AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Technology and Applied Sciences
ISSN (E): 2832-1766| Volume 18, | November, 2023

DETERMINATION OF VIBRATION RESISTANCE OF AUTOMOBILE BRICKS

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A B S T R A C T

The purpose of his work is to study "Analysis of vibrations in fixed joints of vehicles". Studying vibrations in various parts of cars and developing scientifically based recommendations as a result of research. Road transport is an integral part of the country's transport system. The efficiency of many sectors of the economy depends on transport costs.

K E Y W O R D S

Car, cargo, gas cylinder, transport, movement, energy, engine, power, aggregates.

Introduction

When determining the vibration load of the power unit and the transmission of the rear-wheel drive vehicle, it was found that the imbalance of the cardan transmission and the equal-order inertia forces of the engine have the greatest effect on vertical vibrations. They cause a strong vibration of the power unit in the entire engine speed range. When the engine speed is equal to 4860 min^{-1}, strong vibrations of the power unit appear because the frequency of disturbing movement (secondary inertial forces) coincides with the natural frequency of vibrations of the drive transmission. As a result, the vibrations are dampened [1-7].

In addition to the listed sources of excitation, the torque of the engine has a great influence on the side vibrations of the power unit. In this case, the 1st and 2nd harmonics of the engine have the greatest influence. When the engine speed is 4870 min-1, strong vibrations of the power unit appear because the natural frequency of free bending vibrations of cardan gears corresponds to the frequency of the 2nd harmonic. The 2nd harmonic of the engine causes the tilting vibration of the power unit over the entire engine speed range [8-11].

In the first resonance zone for transverse accelerations, the engine has the same frequencies as longitudinal accelerations at a speed of 40-140 km / h, but 8-12 dB lower. The second resonance zone with a maximum frequency of 350 Gs.

The analysis of longitudinal accelerations allows us to conclude that: the engine at a speed of 40, 60, and 80 km/h includes frequencies of 46, 71, and 95 Hz, but 30 dB lower than the levels of vertical acceleration [12-19].

In the extension box, there are two resonant regions in the 180-210 Gs and 280 Gs zones, which are 10-15 dB higher than the spectrum.

Structural measures that allow to reduce the vibration of the power unit

During the work, various constructive measures were tested to reduce the noise of the vehicle. The following parts were prepared for the final test:

– gearbox cover;
– oil tank;
– developed anterior bridge;
– engineered rear bridge.

Vibration tests were conducted to investigate the causes of noise reduction by changing different engine cover materials and oil pans. Shows engine vibration spectra Ndv = 5600 min^{-1} - for air filter cover, gearbox cover and engine oil pan. Replacing the material of these elements allows you to significantly reduce their vibration load and, as a result, the noise they emit.

One of the elements of the engine with a developed radiation surface, which is driven by the vibrations of the block head and pulsation of the air as a result of the operation of the gas distribution mechanism. To reduce the vibration load of the engine, the crankcase cover, the cover of the gas distribution mechanism and the engine holder are made of fibreglass [20-24].

As a result of the research and after processing the test results, a significant decrease in SPL was found in the frequency range from 150 to 1000 Gs, except for the 125 Gs component.

Third-octave analysis of external noise showed that low-frequency sound pressure fluctuations occur in the range of 160 and 200 Gs, that is, at the frequency of engine cycles. Further studies have shown that the high sound pressure level at these frequencies is caused by the resonance of the air volume of the engine compartment and the downward reflection of the sound wave generated by the vibrations of the power unit from the hood [25-32].

Analyzing the propagation pattern of the external noise of the car shown in the figure, it can be assumed that an effective means of reducing it can be a view of the power of the acoustic waves reflected downward from the hood. For this purpose, the bridge in the production vehicle is significantly developed and made of fibreglass plastic. It should be noted that the minimum noise reduction of the anti-sludge is 125 Gs in the octave range, mainly due to the reception noise.

