Multidisciplinary Journal of Materials Science and Engineering
Volume 10 Issue 2, April-June 2022
ISSN: 2995-374X
Impact Factor: 6.65
http://kloverjournals.org/journals/index.php/mse

HEATWAVE RESILIENCE: REDOC'S SYMPHONY OF SOLUTIONS FOR FAULT DETECTION AND MAINTENANCE IN AUTOMOBILE COOLING SYSTEMS

Hu Ruihan
Zaozhuang Vocational College of Science and Technology, Tengzhou 277500, Shandong, China

Abstract
At present, the main means of transportation is automobile, so people are very concerned about the service life of it and the safety in car driving process. Automobile engine cooling system is the main structure of an automobile, which can control the operating temperature of the engine, control the loss of components to the minimum by absorbing a large amount of internal heat, and comprehensively reduce the probability of structural failure. In this study, the fault detection and maintenance strategies of automobile engine cooling system are deeply analyzed and studied, in order to fundamentally improve the comprehensive quality of automobile operation and maintenance.

Keywords: automobile engine; cooling system failure; maintenance strategy

1. Introduction

With the development of society, people are increasingly in the pursuit of happiness and their requirements for living standards are also getting higher and higher, which makes automobiles as a necessity as transportation tools. There are so many auto parts and the technical condition of engine cooling system has great influence on its power performance, economy and reliability.

The main function of an automobile's cooling system is to release heat into air and prevent the engine from overheating. Car engines work best at appropriate high temperatures. If the engine gets cold, it will speed up the wear and tear of auto parts, which makes the engine less efficient and emits more pollutants. Therefore, another important role of the cooling system is to warm the engine as quickly as possible and maintain a constant temperature. This article mainly introduces the elimination of the faults in automobile engine cooling system.

2. The basic working principle of automobile engine cooling system

At present, the main cooling operation mode of automobile engine is wind cooling and water cooling, and the closed and forced circulating water cooling is generally adopted[1]. It mainly uses the action of water pump to accelerate the flow of coolant in the cylinder block, relying on safe electric fans and natural wind, to achieve the purpose of cooling the engine. Automobile engine cooling system is mainly composed of radiator and water pump. In the above components, the repeated circulation of coolant can provide guarantee for the normal operation of automobile engine cooling system. The engine

temperature will change with the operation of the coolant in the cooling system, and it will rise rapidly in a short time.

And the coolant only circulates in the engine channel, which can be called small circulation [2]. The coolant temperature is bounded by 80℃. Once it exceeds this limit, the small circulation path of the thermostat will automatically close. At this time, a large amount of coolant will enter the radiator from the engine channel, and eventually enter the radiator. Under the influence of the water pump, the cooling liquid re-enters the water channel of the cylinder block, and the cooling mode of this operation is a large circulation.

3. The causes of common failures of automobile engine cooling system

The failure of the cooling system of an automobile engine will reduce the service time of the engine, produce safety hazards, make it difficult to ensure the stability of the system, and even cause traffic accidents. Therefore, people need to pay more attention to the engine cooling system fault inspection and maintenance work, accurately understand the composition of automobile engine cooling system, and make targeted detection of fault problems such as overheating temperature and low water temperature with the consideration of the specific reality. In the maintenance process, it is necessary to take efficient and simple methods to clean cooling system regularly and strengthen daily maintenance of automobiles, so as to provide important guarantee for the safe and stable operation of the cooling system of the automobile engine.

3.1 Overheating temperature

When water temperature warning and long callback time appear in the process of car running, the coolant indicator lights send out alarm information, and the coolant in the engine appears boiling, in this case, the coolant temperature in the engine is too high, so it is necessary to check the engine to understand the actual situation of the fault[3]. Normally, when the cooling pump is blocked, or the coolant is missing, it will affect the temperature of the engine coolant, resulting in its temperature is too high.

3.2 Low coolant temperature

In the process of car running, if the engine power is reduced and the water temperature meter shows a value less than 75 degrees, there will be a violent sound in the exhaust pipe and the fuel consumption of the car will be gradually increased, indicating that the engine coolant temperature is relatively low [4]. Under normal circumstances, the engine coolant temperature is too low mainly because of different faults like automobile measurement and control switch failure or fan electrical failure.

