a two way valve in place of a single valve in order to reduce the coolant flow time. This two way valve is made of either PVC or steel.

IV. CONCLUSION

This is the final step of the QC system. In this system, we select the most appropriate method out of the three methods. We compare the merits as well as demerits of these three methods to come to a conclusion. From the comparison table, it is found that the two valve pump system method has the least time consumption as compared to the other methods (47 minutes).

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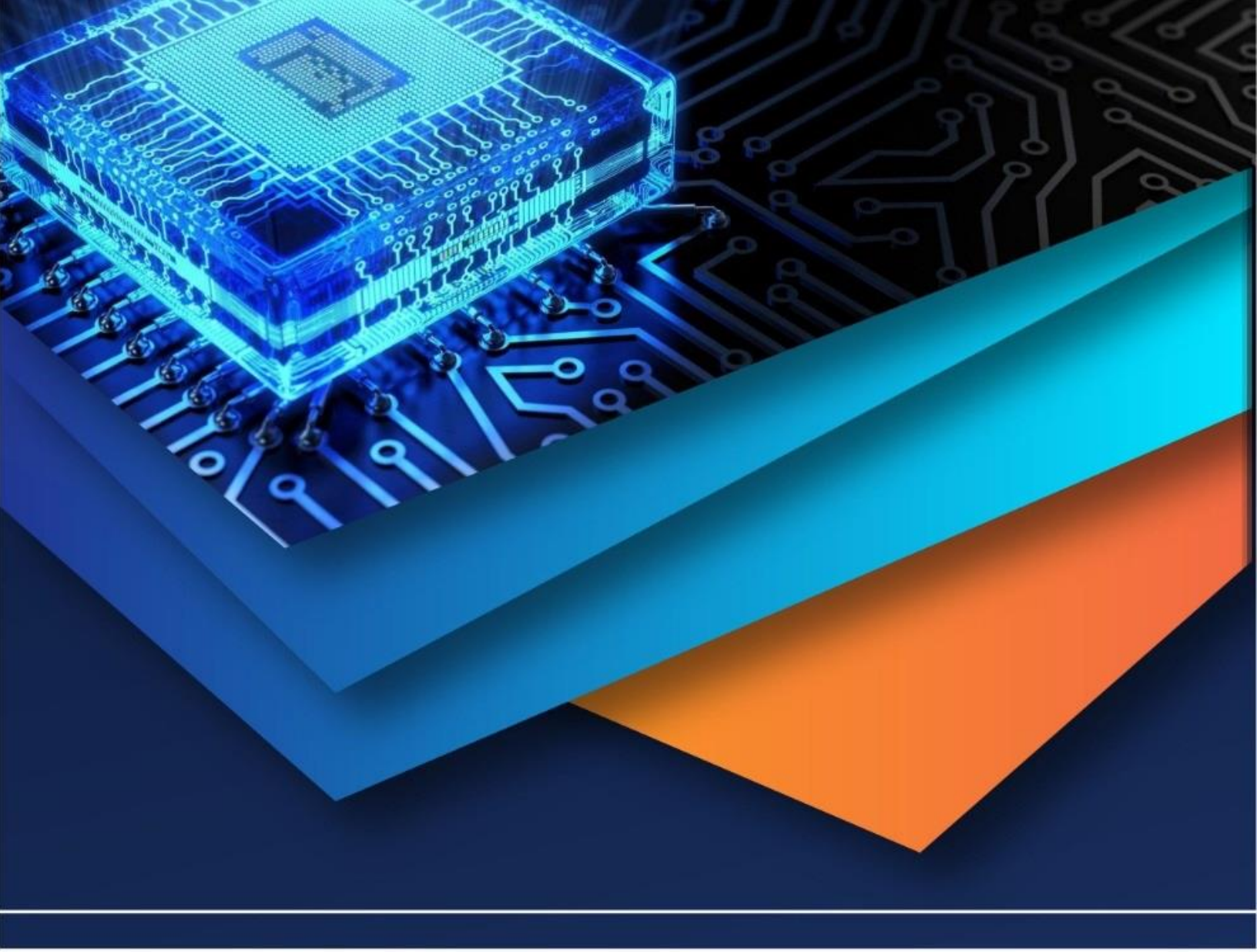

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