

## *Tyre modelling and virtual vehicle integration*

Advanced tyre parametric models (such as FTire and MF-Tyre) permit IDIADA's chassis engineers to consider tyre performance while the vehicle is being designed, without the need to be involved in tyre FEM models. Consequently, this methodology allows the proper integration of the tyre in the chassis during the vehicle development process.

### **TWO PARAMETRIC TYRE MODELS: MF-TYRE & FTIRE**

Applus IDIADA offers the service for generating two parametric tyre models which are widely used to simulate tyre performance.

- **MF-TYRE**

Magic Formula tyre model is a "semi-empirical" tyre model, which predicts handling performance (steady-state and transient behaviour).

Therefore, MF-Tyre models permit the proper integration of the tyre within the chassis during the vehicle development process, when vehicle handling needs to be simulated. MF-Tyre model is

generated by means of force and moment tests such as pure cornering, pure braking and combined test, which are performed with IDIADA's skid trailer – a proving ground tyre testing device.

MF-Tyre 5.2 and 6.1 are generated by means of real proving ground testing data. Various surfaces can be used to test the tyres to be modelled:

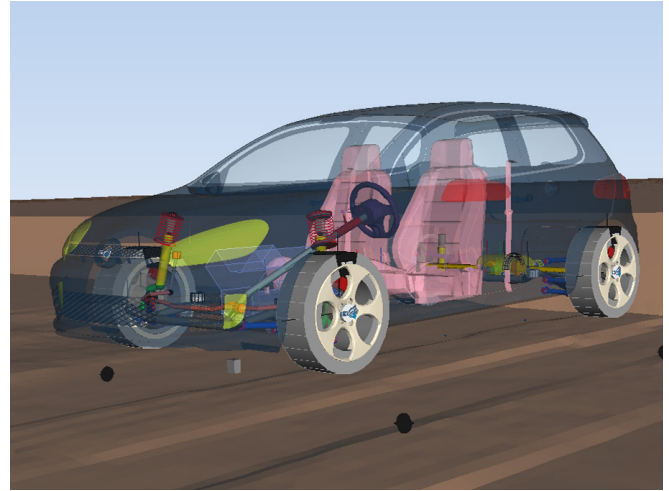
- Asphalt in dry condition
- Asphalt in wet condition
- Compact snow
- Ictet

- FTIRE

FTire is a short wavelength intermediate frequency tyre model. The construction of this parametric model is physically oriented and requires various measurement techniques and specific test equipment. Applus IDIADA has developed its own measuring procedures based on both its laboratory and proving ground measurements, in order to obtain precise and representative tyre behaviour data.

**FTIRE'S MAIN APPLICATIONS:**

- Primary and secondary ride comfort simulations, NVH and prediction of road loads on road irregularities
- Vehicle handling tests on flat or uneven roads
- Real-time simulations
- Prediction of complex tyre phenomena on a strictly mechanical and thermo-dynamical basis



- Complex analyses of the footprint shape at high frequency, pressure distribution, tyre wear and combination of vertical, lateral and longitudinal dynamics

## VIRTUAL TYRE INTEGRATION IN VEHICLE

Applus IDIADA's chassis simulation team offers the possibility to use modelled tyres in virtual chassis models.

Virtual tyre integration in vehicle serves for the refinement of the tyre force & moment targets. Additionally, it provides full-vehicle performance validation and supports tyre OEM's in the tyre development process.

Tyre integration can be done using driver-in-the-loop simulations in any of Applus IDIADA's driving simulators (static and dynamic) on different road surfaces.



### CONTACT INFORMATION

**Headquarters & Technical Centre** · L'Albornar - PO Box 20 · E-43710 Santa Oliva (Tarragona) Spain

For further details, please contact:  [tyrecharacterisation@idiada.com](mailto:tyrecharacterisation@idiada.com)  +34 977 166 023