3.3 Refrigerant leakage

If a car has been running for a period of time, there are signs of water on the ground, and even white smoke comes out from the exhaust pipe of it, this means that there has been coolant leakage [5]. When the car is in operation, coolant leakage will lead to a lack of coolant in the engine, so that the function of the coolant can not be used. Infiltration and extravasation are the main types of coolant leakage. Infiltration is hard to be detected and the treatment time is long, which is easy to increase the temperature of the engine. Extravasation will lead to water dripping from the car body, so it is easy to be detected, convenient to find, and can be effectively dealt with without causing great harm.

4. Detection and maintenance methods for the failure of automobile engine cooling system

Nowadays, people have a greater demand for cars. It is very common to drive cars for a long time. Accordingly, it is easy to appear various problems and faults in the cooling system of cars. The cooling system in the engine is very critical. Once fails, it will threaten the performance of the engine and the whole vehicle. When the engine cooling system fails, it is necessary to immediately carry out maintenance, have a clear understanding and understanding of the failure and cause of the cooling system, and implement targeted maintenance, in order to effectively strengthen the safety and stability of the car.

4.1 Engine overheating fault detection and maintenance

When detecting engine overheating fault, it is necessary to use infrared measurement system to measure the temperature of the cooling system, and compare and analyze the temperature displayed by the water temperature and the temperature detected by the detector. If there is a large deviation between the two, it means that the water temperature meter cannot work normally [6].

When the engine temperature is too high, check if the thermostat loses its function. If so, it must be replaced or repaired in time. After starting the engine, if the water temperature increases rapidly, it indicates that there is a problem with the thermostat, and it must be replaced in time. If a lot of dirt on the surface of the radiator, or radiator deformation affected by external force are found in the inspection process, it is necessary to clean and repair the radiator in time. If the water temperature of the car engine is too high in winter, it indicates that it is affected by environmental factors, and the cooling water in the radiator is frozen. Then, the cooling water needs to be heated.

4.2 Coolant leakage

In view of coolant leakage, maintenance personnel need to carry out detailed inspection on the leakage point. If the leakage occurs in the cylinder pad or radiator, it must be replaced and repaired in time [7]. If the engine itself does not have a strong seal, it will increase the chance of coolant leakage problems. In the process of running the engine, if any external force affects the cylinder block and cylinder head, there will be a cracking problem, and even cause coolant leakage. More scale in the coolant will cause blockage of the cooling system joints. Problems like engine water seal loses its effect or the bolt cannot be tightly connected may cause coolant leakage. It is necessary to replace the engine water seal or joint in time to make the loose bolt tighter. In the process of specific inspection, it is necessary to make a clear judgment on the liquid level of the oil by using oil rulers. If the lubricating oil is white, and it is gradually rising, this indicates that the crankcase has leaked coolant.

4.3 Fault detection of low coolant temperature

When detecting this phenomenon, maintenance personnel should check whether the shutters are closed or whether the insulation cover is installed if the ambient temperature is low when detecting low coolant temperature fault. Maintenance personnel need to run the car, open the tank lid, and gradually increase the speed of the engine. If the water flow inside the engine is gradually increased and the flow rate is increased, it means that the thermostat is not properly installed or the valve of the thermostat is sticky. This fault requires replacing the old thermostat and installing a new thermostat valve. In the

detection process, touch the radiator by hand. If it is obviously hot, it means that the water temperature meter can normally display the value. The fault is in the car temperature meter or temperature sensor, which can be solved by maintaining the temperature meter or sensor. If the fault is not rectified after maintenance, the thermometer or temperature sensor need to be replaced.

4.4 Fault detection of thermostat

In the cooling system, the key is the thermostat, which is an important part of the stable operation of the cooling system. If there is a fault in the running process of the thermostat, it will have an adverse impact on the operation of the engine. The main reason is that the thermostat can adjust the temperature of the engine. When the temperature of the engine continues to rise, the thermostat can open the valve to reduce the temperature of the engine. On the contrary, if the engine temperature is low, the valve will close and help the engine increase its temperature. The thermostat must be kept in good operation, otherwise it will lead to engine failure in actual work. For example, if the thermostat is not set properly, the engine temperature will continue to rise. If the thermostat is turned on early, the engine temperature will be lowered, resulting in a large number of parts running in a low temperature environment, reducing the service time of parts, and will cause a large fuel consumption. If there is a problem with the thermostat, corresponding measures must be taken immediately.

