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Preface CWD & DSEC 2023

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The ATK—Antriebstechnisches Kolloquium has been addressing challenges and innovations in drive train development throughout various industries since 1987. Strong interest of the conference participants in wind power drive train technologies was the reason for establishing a separate Conference for Wind Power Drives (CWD) in 2013. Now, ten years later ATK has been renewing again—this time, to promote Model Based Systems Engineering as fundamental new approach for drive train engineering. For us this step is a logical consequence to further develop and implement our traditional modelling and simulation research into industrial product development processes. Taking account to this evolutionary change the former ATK became DSEC—Drivetrain and Systems Engineering Conference.

This special issue comprises the scientific proceedings of the CWD and DSEC 2023. Both conferences are organized by the Center for Wind Power Drives and the Center for Systems Engineering of RWTH Aachen University together with the Research Association Drive Technology (FVA). The conferences took place in Aachen on March 21st to 22nd, 2023. In order to face today's and tomorrow's requirements, such as electrification, increasing efficiency, sustainability and improved noise vibration harshness (NVH), drive trains and their components have to become even more performant. In the same time ongoing digitalization embeds drive trains as part of larger systems or systems of systems. The growing complexity of these systems, coupled with short innovation cycles, requires a fundamental rethinking of the development process. Model Based Systems Engineering (MBSE) structures a function-oriented development process, contributes to handle complexity and guarantees planning security. MBSE enables early virtual validation and multidisciplinary design analysis and optimization. The goal of the 20th DSEC in 2023 was to review and discuss the latest innovations of cross-industry drive trains and machine elements together with their virtual development using system engineering methods. Systems on the level of entire vehicles, drive trains and its components were considered.

Producers of wind turbines have hard times to earn money. Beside technical challenges by frequent growth of turbine sizes and turbine variety, actual political conditions weigh on business. Significant disturbances of international supply chains because of the Ukraine war as well as unsuitable approval and tendering procedures for the erection of wind farms in some countries shall be mentioned here. From 2025 on an accelerated wind market growth is expected again. Nevertheless, international competitiveness requires continuous cost savings in wind turbines and their drive trains. Engineers work on further increasing power density and on clever product architectures to provide turbine variants with acceptable cost. Moreover, reduced distances of turbines to settlements propel research activities to lower noise emissions and thus increase social acceptance. With talks about the aforementioned topics the 6th CWD in 2023 promoted the knowledge exchange between industry and science.

Our event functions as an interdisciplinary platform, bringing together experts from the field of drive train technology from both, research and industry. To identify practical needs, the conference's contributions are accepted from industry experts and academic researchers in equal parts. By combining CWD and DSEC, the exchange between drive train engineering experts from different industries, such as the automotive and wind energy sectors, will be enabled. Together, the two conferences hosted more than 100 live talks in 25 expert sessions in 2023, showcasing the latest innovations and methods for developing, simulating and testing drive train systems and machine elements.

We highly appreciated the support provided by our friends and colleagues, leading to the great success of the CWD and DSEC 2023. We would like to thank our Program Committee for providing deeper insights into the industry's challenges, assessing numerous contributions

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to build our conference program, and hosting our expert sessions. Furthermore, we would like to thank our keynote speakers for the compelling opening presentations, which made the event a great success right from the very beginning. Finally, we like to thank all authors, speakers, reviewers, sponsors and of course our conference attendees, for a comprehensive and high-quality conference full of discussion and exchange.

We hope to see you all again soon and look forward to meeting you at the CWD and DSEC 2025.

Yours sincerely,
Georg Jacobs

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