ISSN NO: 2770-4491
Date of Publication:10-11-2022

The Impact of the Quality of then and TR Operating Conditions of Cars on Environmental Pollution

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Abstract: The state and improvement of TEA at the level of ATP has a direct impact on the environmental safety of ATP. It is in ATP and other vehicle owners that storage, maintenance and TR of cars are carried out, their operability is restored and the bulk of production waste accumulates. The organization of production, the technologies used, the quality of maintenance and TR ultimately determine the technical condition, and hence the amount of harmful emissions. substances in the movement of cars and from production activities

Keywords: vehicles , car, environmental safety

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Consider the influence of factors that determine environmental safety at the level of ATP.

In the process of operation, there is a change in the technical condition of cars, due to wear of parts, changes in gaps in the interfaces and the associated violation of factory regulations in systems, components and assemblies. The consequence of this is a decrease in engine power, an increase in fuel consumption and emissions of harmful substances (Table. 1).

It is estimated that 10-15 per cent of defective vehicles account for up to 40 per cent of all environmental pollution from road transport. Therefore, correctly selected and observed periodicities and lists of maintenance operations are one of the main mechanisms for the influence of ITS ATP on the level of performance of cars, as well as on fuel consumption, environmental pollution and resources of cars and units.

For example, an increase of 1.5 times the frequency of oil changes in the KAMAZ-740 engine reduces its resource by 15%, and untimely and incomplete performance of maintenance operations - by another 10-15%.

The toxicity of cars in motion is mainly influenced by the technical condition of the engine and its systems, which account for about 80-85% of all malfunctions that in one way or another affect toxicity and fuel efficiency (the remaining 15-20% of malfunctions fall on the transmission and chassis)..

For carburetor engines, the following distribution of malfunctions is characteristic: spark plugs-38%, carburetor-26), interrupter-distributor-21, high-voltage wires-7.5, ignition coil-3.4, cylinder-piston group-3.3, the rest -0.8%. The appearance of these malfunctions directly affects the composition of the working mixture or the conditions for its combustion in the cylinders. As a result, the concentration$_{of}$ CO, C x H$_y$ and NO x, in the exhaust system varies quite widely. At the same time, during transportation, the specific fuel consumption increases, g / 100 t-km, which, in turn, increases emissions of harmful substances.

In diesel engines, any malfunction of the fuel system (coking of nozzle holes, uneven cycle supply, reduction of injection pressure, decrease in the pressure of the beginning of the opening of the nozzle needle, etc.) also dramatically changes the toxicity of the exhaust gas

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Табл. 1.

The effect of the technical condition of the engine and the car on fuel consumption and toxicity O G[1]

Change a setting	Increase relative to normal, %		
	consumption Fuel	CO emission	emission C_xH_y
1	2	3	4
Increase in the throughput of the main jets by 10%	6-7	45	9
Raising the level in the float chamber on 4 мм	2-4	36-40	2
Tight fit of the economizer valve	20	100-500	20
Premature activation of the economizer valve	15-17	200	25
Clogging of the air filter	9-10	150-200	130-190
Incorrect adjustment of the idling system	30-35	500	100-150
Deviation of the gap in the contacts of the interrupter from the norm0,2 мм	7-8	0	200-300
Deviation of the gap in the candles from the 0,2 ммnorm	3-5	0	300
Failure of one spark plug	20-30	0	500-900
Deviation of the ignition timing angle by 1°	0,3-1,0	0	10
Deviation of clearances in the valve mechanism from the norm0,2 мм	7-8	7	80
Violation of the regulation of fuel injection pumps of diesel engines	5-25	5-50	5-25
1	2	3	4
Faulty injectors	10-20	25-50	50-100
Improper tightening of wheel hub bearings	6-7	10	50
Improper tightening ofrear axle tor gearbox bearings	7	10	50
Reduction of tire pressure by 10-15% of Norms	8	50	20
Deviation of wheel convergence by1 мм Norms	3-4	–	–
Reduction of the temperature of the coolingbone in the engine by 10 ° C	2-3	–	–

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[1] According to the NGO "Ecosystem" et al.

