Analysis of fuel Consumption Of Truck Based On Specific Driving Condition

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Key Words: Driving Cycle; Truck; Fuel Performance

Abstract: Fuel consumptions are researched according to the characteristic parameters of driving cycle in the paper. First of all, the work condition characteristics are collected, such as road and transportation information of the sub market, and the driving mode of the sub market is established by using the dynamic analysis software CRUISE. Based on the driving cycle, the fuel economy is simulated and the experimental study is carried out.

1Introduction

The characteristic parameters of driving cycle is relationship between time and Speed of a particular type of the vehicle(such as a car, light truck, heavy truck) in a specific drive work(such as unban, freeway, and national highway). vehicle driving cycle be made use of bench test and simulate. Currently, built up to a relatively perfectly driving condition in domestic and foreign countries, then accord with the characteristic parameters of driving cycle about truck. For example WTVC the United States, China C-WTVC(WTVC),and other heavy duty cycle conditions. Although driving cycle is relatively perfect, it can reflect a true circumstance to a certain extent, but it still has a gap with the actual driving. Therefore, in order to further improve the fuel economy, it is needed to study the fuel consumption of the tractor under specific conditions.

2Research on driving cycle of a truck in a certain segment

The development of the driving cycle of the truck includes investigation of specific driving cycle, the experiment preparation, the data collect and analysis and the working condition of the data synthesize.

2.1Research on actual driving conditions

In order to accurately reflect the condition for actual driving cycle, need to carry on collecting data about driving cycle to install to the equipment in test truck, the main acquisition of the item is maximum speed, minimum speed, Average speed, maximum acceleration, minimum acceleration, Average acceleration and altitude and so on.
2.2 Application development of working condition based on actual

Article is to set up cycle of subsection market with actual driving cycle. First, make used of software to conceive relation between distance and speed in Project Data/Project/Task Folder/Cycle Run/Profile, figure 2; conceive relation between distance and altitude in Project Data/Project/Task Folder/Cycle Run/Course, figure 3. Through the combination of the software, the working condition is defined for a particular case.

2.3 Study on multi scheme fuel consumption of specific driving cycle

A heavy truck adopt to the same engine, the same gearbox, then engendered 3 power configurations by adjusting ratio of axle type. Simulation analysis and experimental verification work under certain driving conditions, the results in table 1:

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Simulation results</th>
<th>Test results</th>
<th>D-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>scheme one (4.2)</td>
<td>121.77</td>
<td>112.5</td>
<td>9.27</td>
</tr>
<tr>
<td>scheme two (4.11)</td>
<td>121.42</td>
<td>110.5</td>
<td>10.09</td>
</tr>
<tr>
<td>scheme three (3.8)</td>
<td>123.37</td>
<td>119.8</td>
<td>3.57</td>
</tr>
</tbody>
</table>

The simulation results of three kinds of configuration in a certain working condition are the scheme one is 121.77L/km, and the scheme two is 120.597L/km, and the fuel consumption of the scheme
three is 123.37L/km. In three under the specific conditions of bridge configuration scheme does not satisfy the axle ratio increases the increase of fuel consumption, the main reason is the specific conditions for climbing section, large ratio configuration has more advantages.

The engine speed range of the engine is 1100-1300r/min, and the full load operating point of the full load operating point at 1125 rpm is 36.91%, 38.58%, 24.37%(see fig 3). In the three scheme, the second scheme is more suitable for the actual operating mode under the condition of low speed and full load operation.

![Figure 3](image)

Figure 3. distribution diagram of velocity different ratio running condition.

**3Summary**

Through the analysis of the fuel consumption of the truck in a specific driving mode, the current cycle test cases can be drawn. Although it is common, but can not be a good response to the actual driving conditions, the power allocation of heavy trucks can not only start from the existing traditional matching laws, but also for specific segments of the driving cycle, the economic analysis, can be more close to the actual, more instructive.
References