In the maintenance of this fault, if the engine water temperature is relatively high, it needs to be repaired in different ways. First, touch the water tank by hand, if the temperature of the coolant can not reach more than 85 degrees Celsius, the inlet and outlet temperature of coolant water tank is different. That is, the fault occurs in the position of the thermostat, or the oxygen water tank can not maintain the flow, then we need to eliminate the air in the tank. Second, use experimental method. Put the thermostat in the basin with the temperature of 83 degrees Celsius. A few minutes later, if the thermostat can not start, the thermostat has lost its function.

4.5 Corrosion fault detection and maintenance of cooling system

After using the car for a long time, the external factors will seriously affect the cooling system, and the cooling system will appear different degrees of corrosion. Maintenance personnel need to replace the water pump bearing in the inspection, if the coolant is brown, because the rust in water pump bearing will cause corrosion to the cooling system, which will lead to the damage of water pump bearing for a long time. For the maintenance method of cooling system corrosion, it is necessary to remove the coolant in the cooling system in time to avoid discharging the coolant in the sewer system, otherwise it will cause pollution to the sewer pipe. Then determine whether the heat pipe is in a smooth state. If there is a blockage, it is necessary to clean the radiator. In order to completely remove corrosion in the cooling system, it is necessary to formulate a scientific maintenance method to avoid the adverse impact of operation error on the maintenance effect.

5. Cooling system maintenance

5.1 Maintenance of automobile engine cooling system

In order to effectively promote the overall performance of the automobile cooling system, the coolant must be replaced regularly, because the additives in the coolant and a large number of toxins will affect human health. Therefore, when replacing the coolant, it is necessary to take appropriate protection to

avoid the coolant harming the human body. In automobile daily use, the user needs to go to professional maintenance departments to replace the car's cylinder pad and heat related components, in order to strengthen the performance of the car. The pump belt is the key component that keeps the pump, engine and electric fan drive synchronously. Rubber material is mainly used in the production of water pump belt. With the prolongation of the running time of the car, it is easy to damage the water pump belt and adversely affect the operation of the water pump and engine fan. Strengthen the performance of the pump belt and make the corresponding protective measures to effectively reduce the impact of the cooling system impact load on the pump belt.

5.2 Pay attention to the daily maintenance of vehicles

The daily maintenance of the engine needs to do a good job in different aspects: first, the water tank should be cleaned regularly to avoid the existence of scale and rust, which may affect the operation of the cooling system. Ensure that the system can evenly dissipate heat, and minimize the probability of engine overheating. Second, the filter element and oil need to be replaced regularly in order to avoid engine oil quality changes and failure problems. Third, it is necessary to develop a scientific maintenance plan. Have an accurate understanding of the mileage of the car and based on which reasonably choose engine oil to put forward scientific maintenance requirements. Coolant must be kept clean in order to optimize the heat dissipation performance of the engine. Clean the air and oil circuit regularly to ensure smooth air and oil intake.

6. Conclusion

To sum up, with the continuous development of science and technology, the technical level of automobile manufacturing has been gradually improved. Before automobiles leave the factory, the manufacturer needs to test and debug cars repeatedly to ensure that the quality of them meets the requirements. However, after an automobile runs to a certain mileage, its parts will appear aging problem, which increases the probability of failure. In particular, the cooling system of the automobile engine is more prone to failure, so the detection and maintenance must be strengthened to ensure the safety of the automobile.

References

Li Shaohui. Research on Fault Detection and Maintenance Method of Automobile Engine Cooling System [J]. Internal Combustion Engine and Accessories, 2021(04):147-148.

Xiao Yu. Discussion on Fault Detection and Maintenance Method of Automobile Engine Cooling System [J]. Times Motor, 2021(21):166-167.

Li Bingliang. Fault Detection and Maintenance of Automobile Engine Cooling System [J]. Internal Combustion Engine & Parts, 2021(22):139-140.

Zhang Keying. Fault Detection and Maintenance of Automobile Engine Cooling System [J]. Times Automobile, 2019(12):152-153.

Shi Xinqing, Wu Xiaoyu. Discussion on Fault Detection and Maintenance Technology of automobile Engine Cooling System [J]. Internal Combustion Engine & Parts,2020(13):134-135. [6] Niu Yuling, Zhu Xiaoou. Fault Detection and Maintenance of Automobile Engine Cooling System [J]. Automobile Maintenance, 2018(11):9-10.

Zhou Yongping. Analysis on Inspection and Maintenance of Automobile Engine Cooling System [J]. Curriculum Education Research, 2019(26):250-251.