

# Summary

A typical premium car, e.g. BMW, has up to 20.000 parts. New customer requirements, designs and technologies lead to very complex structures. In addition to that, lead time and cost reduction require new methods in order to manage and control the virtual product development process.

In this paper we discuss virtual engineering as a continuous virtual product development process in order to digitally create and manage all necessary product data for a virtual vehicle along its product life cycle. A virtual vehicle is a digital product model of a car which covers all characteristics and properties in order to model and simulate its physical behaviour along the product life cycle.

The focus of this paper will be on integrating technologies in order to support distributed design and simulation tasks for multidisciplinary engineering. The overall goal is to realize an integrated virtual process including lots of virtual subprocess models and virtual subsystem product models referencing appropriate data versions and defining well-designed development iterations. In a project for the thermodynamic simulation of the underhood we coupled different simulation tools using a Python-based framework and a conservative synchronisation concept. We define process and product models interacting according to reference data and determining property related iterations. The experience made in this project lead to the idea of extending the framework to a fully integrated virtual development framework using commercial CAD, PDM and KB systems.