The increase in wears and gaps in the interfaces violates the factory adjustments of the transmission and suspension units (gearbox, gearbox, wheel hubs). The mutual arrangement of the parts also changes (gaps in the gear engagement, convergence and camber of the wheels, angles of inclination of the kingpins). As a result, power losses in the transmission and resistance to the movement of the car increase, and consequently, the specific fuel consumption and emissions of harmful substances increase, and very significantly.

Thus, the operation of vehicles with deviations of the design control parameters from the normative ones, which is quite often the case in practice, can increase fuel consumption by 40-50%, and the toxicity of the exhaust gas by several times. Therefore, maintaining the rolling stock of ATP in good condition is one of the most important factors in improving the efficiency and environmental friendliness of cars in operation.

The technical condition of the park depends on the level of organization of the production process at ATP. However, not all enterprises are properly equipped and apply the progressive organization of technological processes of maintenance and repair using diagnostic tools, which allows ITS to objectively assess the technical condition of cars, determine the volume of necessary technical impacts and promptly manage the production processes of TE in compliance with the standards and requirements of the current maintenance and repair system. As a result, the operational properties and performance of cars on these ATPs are not fully restored, which leads to a significant increase in emissions of harmful substances (Table. 2).

In this regard, ITS should, firstly, ensure the availability of the necessary technological equipment in the ATP and apply advanced technological processes in the TO-1, TO-2, TR zones and at production sites, which will improve the quality of maintenance and repair and ensure the required level of technical condition of the rolling stock. Secondly, to organize constant monitoring of the toxicity of cars and timely take the necessary measures to restore the environmental performance of the fleet.

The D-2 section should be equipped with a traction stand, a motor-tester, a gas analyzer and an opacimeter, compression meters, a pneumatic tester, as well as devices for checking fuel pumps, injectors, spark plugs, non-contact ignition systems and fuel systems for gasoline injection.

The presence of a traction stand on the site makes it possible to conduct tests extended in comparison with the requirements of GOST 17.2.2.03-87 to determine the toxicity of the exhaust gas of gasoline cars. To do this, the concentrations of CO and C_xH_y are measured not only in the idle mode, but also under load. This allows you to identify malfunctions (the operation of the economizer, the vacuum ignition timing regulator, the capacity of fuel and air giclers, the failure of individual spark plugs, the violation of gaps in the valve mechanism and the landing density of the valves, etc.), which are not clearly manifested in idle modes.

Specific emissions of harmful substances, g/(kWh), during testing on the engine bench of new (I) in service (II) truck engines[1]

Табл. 2.

Engine type and condition		With	C_xH_y	NO_x	Debris	Polyaromatic hydrocarbons	Aldehydes
Diesel	I	3,5-4,5	2,0-3,0	11,0-14,0	0,3-0,4	0,0007	0,08
	II	7,0-12,0	2,5-4,0	10,0-14,0	0,5-0,8	0,004	0,2-0,4
Gasoline	I	85-95	8,0-10,0	15,0-17,0	0,05	0,075	0,65-1 ,0
	II	120-130	12,0-14,0	15,0-17,0	0,1	0,25	2,0-3,0

[1]According to NAMI RF.

Rationing and accounting for the consumption of fuels and lubricants. Keeping operational records at the ATP makes it possible to constantly monitor the efficiency of vehicle use, prevent irrational fuel consumption and the associated increase in environmental pollution.

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Improving the efficiency of rolling stock use. The higher the values of the coefficients of using the mileage of β and the use of carrying capacity γ, the higher the productivity and the lower the specific fuel consumption per unit of transport work and, as a result, the number of cars involved in transportation and environmental pollution.

Management of the age structure of the park. The efficiency of using brocade as the mileage of cars increases from the beginning of operation decreases, and emissions of harmful substances increase. In addition, the maintenance of "old" cars to a technically serviceable condition increases the need for PTB, labor, technological equipment, spare parts, operational materials, which leads to an increase in the generated production waste. In this regard, the management of the age structure of the fleet, which determines the timing of the write-off of old ones and the supply of new vehicles and ensuring an increase in the efficiency of the use of SAR, reduces the amount of emissions of harmful substances by the ATP fleet.

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