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Forschungsvereinigung Verbrennungskraftmaschinen e.V.
FVV | Research Association for Combustion Engines

Petra Tutsch | Communications & Media Relations
T +49 69 6603 1457 | tutsch@fvv-net.de | www.fvv-net.de

04.10.2018

Better calculations, less CO₂: FVV awards the Hans Dinger Prize 2018 to young researchers

High-tech steels, adaptive air bearings and biofuels: Young scientists find exciting tasks in research on turbomachinery and internal combustion engines. Some outstanding works have now been awarded the Hans Dinger Prize 2018 by the Research Association for Internal Combustion Engines (FVV). The common goal of the young researchers is to use better calculation and simulation methods to make more climate-friendly engines and turbines a reality.

Frankfurt/Main. The winner of the Hans Dinger Prize 2018 is **Fabian Goergen**. His Master thesis at RWTH Aachen University on "**Experimental and computational analysis of tooth flank fatigue damage in conventional and novel material systems**" was awarded first place. The work does not deal with the gears in vehicle transmissions, but with a transmission that enables different speeds between the fan and the gas turbine in an aircraft engine. The reduction ratio allows the fan to rotate at a significantly lower speed than the gas turbine. The turbine can therefore be operated with a very high degree of efficiency, even with a large proportion of jacket flow. The gear flanks of such a turbo transmission are exposed to very high loads which, if incorrectly designed, can lead to component failure in the long term. As part of the FVV project on "Turbo Steel", Goergen primarily investigated the mechanisms that lead to the formation of so-called pitting in the tooth flanks. With the computational method he developed, which was verified on both conventional and new steels, damage formation can be reliably predicted - an important prerequisite for highly efficient yet safe aircraft engines.

The second winner, **Alexander Kyriazis**, also worked on turbomachinery at the Technical University of Braunschweig. The title of his award-winning student research work is "**Development of an analytical model based on laminate theory enabling an optimised simulation of the curvature of bearing shells in an adaptive foil bearing**". What sounds complicated also contributes to more efficient turbines. The increasing power density of turbomachinery places considerable demands on the bearings. In order to safely support the rotor shaft in all operating areas, adaptive aerodynamic foil bearings are to be used in future, in which a piezo actuator can vary the shape of the air gap in a targeted manner. The aim of the study work carried out as part of the FVV project "Foil Bearings II" was to mathematically describe the relationship between the electrical voltage applied to the actuator and the deformation of the bearing shell in such a way that the desired air gap geometry is achieved.

The third prize went to **Marcus Wiens** for his Bachelor work on the "**Development of reduced reaction mechanisms for gasoline fuels**" at the RWTH Aachen University, with which he made an important contribution to the FVV research project "Characteristic Fuel Numbers II". The background to the project is the phenomenon that modern, highly supercharged gasoline engines can show an increased tendency to pre-ignition if biogenic components such as ethanol are admixed. The resulting chemical reaction paths are extremely complex and could previously only be calculated using computationally intensive three-dimensional methods. Wiens has adapted a much simpler model, originally developed for n-heptane, to the fuel components methane and ethanol as well as two mixed fuels. With the new method, the interaction between locally elevated temperatures in the combustion chamber (so-called "hot spots") and the air-fuel mixture can be calculated much faster.

Every two years, the FVV awards the **Hans Dinger Prize** to young scientists whose work has contributed to the success of one of the projects carried out by the Research Association. The scientific content of the work, the usability of the results in practice and especially the innovative character of the research results are evaluated. This year's award ceremony took place on 27 September at the autumn conference of the FVV in Würzburg. The award commemorates the former CEO and head of research and development of MTU. Hans Dinger (1927-2010) supported pre-competitive Industrial Collective Research throughout his life and was honorary president of the FVV from 1989 until his death.

Images



Hans Dinger Award Winners 2018
1st Prize: Fabian Goergen (WZL)
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Alexander Kyriazis (iaf), Fabian Goergen (WZL)
and Marcus Wiens (vka)
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About FVV

FVV | The Research Association for Combustion Engines is a globally unique network of companies, research & technology performers (RTD) and funding bodies. . In the context of pre-competitive Industrial Collective Research (IGF), manufacturers of automotive engines, industrial engines and turbomachinery as well as their suppliers and service providers work together with universities and other research establishments on cutting-edge technologies. The aim is to make engines and turbines cleaner, more efficient and sustainable – for the benefit of society, industry and the environment.

Combustion engines facilitate individual mobility, transportation, energy supply and industrial added value. The innovative power of the industry and its economic success make a significant contribution to social prosperity. As a non-profit organisation, the FVV supports the development of its members - small, medium and large companies - and the promotion of young scientists through pre-competitive industrial collective research.

The FVV is a member of the German Federation of Industrial Research Associations (Arbeitsgemeinschaft industrieller Forschungsvereinigungen - AiF), the leading national organisation for applied research and development for SMEs. It has invested more than 500 million euros in 1,200 research projects since it was founded in 1956.

More information at www.fvv-net.de/en/