

OPINION

on a dissertation work for the acquisition of the educational and scientific degree "PhD"
in the scientific specialty 5 Technical Sciences, by professional direction 5.1 Mechanical
Engineering, scientific specialty Internal Combustion Engines

Author of the dissertation: **M. Eng. Velichka Rosenova Georgieva**

Dissertation topic: **Research into the influence of fuel type on the working process of a diesel engine**

Member of the scientific jury: **Prof. PhD Eng. Reneta Krasimirova Dimitrova**,
Technical University of Sofia, Faculty of Mechanical Engineering, Department of Automation of
Discrete Production Engineering

1. Relevance of the problem developed in the dissertation

The dissertation examines issues related to energy efficiency and the need for a sustainable energy policy, namely biofuels as an alternative source of energy for internal combustion engines. The issue is topical and aims to study the working process of a diesel engine with direct injection and electronic control when operating with different mixtures of diesel and biodiesel fuel, which is an opportunity to reduce harmful emissions and dependence on fossil fuels.

2. Assessment of the contributions of the dissertation work

The doctoral student used and cited a total of 57 literary sources, such as 29 are in Latin and 28 in Cyrillic, which provides a very good basis for assessing the state of the problem considered in the dissertation. The review concludes with conclusions based on which the goal of the dissertation is formulated and the main tasks for achieving the set goal are determined.

The methodology used by the doctoral student is fully adequate to the goal set in the dissertation and is suitable for solving the tasks formulated in chapter one. The doctoral student correctly approaches solving the tasks set, which is confirmed by the results achieved in the dissertation.

The contributions of the dissertation are divided into Scientific-Applied and Applied contributions, which prove the adequacy of the proposed approach, namely, an existing scientific problem is defined, which is proven with new methods and means. The significance of the contributions is as follows:

2.1. New to science

- A mathematical model for calculating workflow parameters from recorded indicator charts has been refined and improved.
- A model has been developed to calculate the parameters of the working process of a diesel engine with a high degree of reliability.

2.2. Enrichment of existing knowledge

- A detailed analysis of the possibilities for blending biodiesel fuel into diesel fuel has been made.
- The influence has been established and the power-economic, environmental, indicator, effective indicators and parameters of the working process have

been determined when operating a diesel engine with an electronic fuel injection system with different mixtures of diesel and biodiesel fuels.

- The change in the parameters of the operating process of a diesel engine with an electronic fuel injection system for different mixtures of diesel and biodiesel fuels has been studied and determined.

2.3. Application of scientific achievements in practice and realized economic effect

- A database has been created with the indicators and parameters of the working process in different operating modes of a diesel engine with an electronic fuel injection system for different mixtures of diesel and biodiesel fuels.
- An experimental system for indicating a diesel engine with a modern fuel injection system has been improved and optimized, which allows for recording rapidly changing values during engine operation in steady and transient modes.

I believe that of the scientific and applied contributions defined in this way in the dissertation, HIIII-1 and HIIII-3 are such, and the rest are applied.

3. Opinions, recommendations and critical notes

I did not find any fundamental errors or incorrect use of other people's works in the dissertation. I have no critical remarks with which to dispute the applied and scientific-applied contributions of the doctoral student.

4. Conclusion

The dissertation work of **M. Eng. Velichka Rosenova Georgieva** is complete, very well-formed and sufficient in volume, examining a current problem and is the personal work of the doctoral student. The main tasks set have been fulfilled, and sufficient applied and scientific-applied contributions have been obtained. The main results of the dissertation work have been published.

On this basis, I believe that the dissertation fully satisfies the requirements of the current Law on the State Educational and Scientific Research of the Republic of Bulgaria for the conditions and procedure for acquiring the educational and scientific degree "Doctor". I give a positive assessment and propose to the scientific jury **to award to M. Eng. Velichka Rosenova Georgieva educational and scientific degree "Doctor" in professional field 5.1 Mechanical Engineering, scientific specialty Internal Combustion Engines.**

Date: 05.06.2025

Jury member:

/Prof. PhD Eng. Reneta Dimitrova/