

Analysis of Diesel Engine Cooling System

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Abstract- With the consistent improvement of diesel trains toward single power, the warmth scattering of the train cooling framework is getting greater and greater, and its presentation straightforwardly influences the economy and unwavering quality of the train. Because of the constraint of train hub load and basic space measure, there is an extraordinary specialized issue between the cooling framework structure and the game plan of the cooling gadget and the general design of the train. The expansion in the quantity of radiators, making the quantity of cooling framework forms are correspondingly expanded, bringing about train cooling framework water obstruction and water framework weight are enormously improved. The conventional cooling framework structure and the radiator structure are difficult to meet the advancement necessities of high power train. In light of the ordinary cooling framework structure technique, a multi-process radiator is proposed. The multi-process cooling framework has the benefits of high cooling efficiency, basic structure, little helper control utilization of the siphon and high unwavering quality of the cooling framework parts. In this paper, the cooling framework and its capacity, the current cooling innovation and the multi-process radiator are considered and broke down, and the three-process radiator and the single-process radiator are tried and analyzed. In this paper, another multi-process radiator structure plot is proposed for the plan necessities of CKD9 diesel train cooling framework. The program effectively utilizes the radiator cooling water and cooling air temperature difference, to accomplish the motivation behind expanding heat dispersal.

Index Terms- diesel locomotive; cooling system; radiator; process; contrast

1. INTRODUCTION

The cooling framework is a significant piece of the diesel train, which assumes a significant job in guaranteeing the typical and solid task of the diesel train. Not just that, with the advancement of fast, uncompromising high-control diesel trains, the

cooling framework is additionally significant for improving the economy of train activity.

For the cooling system of the diesel locomotive cooling system, especially for single-section high-power diesel locomotives, the following requirements should be made from the aspects of structure, energy consumption, process and operation:

1. the cooling gadget is reduced, little size, light weight, meet the serialization prerequisites;
2. in the cooling room, the format is sensible, simple to introduce, dismantle, screen and other gear design and team accommodation;
3. manufacturing and upkeep of good innovation, simple to utilize, ease;
4. as far as conceivable the utilization of standard metal and non-metallic materials, decrease non-ferrous metal utilization;
5. in the diesel train running under different climatic conditions, the cooling gadget ought to guarantee that diesel motors, footing engines and different pieces of the cooling framework in the typical warmth load condition of solid work;
6. The cooling unit enables the diesel motor to work at ordinary water temperatures so the normal genuine fuel utilization and the cooling fan are limited;
7. For the cooling arrangement of the footing engine of the diesel train, the accompanying focuses ought to be considered: the use of incorporated or gathered air filtration and ventilation frameworks; the cooling air volume of the footing engine can be balanced with the heap and the temperature change; Of the high efficiency of the fan; the utilization of air filter to guarantee that the air tidiness and diminish ventilation opposition;
8. radiator air consumption gadget ought to have great streamlined execution and sensible structure;

9. make full utilization of the space between the casing, set the footing engine solid air pipe;
10. so that the radiator from the diesel motor fumes discharges of contamination

All of the above characteristics are in line with the following major economic requirements: the cooling system manufacturing and use costs should be reduced to a minimum. Therefore, it is necessary to carry out technical and economic analysis on the impact of various factors such as structure, power, process and application on the cost of manufacturing and using the cooling system in order to determine the further research tasks and directions when developing a diesel locomotive cooling device.

At present, the domestic diesel locomotive cooling water system is generally divided into high temperature system and low temperature system. Cooling devices are usually used in multiple sets, modular, interchangeable single-process radiator structure. The outstanding advantages of this structure are versatility, interchangeability, easy maintenance. For different power levels, different application environments and different technical requirements of diesel locomotives, generally can increase or decrease the number of radiators to meet their cooling capacity requirements. The drawback of the cooling system is the cooling efficiency of the radiator is not high, the locomotive water system resistance, high working pressure and poor system reliability.

With the continuous improvement of diesel locomotive power, requiring the cooling of the locomotive cooling system is getting bigger and bigger. Due to the limitation of the locomotive structure space and the axle load, it is impossible to meet the cooling capacity requirement of the locomotive simply by increasing the number of radiators. Therefore, it is necessary to put forward the requirement of the structure of the cooling system and the performance of the radiator, the device has high performance, lightweight and high reliability.

