CarMaker, TruckMaker, MotorcycleMaker

The open integration and test platforms for virtual test driving
You are Always One Step Ahead – with Virtual Test Driving

A growing number of vehicle variants and drivelines, more extensive system integration and higher requirements for safety and comfort – these are just a few of the factors that increase both the effort and costs involved in development and testing for the automotive and supply industry. With the CarMaker product family, we will show you how implementing virtual test driving and comprehensive vehicle development at an early stage can help you meet these challenges.

Our strengths: Vehicle Dynamics, Driver Assistance and Powertrain

With our innovative simulation solutions for Vehicle Dynamics, Driver Assistance and Powertrain, you can create accurate virtual models of real world test scenarios. This makes it possible to conduct automated and reproducible tests of a large number of test scenarios inexpensively and at an early stage of development – even before a real prototype exists.

Our solution: An open integration and test platform

CarMaker, TruckMaker and MotorcycleMaker ensure the efficient development, optimization and validation of individual vehicle components, vehicle systems and complete vehicles. Our open integration and test platforms are suitable as holistic complete solutions for both office applications and Hardware-in-the-Loop tests on component and system test benches as well as on large testing facilities.
The CarMaker product family can be used to improve efficiency throughout the entire development process – from MIL and SIL to HIL and VIL.

Implementing virtual prototypes in all phases of development advances product maturity.

Powerful visualization provides rapid analysis.

Numerous standards and interfaces are supported for easy integration in your established development environment.

Complex and realistic test scenarios can be created quickly with powerful models that are easy to parameterize.

Maneuver and event-based testing offers maximum flexibility.

Automated execution of comprehensive maneuver catalogs shortens test cycles.

Your Advantages at a Glance
With the real-time capable models offered by our CarMaker, TruckMaker and MotorcycleMaker simulation solutions, you can realistically and precisely represent a wide variety of vehicle types along with their handling and performance characteristics, the traffic situation, the road and the surrounding environment in the virtual world.

Our clearly structured, uniform user interface promises easy parameterization of detailed models. Whether you are testing simulation models, software or real vehicle components – individually or as part of an integrated system – our CarMaker product family promotes the quick and easy set-up of digital prototypes for virtual test driving according to your individual testing requirements.

### Traffic
- Modeling of complex and reproducible traffic situations
- Wide range of traffic objects, such as vehicles, cyclists and pedestrians
- Event-based control of traffic objects
- Nearly unlimited number of traffic objects that can be simulated at the same time including relevant movement patterns
- Assignment of various routes to traffic objects

### Vehicle
- Vehicle models for passenger vehicles, motorcycles, trucks and trailers
- Realistic simulation up to the limits of vehicle dynamics
- Efficient implementation of multibody systems – entirely non-linear, expandable and real-time capable
- Clear set-up according to vehicle subsystems
- Flexibly configurable sensor models
- Easy validation using the model check function

### Driver
- Independent route and speed planning based on the characteristics of the road
- Separate lateral and longitudinal control of the vehicle with the option of externally defined speed and steering profiles
- Adjustable vehicle handling and performance, including pre-defined driving styles ranging from defensive to sporty
- Realistic handling of steering and advanced driver assistance systems
- Complex maneuvers – from difficult parking situations to stop-and-go traffic to driving at dynamic limits
- Automatic learning function and adaptability to various vehicles

### Road
- Fast, realistic generation of roads or customer-specific test tracks
- Import of real road networks from HERE’s ADAS RP
- Multi-lane roads, intersections and exits
- Extensive design possibilities, including road markings, traffic signs, crash barriers, guide posts, buildings and plants
- Step-by-step definition of relevant road characteristics such as incline, slope or camber
I. Integration of virtual and real components using various interfaces in the development environment

II. Coupling to third party tools

III. Support of various hardware platforms

Flexible and Efficient – Open Integration and Test Platform

Quickly and easily connect virtual and real components via a standard and direct interfaces with third party tools that are supported by the CarMaker product family. With the virtual prototype, you can easily integrate everything from engines, powertrains, chassis and control devices to assistance and vehicle electric systems from a diverse range of modeling tools. Our open integration and test platforms ensure efficient development and testing by allowing you to adjust tests to reflect your testing requirements in every phase of the development process, from MIL and SIL to HIL and VIL. Whether simulation model, software, control device or hardware on the test bench – with the CarMaker product family, all systems can be integrated in accordance with their level of development and tested in the context of the complete vehicle.
Online Evaluation with Realistic Visualization

The visualization tools included with the CarMaker product family can offer you detailed and reliable feedback on all relevant parameters, data and models for your individual test scenario at any point during the simulation.

The 3D visualization tool IPGMovie supports the online observation of your virtual test run within a user-defined environment.

IPGMovie features a range of functions which make it possible to model the test run from various angles, through different types of lenses or via mirrors. It can also model all active sensors and various lighting conditions using headlights. On-screen overlays and the option to compare test runs round out the visualization tools offered by IPGMovie.

The data analysis tool IPGControl and the virtual dashboard in Instruments complement the powerful visualization tools of the CarMaker product family and can be synchronized with IPGMovie, ensuring that you never lose track of your virtual test run.

The visualization tools included in the CarMaker product family provide an overview of your virtual test run.

Screenshots from IPGMovie, Instruments and IPGControl
Test Management and Test Automation Made Easy

The Test Manager in our CarMaker, TruckMaker and MotorcycleMaker simulation solutions ensures a smooth, stable and automated testing process that can be implemented across the areas of MIL, SIL and HIL – no programming knowledge required. And that’s not all: Test Manager also offers a wide variety of functions to help you manage test maneuvers. With the complementary TestWare Designer and Test Configurator tools, you can define test templates and use them to generate entire test series, making it possible to quickly and easily develop even large maneuver catalogs.

For test automation, you can access all available commands, models, parameters, variables and data and automatically save your results in a test report once the test has been completed. These test reports can be retrieved via a requirements management tool at any time and can even be presented as a diagram.
As an innovation driver for virtual test driving, the company is a leading global provider of software and hardware products for the automotive and supplier industry. With the areas Simulation Software, Real-time Hardware, Test Systems and Engineering Services, IPG Automotive supports its customers in creating innovations and improving their development process efficiently. The simulation solutions CarMaker, TruckMaker, and MotorcycleMaker, as open integration and test platforms, facilitate great savings in time and cost for customers, in a continuous development process of Model-, Software- and Hardware-in-the-Loop, all the way to the Vehicle-in-the-Loop method. The application ranges from the general vehicle dynamics simulation, developing and testing of chassis control systems, as well as interconnected systems such as chassis, powertrain, and steering in full electric and hybrid vehicles. Another strength of IPG Automotive is the development of future-oriented solutions for the integration and testing of advanced driver assistance systems.