Preface

Dear colleagues,

If we want to continue to offer our customers vehicle drive systems that unite key characteristics such as low fuel consumption, impressive driving dynamics, flexibility in use, and high comfort combined with the sustainable use of resources and the lowest exhaust emissions, then we're going to have to ramp up our development budgets. Current market trends, which are seeing a decline in registrations of vehicles with diesel engines, are increasing the pressure to develop high-efficiency gasoline engines. As a bridging technology, the gasoline engine will be a key determinant of our car fleet's consumption in the coming years. Further increases in efficiency, however, will be limited by the well-established phenomenon of gasoline engine knock.

This conference thus addressed one of the most important issues in the ongoing development of the gasoline engine.

The majority of today's high-efficiency gasoline engines utilize downsizing or combine high mean pressures with Miller cycles and increased geometric compression, known as "rightsizing." When designing engines for high compression ratios—an essential requirement for efficiency increases—the knock limit is the defining criterion. In addition, the rise in specific torque at very low speeds as the basis of low fuel consumption, assisted by downsizing and downspeeding, has long been associated with the preignition phenomenon.

Ideal efficiencies are achieved by charge dilution combined with very high compression. This, however, causes "extreme knock," potentially leading to catastrophic events in the mid- to high-speed range. Improving charge-diluted concepts demands a greater focus of research in this field.

The introduction of RDE legislation this year will further grow the requirements for combustion process development, as residual gas scavenging in the low-end torque range and enrichment to reduce knock and exhaust temperatures will be legally limited. There is still, however, the need to reach the center of heat release with the highest possible compression. Preventing damage to high-efficiency gasoline engines demands a deep understanding of the phenomenology and precise detection and control engineering, resulting in new approaches to improved thermodynamics, more exact control algorithms, and optimized applications.

Together with its partners, IAV presented a wide range of research findings.

We hope that this conference gave all participants an opportunity to gain new insights, impressions, and ideas for their future development work.

We would like to thank our partners at UNIVERSAL Kongress & Event Marketing GmbH, and in particular Mr. Kniehase, for their proactive support in preparing and running the conference, our IAV colleague Lars Gamasin, and Springer Verlag.

Special thanks go to the international speakers, without whose active contribution this conference could not have been such a success.

The conference explored important ways to improve engine thermodynamics and control technology of interest to combustion process specialists, design engineers, and application experts. In the process, it presented solutions of relevance to advanced engineering, volume, and application specialists. IAV and its expert colleagues around the world are working hard on solutions that prevent or reliably control knock and other irregular combustion events such as preignition. These solutions create the conditions to further increase the efficiency of the gasoline engine and thus meet ambitious CO2 emission reduction targets.

We would be pleased to welcome you again as a participant or exhibitor to this IAV conference.

December 2017 Michael Günther
Marc Sens

http://www.springer.com/978-3-319-69759-8

Knocking in Gasoline Engines
5th International Conference, December 12-13, 2017, Berlin, Germany
Günther, M.; Sens, M. (Eds.)
2018, IX, 384 p. 308 illus., Softcover
ISBN: 978-3-319-69759-8