TESTING, RESEARCH CERTIFICATION OF INTERNAL COMBUSTION ENGINES WORKING ON BIOFUELS LABORATORY

Contact details

Name	**Testing, Research and Certification of Internal Combustion Engines Laboratory**
Acronym	**TestEcoCel**
Logo	Departamentul de Autovehicule Rutiere şi Transporturi – Testare, Cercetare şi Certificare a Motoarelor cu Ardere Internă – Laborator de Universitatea Tehnică din Cluj-Napoca
Site	http://www.testecocel.utcluj.ro/
Tüv Certificate	No. S-120.99.241.00, given on 19.12.2012 for ISO 8178, Part 1,3 and 5
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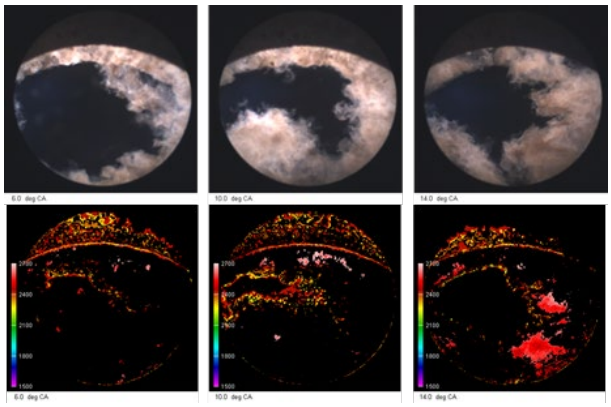

Areas of expertise

Engine testing:
In the TestEcoCel Laboratory a series of functional, reliability and dynamic analysis can be performed on internal combustion engines designed for vehicles, powered by conventional fuel and also non conventional fuels.
Testing the quality of fuels on engines:
An analysis of the physical and chemical properties of fuels used in internal combustion engines can be made, and also the evaluation of pollutant emissions generated in the burn process.
Optical analysis of the combustion:
Using an endoscopic camera and the transparent components of the single cylinder research engine inside the Laboratory, some tests regarding the characteristic phenomenon of the combustion process can be made, based on the particularities of the burning flame generated by the different fuels used to powered the internal combustion engine.
Hardware in the loop testing
Using the engine mounted on the testbed, and a virtual environment, the team can implement different driving techniques, roads, manoeuvres, vehicles and the real system (engine) can be compared to a simulation version and validate its functionality. Also acceleration tests can be implemented.

Team

Prof. PhD. Eng. Nicolae Burnete, Prof. PhD. Eng. Bogdan Varga, Prof. PhD. Eng. Florin Mariaşiu, Prof. PhD. Eng. Istvan Barabas, Prof. PhD. Eng. Adrian Todoruţ, Assoc. Prof. PhD. Eng. Dan Moldovanu, Assoc. Prof. PhD. Eng. Calin Iclodean, Assoc. Prof. PhD. Eng.Nicolae Vlad Burnete, Lect. PhD. Eng. Andreia Molea, Lect. PhD. Eng. Levente Kocsis, PhD. Stud. Eng. Irina Duma.

Representative projects

"Cooperation with Porsche Engineering", Industry research, (2016-2023)
"**Cooperation with LUK Oil Romania"**, Industry research, (2019)
"**Endurance testing of various gasoline blends mixed with metallic additives**", Industry research, (2012-2013)
TestEcoCel, "Testing laboratory of internal combustion engines that run on biofuels", POS CCE, (2009-2011)
"The influence or the energetic contribution on functional parameters and emissions of internal combustion engines that work with blends of biofuels", (2007-2009)
EnergoEcoFarm,"**Studies regarding the usage of oil based fuels as a reliable energy source for agricultural**

farms", PN II-21046, (2007-2009)
BIOBENZ, "New, modern, unconventional technologies of superior biomass capitalization from sugar beet – obtaining gasoline", (2006-2008**)**
BIOGEF, "High energetic efficiency technology for producing an integrated biogas system and electrical energy from bio mass, for Romanian farms", (2006-2008)
ECOTRANS, "Possibilities and limits of greening urban transportation through vegetable oil fuels", CEEX Program, (2005-2008)

Significant results

The most representative publications of the past 5 years:

