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# Simcenter Tire

## Providing a versatile and cost-efficient approach to tire modeling

### Benefits

- Achieve cost efficiency by minimizing required tire testing effort for model parameterization
- Standardize tire modeling by making it available with all vehicle dynamic simulation packages and industry standard, real-time computation systems
- Produce accurate and realistic tire-slip characteristics resulting from on-road testing

### Summary

Simcenter™ Tire software is a range of products and services that are used to model tire behavior for vehicle dynamic simulations. Using Simcenter Tire enables vehicle manufacturers and suppliers to realize cost efficiency by minimizing required tire testing for model parameterization, standardizing modeling by making it available with all vehicle dynamic simulation packages and industry standard real-time computation systems, and producing accurate and realistic tire-slip characteristics resulting from on-road testing.

### MF-Tyre

MF-Tyre™ is the worldwide standard implementation of the Pacejka Magic Formula, including the most recent developments, such as representing the effects of inflation pressure and estimating combined slip behavior. MF-Tyre is the only Pacejka Magic Formula-based tire model that is available in all major vehicle dynamic simulation packages. The model is available for both desktop as well as real-time simulations. These attributes make MF-Tyre an excellent tire model for conducting vehicle handling and control prototyping analyses.

### MF-Swift

MF-Swift is an extension of MF-Tyre for ride comfort, road load and vibration analysis. MF-Swift adds generic 3D obstacle enveloping and tire-belt dynamics to MF-Tyre functionality. With this approach, an all-in-one tire model is created in which all relevant vehicle dynamic simulations can be performed. The MF-Swift model provides short simulation times for 3D uneven road simulations. Due to its structure, parameters can be easily identified from measurements, or estimated by the end user early in development before physical tires are available for testing. Also, MF-Swift is available for both desktop and real-time simulations.

### MF-Tool

The MF-Tool product enables user-friendly tire model parameter identification using measurement data. It is fully backward compatible with all MF-Tyre/MF-Swift models. Model and measurement data visualization, database functionality and advanced estimation capabilities are all integrated into this tool. Furthermore, using MF-Tool enables you to visualize and tune/modify tire models. It allows the user to study the effects of changing tire conditions, such as inflation pressure, stiffness and friction levels.

# Simcenter Tire

## Testing

The Simcenter Tire test trailer enables users to conduct tests in real-life conditions using dedicated measurement towers for passenger car and motorcycle tires. Tires can be tested on any type of road surface. The test trailer can even put down a controlled layer of water in front of the tire so it can be tested in wet conditions. The Simcenter Tire test trailer has also been used to test tires on snow and ice in Arctic regions.

Further, there is a worldwide network of renowned measurement institutes to supply you with a broad range of additional tire tests.

## MF-Tyre

Modeling for vehicle handling simulations include:

- Pacejka Magic Formula slip characteristics
- Advanced nonlinear relaxation effects
- Tire-road contact for smooth roads
- Combined slip-estimation possibilities
- Inflation-pressure effects
- OpenCRG (curved regular grid) road modeling
- Desktop as well as real-time simulations

## MF-Swift

Tire modeling for parking, ride comfort and durability simulations include all MF-Tyre features and the following additional functionality:

- Advanced contact model for uneven roads
- Rigid-ring model for representing tire dynamics
- Turn-slip modeling for parking applications
- Inflation-pressure effects
- OpenCRG road modeling
- Desktop as well as real-time simulations

## MF-Tyre/MF-Swift interfacing

- Altair MotionSolve
- Dassault Simpack
- FunctionBay Recurdyn
- IPG CarMaker
- Mechanical Simulation CarSim/BikeSim/TruckSim
- Modelon Dymola vehicle dynamics library
- MSC ADAMS
- Simcenter Amesim™ software
- Simcenter 3D software
- VI-Grade VI-CarRealTime
- VirtualMotion DAFUL

## MF-Tool

The tire model parameter identification tool includes:

- Full backward compatibility with all MF-Tyre/MF-Swift models
- Graphical representation of measurement data and tire models
- Built-in model parameter estimation
- Database to store large numbers of models and measurement data
- Compatibility with worldwide tire measurement standards

## Simcenter Tire test trailer

Mobile tire test features:

- On-road tire force and moment testing
- Passenger car and motorcycle tires
- Dry, conditioned wet, snowy and icy road

## Services and support

Services and support include regular worldwide training sessions, local and back-office support teams with tire modeling experts and modeling consultancy and development projects.

## Application fields

- Modeling of passenger car, motorcycle, truck and aircraft tires
- Vehicle-handling evaluations
- Development of vehicle dynamics control systems, including electronic stability control (ESC) and antilock braking systems (ABS)
- Parking and turn-slip maneuvers
- Evaluation of vehicle ride comfort
- Prediction of road loads for vehicle-durability evaluations
- Active and passive safety rollover prediction

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