



Science for a
moving society

FINAL REPORT

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HyFlex-ICE

Hochflexible Verbrennungsmotoren für Hybridfahrzeuge

HyFlex ICE

Highly-flexible internal combustion engines for hybrid vehicles

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Project no. 1433

Highly-flexible internal combustion engines for hybrid vehicles

Final report

Abstract:

In the development of future passenger cars, the statutory regulations on defossilization of the exhaust emissions must be reconciled with customer requirements. Therefore, it is necessary to consider the complex interactions within powertrain systems at the earliest possible stage of development, to exploit their full potential. Thus, this paper presents a holistic methodology for optimizing the operation of all powertrain components exemplified by a hybrid powertrain. The methodology enables the full potential of all powertrain components to be exploited. For this purpose, a requirements catalog focused on the powertrain was derived using a top-down systems engineering approach. This requirements catalog is necessary for the identification of all limiting factors of the powertrain system. The development and application of the methodology and the system optimization were carried out via extensive simulation studies. Thereby, an optimal design of the hybrid powertrain was derived for a defined target application. Based on this, the system limitations were identified in Real-World Driving Scenarios, considering all relevant requirements. These limitations were significantly minimized and optimized by predictive control strategies, sophisticated hardware adaptations and innovative technologies. Finally, the scalability and transferability of this holistic approach is demonstrated by developing and optimizing a P2-Hybrid and a BEV powertrain for the same requirements.

The objective of the research project was achieved.

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Scientific advisory committee chair:	Dr.-Ing. Andreas Kufferath (Robert Bosch GmbH)
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