1. Burnete, N.V., Mariasiu, F., Depcik, C., Barabas, I. and Moldovanu, D., 2022. Review of thermoelectric generation for internal combustion engine waste heat recovery. Progress in Energy and Combustion Science, 91, p.101009.
2. Burnete, N. V., Mariasiu, F., Moldovanu, D., & Depcik, C. (2021). Simulink Model of a Thermoelectric Generator for Vehicle Waste Heat Recovery. Applied Sciences, 11(3), 1340.
3. Burnete, N. V., Mariasiu, F., Moldovanu, D., Burnete, N., Capata, D., & Jurchis, B. (2021, August). Parametric study of air-cooled TEG heat exchanger design for waste heat recovery in heavy-duty vehicle. In IOP Conference Series: Materials Science and Engineering (Vol. 1169, No. 1, p. 012027). IOP Publishing.
4. Mattson, J., Burnete, N. V., Depcik, C., Moldovanu, D., & Burnete, N. (2019). Second law analysis of waste cooking oil biodiesel versus ULSD during operation of a CI engine. *Fuel*, *255*, 115753.
5. Burnete, N. V., Balint, R. J., Măgherusan, C. A., & Moldovanu, D. (2019, October). Performance, Combustion and Emissions Study of a DI Diesel Engine Running on Several Types of Diesel Fuels. In *SIAR International Congress of Automotive and Transport Engineering: Science and Management of Automotive and Transportation Engineering* (pp. 153-159). Springer, Cham.
6. Varga, Bogdan Ovidiu; Sagoian, Arsen; Mariasiu, Florin, Prediction of Electric Vehicle Range: A Comprehensive Review of Current Issues and Challenges ENERGIES Volume: 12 Issue: 5 Article Number: 946 Published: MAR 1 2019
7. Varga, Bogdan Ovidiu; Mariasiu, Florin, INDIRECT ENVIRONMENT-RELATED EFFECTS OF ELECTRIC CAR VEHICLES USE ENVIRONMENTAL ENGINEERING AND MANAGEMENT JOURNAL Volume: 17 Issue: 7 Pages: 1591-1597 Published: JUL 2018
8. Moldovanu, D., Mariașiu, F., & Bagameri, N. (2018). Influence of swirl and tumble motion inside the combustion chamber of a compression ignited engine on vertices formation. In MATEC web of conferences (Vol. 184, p. 01022). EDP Sciences.
9. Burnete, N. V.; Burnete, N.; Jurchis, B.; et al., Influences of diesel pilot injection on ethanol autoignition - a numerical analysis NTERNATIONAL CONGRESS OF AUTOMOTIVE AND TRANSPORT ENGINEERING - MOBILITY ENGINEERING AND ENVIRONMENT (CAR2017) Book Series: IOP Conference Series-Materials Science and Engineering Volume: 252 Article Number: UNSP 012066 Published: 2017
10. Iclodean, C.; Varga, B.; Burnete, N.; et al., Comparison of Different Battery Types for Electric Vehicles INTERNATIONAL CONGRESS OF AUTOMOTIVE AND TRANSPORT ENGINEERING - MOBILITY ENGINEERING AND ENVIRONMENT (CAR2017) Book Series: IOP Conference Series-Materials Science and Engineering Volume: 252 Article Number: UNSP 012058 Published: 2017
11. Burnete, N., Moldovanu, D., Baldean, D. L., & Kocsis, L. (2016). Studies regarding the influence of exhaust backpressure on the performances of a compression ignited engine. In Proceedings of the European Automotive Congress EAEC-ESFA 2015 (pp. 141-149). Springer, Cham.
12. F. Mariasiu, N. V. Burnete, D. Moldovanu, B. O. Varga, C. Iclodean, and L. Kocsis, "EFFECTS OF BIOETHANOL ULTRASONIC GENERATED AEROSOLS APPLICATION ON DIESEL ENGINE PERFORMANCES," *Thermal Science*, vol. 19, pp. 1931-1941, 2015.
13. Varga BO, Mariasiu F, Moldovanu D, Iclodean C. Electric and Plug-In Hybrid Vehicles. Cham: Springer International Publishing; 2015.
14. Burnete, N. V., Filip, N., & Barabas, I. (2015). Diesel-ethanol blends and their use in diesel engines. J. Automot. Eng, 89, 88-106.

Significant solutions:
Research regarding the use of rape seed oil based fuels with diesel, for the compression ignited engine, to reduce pollution; Studies regarding combustion modelling in a compression ignited engine fuelled with biodiesel for better performance; Studies and research regarding simulation of an internal combustion engine that works with biofuels; Studies and research regarding the possibilities of improving the internal combustion engine performance through supercharging;
Products and technologies:
Active Dynamometer – capable of functioning also as a motor, for starting the single cylinder engine, capable of working at 12000 rot/min, developing a power of 220kW and a torque of 540Nm; and capable of working as a controlled generator, for loading the engine; Single cylinder research engine – the engine has three interchangeable kits: Kit for gasoline engine, for direct injection and indirect injection (PFI); Kit for transparent engine, with a quartz liner in order to film inside the combustion chamber using cameras and a quartz cylinder head, for filming using the camera and a mirror system; Kit for Diesel engine, common rail, direct injection, with two orifices in the cylinder head for the endoscopic camera, to film the processes inside the combustion chamber; Open ECU – the Electronic Control Unit of the engine, Hardware in the Loop system
Patents:
Mariasiu E, Burnete N, Varga B., Cold start device for internal combustion engines supplied with biodiesel fuel, RO127032-

A2 Mariasiu Florin Emil, Varga Bogdan Ovidiu, Deac Teodora Alexandra, Device For Reducing Lube Oil Viscosity Upon Start Of Internal Combustion Engines At Reduced Ambient Temperatures, 128768 / RO128768-A2 / a 2011 01383 - 2016

The offer addressed to the economic environment

Research & development	In the applied engineering service domain, our research group offers technical expertise regarding the dynamic performance, chemical and nuisance while using different types of fuels for the internal combustion engines; Modeling and analysis of the combustion process of an internal combustion engine using different types of fuels; Analysis of biodiesel burn particularities in a compression ignited engine and study of bio-ethanol burn performance in a spark ignited engine.
Consulting	In the consulting domain, our research group can provide data regarding fuel performance and internal combustion engine performance to internal combustion engine producers, to fuel producers and also for research centers. The internal combustion engine is tested as if it is mounted on the vehicle, due to the high performance of the dynamometer.
Training	The available trainings are in Engine testing, Engine certification, and Fuel testing domain.

Last updated: January 2023