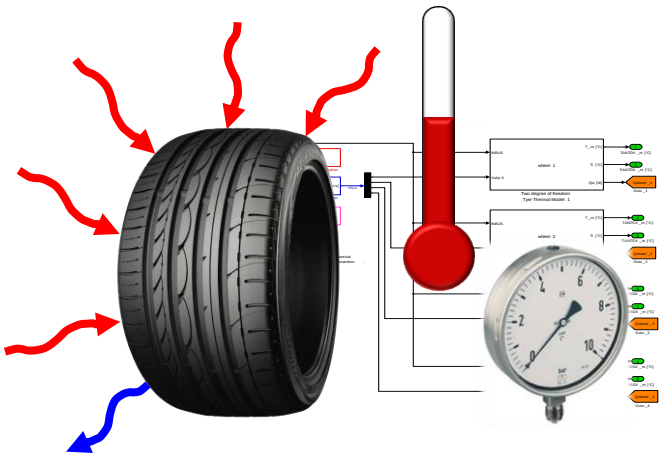
TTyre Plus™

SOFTWARE FOR VEHICLE TYRES TEMPERATURE AND PRESSURE SENSORLESS MONITORING



OVERVIEW

TTyre Plus™ is a suite of software modules that aims at monitoring the tyres status of a vehicle without installation of dedicated and of limited reliability sensors.
The suite is based on the successful sensorless tyre temperature estimation product ***TTyre***, enhanced with sensorless estimation of the tyres pressure, based on wheels pressure reading at the occasional checks.
The installation of ***TTyre Plus***™ on the vehicle (e.g. in the dashboard microcontroller) allows:

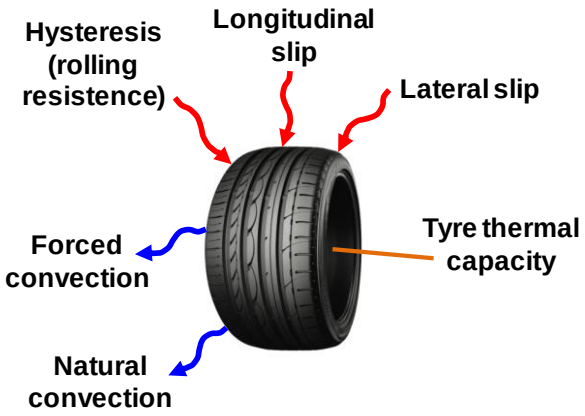
- safety improvement;
- reduction of tyres wear;
- reduction of fuel consumption;
- tyres performance monitoring and improvement (e.g for high performance cars).

Key features of the ***TTyre Plus***™ technology are:

- sensorless based (installation of dedicated sensors is not needed);
- based only on dynamic signals of the vehicle (accessible from the CAN network);
- flexible and easily adaptable to different types of vehicles (trucks, buses, commercial cars, sport cars);
- developed in MATLAB®/Simulink®[1] 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).

TYRE TEMPERATURE ESTIMATION

TTyre estimates the tyres tread and internal temperatures.
The algorithm is based on the modeling of the heating up by hysteresis and friction and the consequent thermal exchange phenomena involving the tyres during the operation of the vehicle.



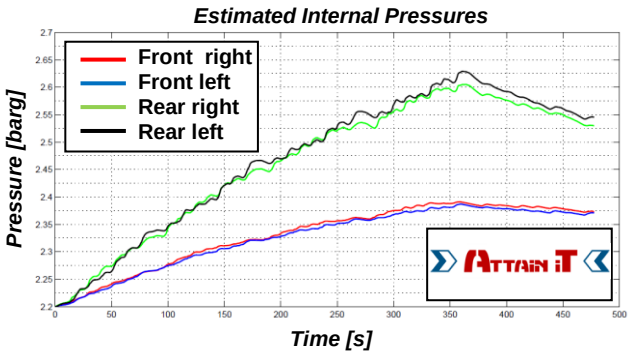
The model takes as input the vehicle dynamic signals (e.g. accelerations, vehicle speed, etc.) and returns as output the tyres internal and tread temperatures based on energy balances.

[1] MATLAB® and Simulink® are products made by Mathworks Inc. (Natick, MA)

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

TYRE PRESSURE ESTIMATION

TTyre Plus^{TM} is enhanced by an additional module capable of estimating the tyre pressure too from further thermodynamic calculation taking into account the starting inflation pressure of tyres, their thermal status and the properties of the inflating gas.

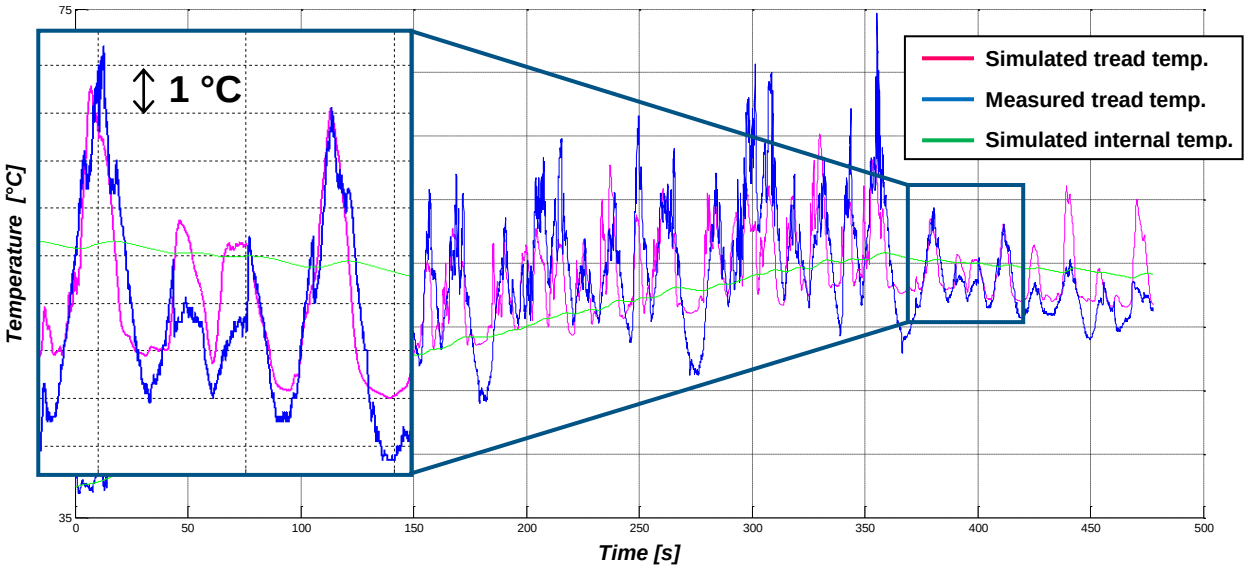


MODELS OPTIMIZATION AND TESTING

Since all the models are developed in MATLAB®/Simulink® environment, the model can be deployed not only for the specific end platform, but also as Simulink® S-function module in order to perform:

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

Attain IT provides a specific service of tuning and optimization to find one or more sets of values for the tunable parameters of the models, corresponding to different car sets, tyres or driving conditions.



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