Methodology of experimental research on self-emptying of gas cylinder equipment under the influence of vibration

In recent years, several measures have been taken to provide motor vehicles with environmentally friendly fuels, including compressed natural gas, the number of compressor stations for filling cars with gas has reached 1000, and more than 60-70 percent of motor vehicles are using compressed natural gas as an alternative fuel. Cars and trucks in almost all regions of our country use natural (methane) and liquefied (propane) gases as fuel. Therefore, several works are being carried out by private companies to equip cars with gas cylinders.

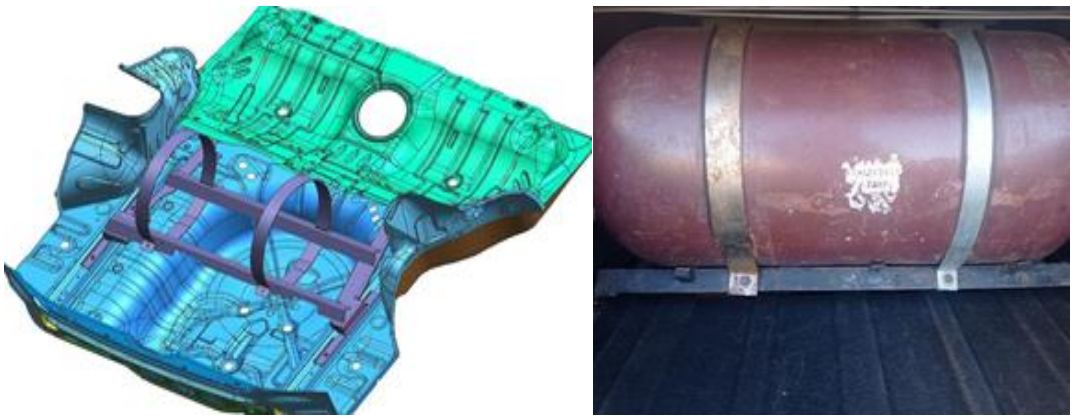

Figure 1. Gas cylinder locking devices.

The materials used in these works are mainly local raw materials. The fact that the masters (masters) performing such work do not have any knowledge and skills causes some inconvenience. Including loosening of the strap holding the gas cylinder fastened to the car, hardening of the rubber material between the gas cylinder and the metal strap, vibrations and noises caused by the loosening of threaded joints used for fastening.

To regulate safety issues in this area, the Cabinet of Ministers of the Republic of Uzbekistan "Development of the network of compressor stations for filling vehicles with gas and step-by-step transfer of motor vehicles to compressed natural gas, as well as ensuring the safe use of gas cylinder equipment in them" on additional measures" No. 815 of October 11, 2017decision[61] and "On additional measures to improve the procedure for mandatory technical inspection of vehicles" No. 1010 of December 22, 2017decisionaccepted.

At the same time, cases of violations of the established requirements and procedures due to the filling of gas cylinders at gas filling compressor stations, periodic testing of the tightness and reliability of the joints of gas cylinder equipment, as well as the use of physically and mentally outdated gas cylinders are meeting

The above-mentioned violations cause accidents that harm people's lives and health, including those that often end in death.

Below we have studied the gas cylinder emptying rates of about 15 different models of passenger cars at several MOT centers.

Table 1.

Tt/r	Model	Expiration Year	Strong force. Kn	Discharge degree
1	Gentra	3 years 01y096gb	45 kN	35 degrees
2	Aveo	2nd year 40O468PA	45kN	30 degrees
3	Tracker	3 years 40766PA	45kN	45 degrees
4	Gentra	2nd year 40M008MA	45kN	30 degrees
5	Gentra	3 years 40R772RA	45kN	30 degrees
6	Nexia	7th year 40R014KA	45kN	180 degrees
7	Aveo	4th year 01L365DB	45kN	90 degrees
8	Gentra	8 years 40R834RA	45kN	650 degrees
9	Nexia	8 years 40A532JA	45kN	720 degrees
10	Matiz	7 years 40U224EA	45kN	650 degrees
11	Lacetti	Year 10 01P995MA	45kN	620 degrees
12	Spark	10 year 40A763SA	45kN	720 years
13	Spark	10 years 40A763SA	45kN	640 degrees

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