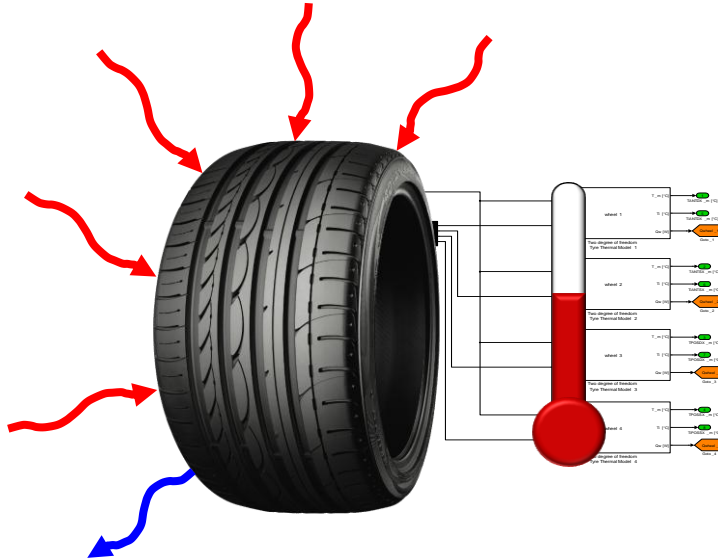




# Ttyre™

SOFTWARE TECHNOLOGY FOR VEHICLE TYRES TEMPERATURE SENSORLESS MONITORING



## OVERVIEW

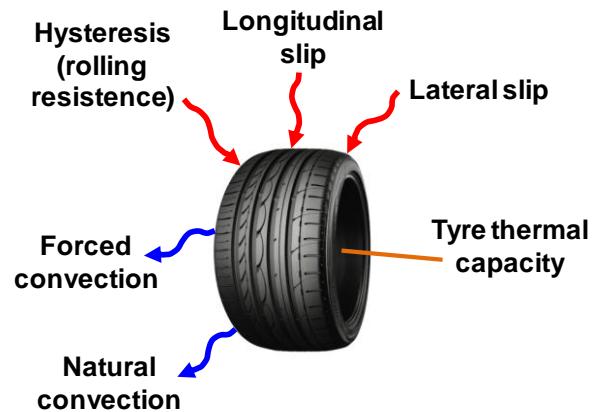
**Ttyre™** is a software module that aims at monitoring the tyres temperature of a vehicle without the installation of dedicated and expensive sensors. The installation of this module on the vehicle (e.g. in the dashboard microcontroller) allows the tyres performance monitoring and the improvement of safety, in particular for high performance cars)

Key features of the **Ttyre™** technology are:

- sensorless (installation of dedicated sensors is not needed);
- based only on dynamic signals of the vehicle (accessible from the CAN network of the vehicle);
- flexible and easily adaptable to different types of vehicles (truck, compact car, sport car)
- developed in MATLAB®/Simulink®<sup>1</sup> environment
- automatic code generation with RTW® Embedded Coder™ (certified for use in development processes which need to comply with IEC 61508 standards)
- implementation on various target platforms (Simulink® S-function, Windows XP, Windows CE, microcontrollers).

## TYRES TEMPERATURE ESTIMATION

The temperature estimation algorithm is based on the modelling of the heating up by hysteresis and friction and the consequent thermal exchange phenomena involving the tyres during the operation of the vehicle.



The model takes as input the vehicle dynamic signals (e.g. accelerations, vehicle speed, etc) and returns as output the temperature of the tyre tread.

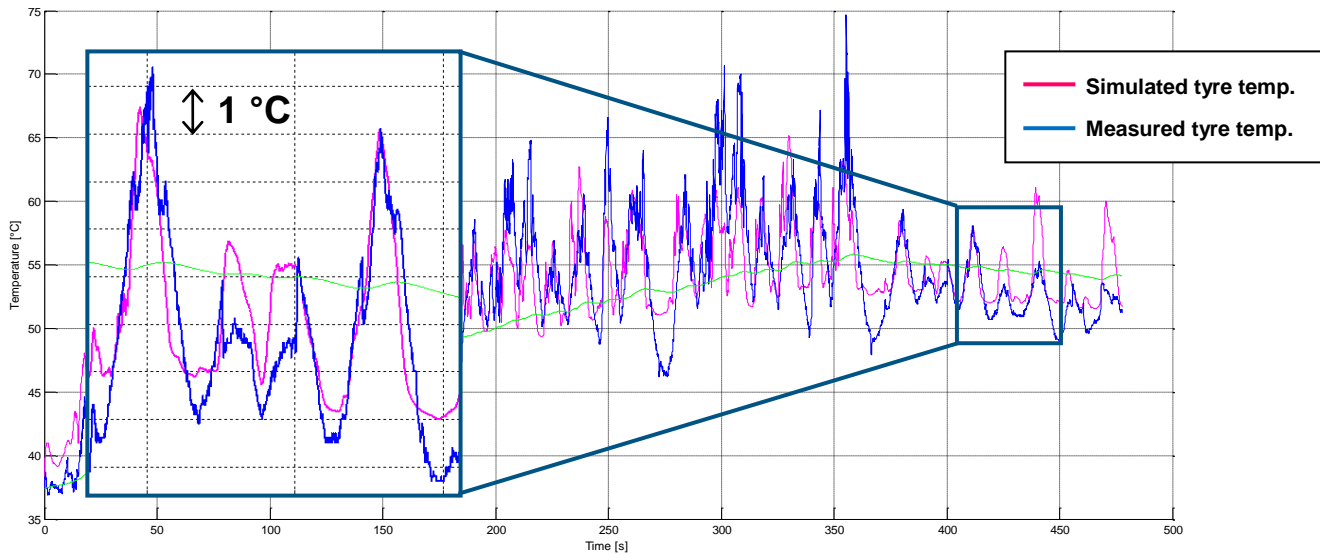
The flexibility of the model is guaranteed by a set of tunable parameters that can be easily optimized for the specific vehicle with a few dedicated test sessions (constant speed steps, steering pad, acceleration and braking).

This allows deploying the model not only for the specific end platform, but also as Simulink<sup>®</sup> S-function module in order to perform:

- off-line parameters optimization
- off-line testing
- SIL (Software In-the-Loop) testing.

## MODEL OPTIMIZATION AND TESTING

The model has been developed in MATLAB<sup>®</sup>/Simulink<sup>®</sup> environment.



<sup>1</sup> MATLAB<sup>®</sup> and Simulink<sup>®</sup> are products made by Mathworks Inc. (Natick, MA)

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