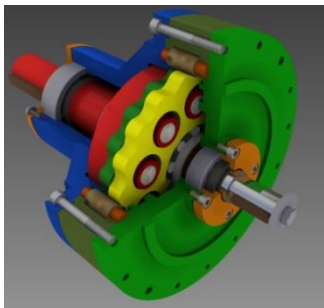
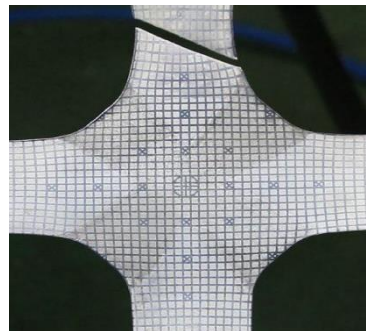




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name of the unit: DEPARTMENT OF VEHICLES AND FUNDAMENTALS OF MACHINE DESIGN		symbol: K-15 https://pojazdy.p.lodz.pl/
head of the unit: Damian Batory PhD, DSc, TUL Prof.	potential promoters: Damian Batory, PhD, DSc, TUL Prof. Krzysztof Siczek PhD, DSc Bogdan Warda, PhD, DSc	contact person: Grzegorz Mitukiewicz, PhD phone: 42-631-23-91 grzegorz.mitukiewicz@p.lodz.pl
scope of activities: The main areas of interest and research directions are the following issues falling within the general concept of Mechanical Engineering: • designing and testing of the transmission drive systems for motor vehicles • tests of internal and external combustion engines (SI, CI, Stirling) • testing the reaction time of drivers • plane stress state phenomena testing (Forming Limit Diagram, coatings) • the analysis of mechanical properties of substrate – coating systems under • biaxial tensile conditions • testing of roller and journal bearings, • pitting in gear meshing.		
present activities: We prepare prototypes of mechanical transmissions, which we then test on specially designed stands. We have test benches up to 220kW. Thanks to the cooperation with the Stellantis concern, we conduct research on cylinder deactivation or additional HHO injection on our engine dynamometers (Horiba / Schenck) in order to reduce fuel consumption. Research on an alternative source of propulsion is currently focused on the Sirling engine. Our work on this topic concerns the development of an effective combustion chamber and the reduction of mechanical losses in the engine itself. We conduct tests of drivers' reaction time at a specially designed stand. A large group of research participants (university staff, students) allows for a broad statistical analysis of the results obtained. We are also developing the system which allows to introduce plane stress state to the material sample. The state of bidirectional stress of the specimen is being achieved by stretching a cruciform specimen in two perpendicular directions. This kind of method allows to characterize the materials modified with variety of protective and technical layers work in devices where they are subjected to mechanical loads, usually with complex character. Our team developed a bench for journal bearing testing, which enable to measure its drag torque depending on the surface shape, roughness and lubrication.		 
future activities: Developing the new designs of drive systems, intended mainly for electric vehicles. Development of a cooling system for car batteries during the charging process. Developing the method to characterize the materials modified with variety layers		



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[publications/patents, awards, projects:](#)

- J. L. Dion, Z. Pawelski, V. Chianca, Z. Zdziennicki, N. Peyret, G. Uszpolewicz, J. Ormezowski, G. Mitukiewicz: Theoretical and Experimental Study for An Improved Cycloid Drive Model, Journal of Applied Mechanics JANUARY 2020, Vol. 87
- J. Goszczak, G. Mitukiewicz, B. Radzymiński, A. Werner, T. Szydłowski, D. Batory: The study of damping control in semi-active car suspension, Journal of Vibroengineering, Vol. 22, Issue 4, 2020, p. 933-944
- T. Szydłowski, K. Surmiński, D. Batory: Drivers' Psychomotor Reaction Times Tested with a Test Station Method Appl. Sci. 2021, 11(5), 2431
- G. Mitukiewicz, C. Kuzalski, J. Goszczak, J. Leyko, Z. Dimitrova, D. Batory: Analysis of the cruciform sample shapes for bi-axial tensile tests based on the geometries currently present in the literature, Advanced in Science and Technology Research Journal 2021
- Patent FR3063531 Reducteur hypocycloidal, Wascheul Michael; Lelasseux Xavier; Mitukiewicz Grzegorz; Ormezowski Janusz; Pawelski Zbigniew

[keywords:](#)

cycloid gear, Stirling engine, driver response time, roller and journal bearings, forming limit diagram, material coatings

[List of internship proposal in this research team:](#)

- Co-operation during the analysis of mechanical properties of substrate – coating systems under biaxial tensile conditions.
- Co-operation during testing and analysis of journal bearings or gears wearing.