

## **INFORMATION ON THE NOVEL CONTRIBUTIONS OF THE DOCTORAL DISSERTATION**

Dissertation title: *“Research on the impact of the weight of a 5-seater car on fuel consumption”*

Major: Transport Mechanical Engineering

Code: 9520116

Doctoral Candidate: Ngo Quang Tao

Cohort: 8

Supervisor’s full name:

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Training Institution: Hanoi University of Industry

### **NOVEL CONTRIBUTIONS OF THE DISSERTATION**

- 1) This thesis established and clarified the quantitative relationship between the mass of a 5-seater car and fuel consumption based on a longitudinal motion dynamics model of the car. Unlike many previous studies that often considered mass as a secondary parameter in overall optimization problems, this thesis focuses on in-depth research into the individual influence of mass on motion resistance forces and fuel consumption under specific operating conditions;
- 2) This thesis developed an algorithm and simulation model for FC(stat) using Matlab/Simulink, allowing for the determination of fuel consumption of a car when the mass changes under different operating conditions. The model is organized with a clear structure, showing the relationship between input and output quantities, and allows for direct comparison with experimental measurement results, contributing to improved reliability of the simulation method;
- 3) This thesis proposed and implemented a method for measuring fuel consumption in automobiles under real-world operating conditions, through the design, fabrication, and testing of a measuring device for research purposes. The device allows for the simultaneous collection of important operating parameters such as vehicle speed, brake pedal force, throttle opening, and fuel consumption in real time, creating an experimental database for analysis and evaluation;
- 4) Based on a combination of theoretical models, simulations, and experimental results, the thesis has established an empirical function representing the relationship between vehicle weight and fuel consumption

with high accuracy. Comparison results show that the average difference between simulation and experiment is within an acceptable range, thus confirming the validity and applicability of the proposed research method;

- 5) Based on the research results, the thesis proposed a direction for reducing fuel consumption through solutions that reduce vehicle weight, emphasizing the role of selecting and applying lightweight materials in car bodies, contributing to improved fuel efficiency and reduced emissions in actual operation;
- 6) Thus, the novelty of the thesis lies not only in its research content but also in its approach, which combines theoretical models, numerical simulations, and experiments, suitable for the conditions of automobile operation in Vietnam.