



# Particle Simulation for Construction and Agricultural Machinery

The Demify® module is part of the IPS software family and offers, with the “Demify® for Heavy Machinery and Vehicles” toolbox, a particle simulation for various applications at the interface between granular materials and tools. The particle solver enables force prediction in the interaction between the ground and the tool of a construction and agricultural machine. Through Machine Learning, in particular recurrent neural networks (RNN), our researchers significantly accelerate the simulations.

Real-time tests in the RODOS® driving simulator are now also possible. Further research is being funded by the Fraunhofer-Gesellschaft as part of a PACT project. “Over the next two years, we want to develop further features, implement our ideas and establish Demify® on the market,” says Dr. Sebastian Emmerich. In addition to AI models to increase efficiency, new methods for coupling particle systems and multi-body models as well as the co-simulation of flexible components are planned.



[www.itwm.fraunhofer.de/ips-demify](http://www.itwm.fraunhofer.de/ips-demify)

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# Realistic Tire Model for Precise Rolling Resistance Prediction

The rolling resistance of tires is the result of energy losses. It is part of the EU tire label, which divides them into efficiency classes from A to E. It allows new tires to be compared under laboratory conditions. Lower rolling resistance improves fuel consumption and therefore also energy efficiency. In practice, however, the situation is quite different, which means that the efficiency classes cannot be achieved in everyday life due to many short journeys with “cold” tires. However, this is particularly important for

electric vehicles, as it affects the range. Researchers in the “Mathematics for Vehicle Engineering” division are tackling this problem. The tire simulation software “CDTire”, which enables physical modelling of all elements of a tire such as a steel belt – including temperature and pressure variations – has been further developed so that it now also takes internal friction losses into account. By coupling the internal friction with the temperature model, a realistic simulation of the rolling resistance is possible.



[www.itwm.fraunhofer.de/en/cdtire](http://www.itwm.fraunhofer.de/en/cdtire)

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