The multi-process radiator proposed in this paper is based on the conventional cooling system design method, in the radiator internal effective segmentation to achieve its structural design. And by greatly reducing the radiator water resistance and water system pressure, by rationally arranging the flow of cooling water from the multi-process radiator, increasing the average logarithmic temperature

difference between the cooling water and the cooling air and improving the heat transfer performance of the radiator.

The majority of the above attributes are in accordance with the accompanying major financial prerequisites: the cooling framework assembling and use expenses ought to be diminished to a base. Thusly, it is important to do specialized and monetary examination on the effect of different factors, for example, structure, power, procedure and application on the expense of assembling and utilizing the cooling framework so as to decide the further research assignments and bearings when building up a diesel train cooling gadget.

At present, the household diesel train cooling water framework is commonly isolated into high temperature framework and low temperature framework. Cooling gadgets are normally utilized in numerous sets, secluded, tradable single-process radiator structure. The extraordinary preferences of this structure are flexibility, compatibility, simple support. For different control levels, different application conditions and different specialized prerequisites of diesel trains, by and large can increment or lessening the quantity of radiators to meet their cooling limit necessities. The disadvantage of the cooling framework is the cooling efficiency of the radiator isn't high, the train water framework obstruction, high working weight and poor framework unwavering quality.

With the consistent improvement of diesel train control, requiring the cooling of the train cooling framework is getting greater and greater. Because of the restriction of the train structure space and the hub load, it is difficult to meet the cooling limit necessity of the train basically by expanding the quantity of radiators. Subsequently, it is important to advanced the necessity of the structure of the cooling framework and the exhibition of the radiator, the gadget has elite, lightweight and high unwavering quality.

The multi-process radiator proposed in this paper depends on the customary cooling framework plan technique, in the radiator inner effective division to accomplish its auxiliary structure. Furthermore, by enormously lessening the radiator water obstruction and water framework weight, by judiciously orchestrating the flow of cooling water from the multi-process radiator, expanding the normal

logarithmic temperature difference between the cooling water and the cooling air and improving the warmth exchange execution of the radiator.

2. LOCOMOTIVE COOLING SYSTEM

The role of the cooling system

1. The cooling arrangement of the diesel motor itself is a mix of cooling water/air proof water, motor oil and supercharged air cooling gear, which incorporates surface warmth exchangers (radiators), fan units, air sections, shades and warmth sinks, Asked the warmth exchanger (used to cool the diesel motor oil and pressurized air), circling siphon and pipeline made out of water, oil flow framework. Its job is as per the following:

2 Effect of cooling on diesel motor power. Diesel motor work, the fuel contains a piece of the warmth (40%) into effective work, 20% - 30% of the warmth required by the cooling gadget to the environment. With the expansion in the intensity of diesel motors, cooling necessities of the cooling gadget ought to be a comparing increment in the warmth. In this manner, the issue of high-control diesel motor cooling is exceptionally conspicuous.

3 What's more the cooling water temperature is excessively low, the diesel motor power will decay. This is because of the low oil and water temperature will prompt oil consistency expands, the erosion misfortune increments. In the meantime, the measure of warmth lost by the cooling water likewise increments, bringing about an effective power drop. To put it plainly, the diesel motor cooling water and oil temperature ought to be kept inside the typical range, the diesel can just work appropriately and dependably.

4.The requirement for pressurized air cooling. The temperature of the supercharged demeanor of the diesel motor greatly affects its economy and unwavering quality. So as to expand the diesel motor power, or in the diesel motor power remains unchanged under the conditions, in order to reduce the thermal strength of diesel engine parts and reduce fuel consumption, are widely used in the case of diesel engine parts to maintain a certain heat conditions, This effective measure. At present, the world generally uses high pressure to improve the diesel engine single cylinder power. The average effective pressure of the four-stroke high-pressure

diesel engine is around 2-2.3MPa. Generally speaking, the pressurized air temperature for each lower 10 °C, diesel engine power will increase 2% - 3%.

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