Main Focus

- Digital environmental data
- Load data and durability
- Dynamics and system simulation
- Human modelling and human-machine interaction
- Cables, hoses and flexible structures
- Tire models – CDTire
- Technical Center: Human Machine Interaction and driving simulators
The division is divided into the two departments, Dynamics, Loads and Environmental Data (DLU) and Mathematics for the Digital Factory (MDF), the project group Tire Simulation (CDTire), and the cross-sectional unit MF Technical Center, which operates the simulator laboratory with the interactive driving simulator RODOS and the measurement vehicle RE-DAR and takes care of all the division’s testing and measurement related tasks.

In the Dynamics, Loads and Environmental Data department, we develop methods and tools for data analysis and system simulation. In doing so, we rely on a problem-adapted best possible combination of physics-based and data-based (AI, ML) modeling. The increasing availability of data from vehicle development, operation and production constantly leads to new opportunities and challenges here, which fit perfectly with our many years of experience in data-based mathematics and hybrid modeling. Special attention is paid to the inclusion of digital environment data and the simulation of usage variability. In this way, we address the vehicle development attributes of durability, reliability, energy efficiency, and the validation of assistance systems and automated driving functions. In line with this, we are focusing our system simulation activities on vehicle-environment-human interaction and developing tire simulation models (CDTire) as well as methods for interactive simulation.

Mathematics for the Digital Factory bundles the activities for the development of software tools for virtual product development and product creation. Our software product IPS Cable Simulation, developed jointly with the Fraunhofer Chalmers Research Center for Industrial Mathematics (FCC) in Gothenburg (S), supports virtual design, optimization and validation for assembly and operation of cables, harnesses and hoses. In addition, we have developed IPS IMMA, a digital biomechanical human model to virtually optimize assembly processes. Efficient and fast algorithms enable an efficient evaluation and optimization of the ergonomics of assembly processes.

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- The Technical Center – tests and simulations under one roof, p. 37
- CDTire – reinventing the tire with simulation, p. 38
- Making better use of data – AI and ML in vehicle development, p. 40
- EMMA learns to drive – dynamic human model for autonomous vehicles, p. 68
- New features for MeSOMICS®, p. 73

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