

REVIEW

by Assoc. Prof. PhD. Eng. Rosen Petrov Hristov, Technical University of Varna

on the dissertation work for obtaining the educational and scientific degree
"Doctor"

professional direction 5.1 "Mechanical Engineering"

PhD Program: Internal Combustion Engines

Eng. Velichka Rosenova Georgieva

Topic of the dissertation: "Research the influence of fuel type on the working
process of a diesel engine"

1. Relevance of the problem developed in the dissertation.

Efforts to protect the environment from the harmful effects of transport are increasingly important in the present time. Alternative fuels are one of the solutions to these problems, especially those of bio-origin. Internal combustion engines with self-ignition and the use of diesel fuel are subject to major media attacks and are not so desirable by consumers. Despite the decreasing sales of new cars equipped with them, they still occupy a very large part of the car fleet in Bulgaria and Europe. Replacing part of the diesel fuel with biodiesel, which is from a renewable source, makes it possible to reduce carbon dioxide emissions released into the atmosphere.

I believe that in this regard, the problems addressed in the dissertation are relevant.

2. Contributions

The aim of the dissertation is to investigate the influence of the type of fuel on the working process of a diesel engine, specifically considering the addition of different amounts of biodiesel fuel to diesel fuel. An extensive literature review has been made, the created methodologies for processing experimental studies are described. Theoretical studies with the Diesel-RK software product are confirmed by the experimental results.

I am familiar with the doctoral student's work and fully acknowledge her personal contribution to the preparation of the scientific paper. The doctoral student demonstrates a high level of knowledge of the topic, has used 57 literary sources, and has 5 publications, one of which is independent.

I accept the scientific and applied contributions formulated as follows with slight corrections:

- A mathematical model for calculating workflow parameters from recorded indicator diagrams has been refined and improved.

- A detailed analysis of the possibilities for mixing biodiesel fuel with diesel fuel has been carried out. The permissible concentrations of biodiesel fuel with diesel fuel have been determined and their impact on the power-economic and environmental performance of the engine has been determined.

- 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. A database with the indicators and parameters of the working process has been created.

Applied contributions:

- A comparative analysis of the influence of different concentrations of biodiesel fuel on engine performance was performed.

- 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.

3. Critical notes

My remarks are rather formal and I have no substantive comments on the dissertation.

- The dissertation uses English terms, which are then translated into Bulgarian - I think the Bulgarian ones can be used directly.
- Looking at the graphs of the experimental data, it is striking that the trend of some of the series with different biodiesel fuel mixtures changes, which makes it difficult to analyze the results. There are no points with specifically measured values, only approximate lines.
- The issue has not been addressed, or at least there is no data on the fuel injection start angle in the experimental study.

4. Conclusion

Considering the presented comprehensive study by Eng. Velichka Rosenova Georgieva, I believe that it meets the comply with the Academic Staff Development Act, the Regulations for its implementation and the Procedural Rules of the Technical University of Varna and I give a positive assessment. I propose to award her the educational and scientific degree "Doctor" in the professional field 5.1 "Mechanical Engineering", doctoral program "Internal Combustion Engines".

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Prepared by:
/Assoc. Prof. PhD. Eng. Rosen Hristov /