



9th International Scientific Conference Transbaltica 2015

The Research Methodology for Performance Indicators of the Transport Diesel Engine in Exploitation Conditions

Ingrida Gudaitytė*

Klaipėda University, Herkaus Manto g. 84, LT-92294 Klaipėda, Lithuania

Abstract

In article are considered the technological aspects of the transport diesel engine researches on the transient modes under operating conditions. The comparative analysis is made of pilot studies for ecological indicators of the transport diesel engine and the review of the measuring equipment used in the practice intended for measurement of exhaust gases emissions. For planned measurements was formed the equipment and their requirements to technologies.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of Transbaltica 2015

Keywords: diesel engine; transient operation; research methodology; measuring equipments; ecological parameters.

1. Introduction

Environmental pollution from vehicles is the actual problem in our time therefore decrease in harmful substances emissions from diesel engines is one of the strategic tasks solved in the world. In Europe the environmental pollution from diesel engines is normalized by acts and standards of the EU. The last standards assume tests of engines which basis on the test cycles both on steady-state and on the transitional modes of the diesel engine operation.

The operating mode of the transport diesel is mean conditions under which working process is proceeds. The operating mode is characterizing by the load and frequency of rotation, and also nature of load change, frequency of

* Corresponding author

E-mail address: ingrida.gudaityte@gmail.com

rotation and other basic parameters of diesel engine's operation (torque, power, specific and hour fuel consumption, efficiency, etc.).

The operating mode of the diesel engine is changed depending on appointment and features of its use. The steady-state mode means constancy in time of basic working process parameters averages for a work cycle, also rotation frequency and the diesel thermal condition. This mode is characteristic in conditions when the diesel engine is brought to the set mode and works long time without its change. In transient mode the changes in time of functionally dependent parameters of the engine are happening because are changes the external operating conditions or control system parameters of diesel engines – for example, fuel feeding. Start-up, as well as the maneuvering operations, unexpected stops, the reversal operations (on ship engines) and change of loadings, belongs to the transient modes which often are the cause of the engines emergency damages.

Now for road vehicles are developed the cycles tests imitating operation of the diesel engine on the transient modes in the conditions for rural areas, also for the highway and city conditions. For off-road vehicles the standard included the transient test cycle for the engines which having electronic sensors for measurement of rotation frequency and a torque. The heavy transport diesels (heavy-duty diesels using, for example, on ships or locomotives) which don't have these sensors are tested only on the steady-state modes. However harmful substances emissions from the fulfilled gases depend on many parameters, for example, its depend for the used technologies, for emissions reduction, also for the used fuel, diesel engine management, environment conditions, etc. As a result indicators of the transport diesel engine under operating conditions significantly differ for the worse from the indicators of work established on the basis of official norms and standards.

For this reason research the operational indicators registration methodology aspects in the diesel engine on transient modes represents the actual and demanding the decision technological task.

In article are considered the methods of operational indicators measurement in the diesel engine on transient modes and their applicability for research of heavy transport diesel engines. The review of ecological indicators researches on heavy transport diesel engines and the comparative analysis of the used equipment is made. The common scheme of emissions assessment from diesel engine fulfilled gases on transient mode is represent.

2. Emission measurement in heavy-duty transport diesel engines

2.1. Test cycles and emission factors for heavy-duty transport diesel engines

An emissions test cycle (or driving schedule) is a predefined driving profile that the vehicle or engine under test has to follow. Test cycles are an integral part of all chassis and engine dynamometer tests, and their representativeness and completeness. The number of engine and vehicle dynamometer test cycles used worldwide for emission and fuel consumption measurements is continuously expanding to cover regulatory needs, while also trying to simulate real-world driving conditions (Franco et al. 2013).

There are two categories of test cycles, namely steady-state (or modal) and transient cycles. Steady-state test cycles involve running the engine or vehicle under a number of modes, each featuring constant engine speed and load. For each mode, the engine or vehicle is operated for a sufficient amount of time to produce relatively stabilized emission rates.

Transient test cycles include variations in the operating conditions as part of the test procedure, and they are regarded as more representative of real-world operation because they can be designed to account for real-world situations such as idling, acceleration, and deceleration. Detailed technical information on the most commonly used standardized driving cycles can be found in the literature or internet source (Emission Standards).

For an assessment of level of emissions of harmful substances from the engine define an emissions factor. The emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., kilograms of particulate emitted per gram of coal burned). Such factors facilitate estimation of emissions from various sources of air pollution. In most cases, these factors are simply averages of all available data of acceptable quality, and are generally assumed to be representative of long-term averages for all facilities in the source category (i.e., a population average).

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات