

Parameter studies

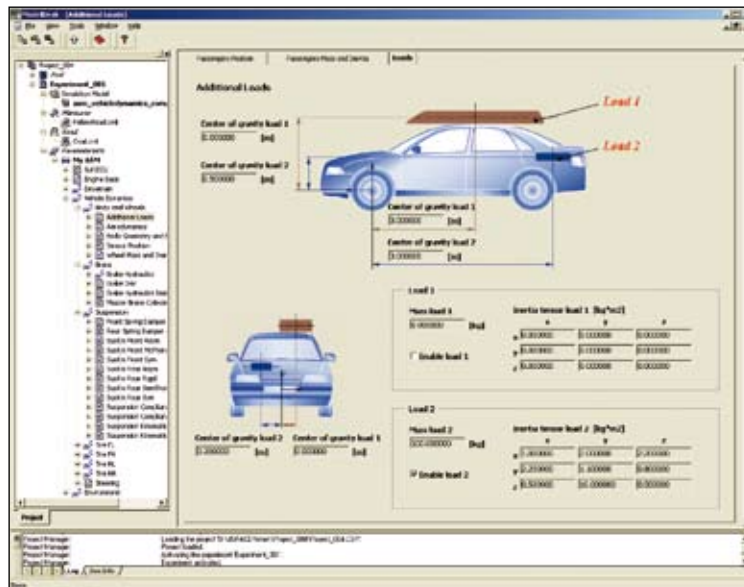
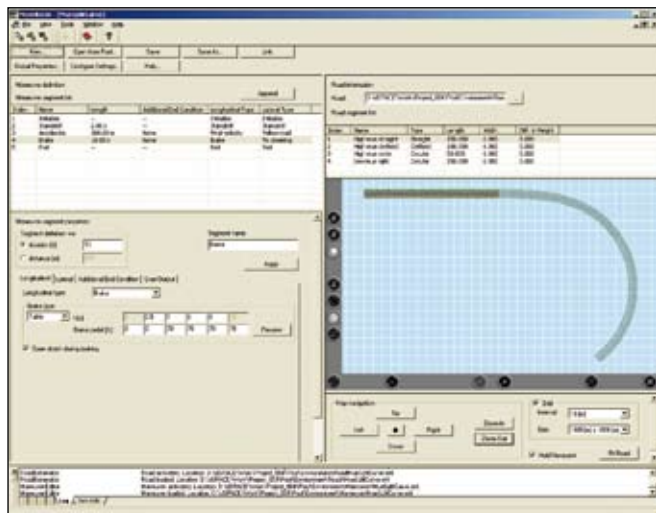


ModelDesk is the graphical user interface (GUI) for the vehicle dynamics model of dSPACE's Automotive Simulation Models (ASM), and is included in the ASM – Vehicle Dynamics Simulation Package. It provides an intuitive way to parameterize modeled vehicle components such as engine, drivetrain, axle kinematics, or tires with the aid of graphical visualizations. Environment components, such as roads and maneuvers, can also be defined and parameterized graphically – for example, to change the road surface friction or the final speed for a certain maneuver. Developers can set up virtual test drives including vehicle, roads and maneuvers, and save them as experiments.

The aim of ModelDesk is to produce well-parameterized models ready for simulation runs. ModelDesk downloads parameter sets (even during simulation) to a dSPACE simulator for real-time simulation, or to Simulink for offline simulation – without prior code generation.

ModelDesk 1.1, available in March 2007, supports remote control based on script languages such as Python and MATLAB M, and also Automation-Desk – the test automation software from dSPACE. The feature is available under the name of tool automation and uses ModelDesk's COM interface (Microsoft Common Object Model). It means that functions for experiment

MANEUVER DEFINITION PAGE WITH ROAD PREVIEW IN MODELDISK



ADDITIONAL LOADS CAN BE APPLIED TO THE VEHICLE WITH THE AID OF GRAPHICAL VISUALIZATIONS

management and vehicle or environment parameterization previously available via the GUI are now available via a programmable interface. Thus, everything that can be done manually by clicking buttons or entering values can also be executed from an external instance like a script. This includes loading and activating predefined experiments, loading and activating predefined parameter sets, activating maneuvers and roads, and modifying vehicle and environment parameters. Therefore, tool automation supports long, comprehensive simulation runs.

Tool automation brings efficiency and convenience to parameter studies. As in real test drives, maneuvers can be performed repeatedly, varying certain conditions each time. This allows standard tests to run on a virtual basis before vehicle prototypes are available, and new control strategies to be tested without expensive physical infrastructures.

The fishhook maneuver test – a typical rollover detection test often performed for pickups – can be simulated by maneuvers and automation scripts for ModelDesk. The fishhook maneuver is included in ASM as a standard maneuver for maximum ease of use. A short script

that covers the following steps will be sufficient: set the test velocity; perform the fishhook maneuver; and check if the tire lift exceeds the end condition – if not, increase the test velocity and restart. Once the tire lift condition is reached, the script can end the loop and save the results.

Tool automation can also be used to check ESP under different conditions on a hardware-in-the-loop (HIL) system. The corner braking maneuver can be performed on a road repeatedly, with varying road frictions, test velocities, or additional loads on the vehicle, for instance. It is even possible to run the maneuver on corners with different radii by switching between predefined roads.

ModelDesk's tool automation helps gather valuable data in the early stages of the development process and makes actual test drives more efficient. The feature is seamlessly integrated into the dSPACE tool chain and can be used in offline simulation for developing control algorithms, and for testing ECUs on a HIL simulator in real time.



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