Engine optimisation and combustion control

Challenges and solutions:

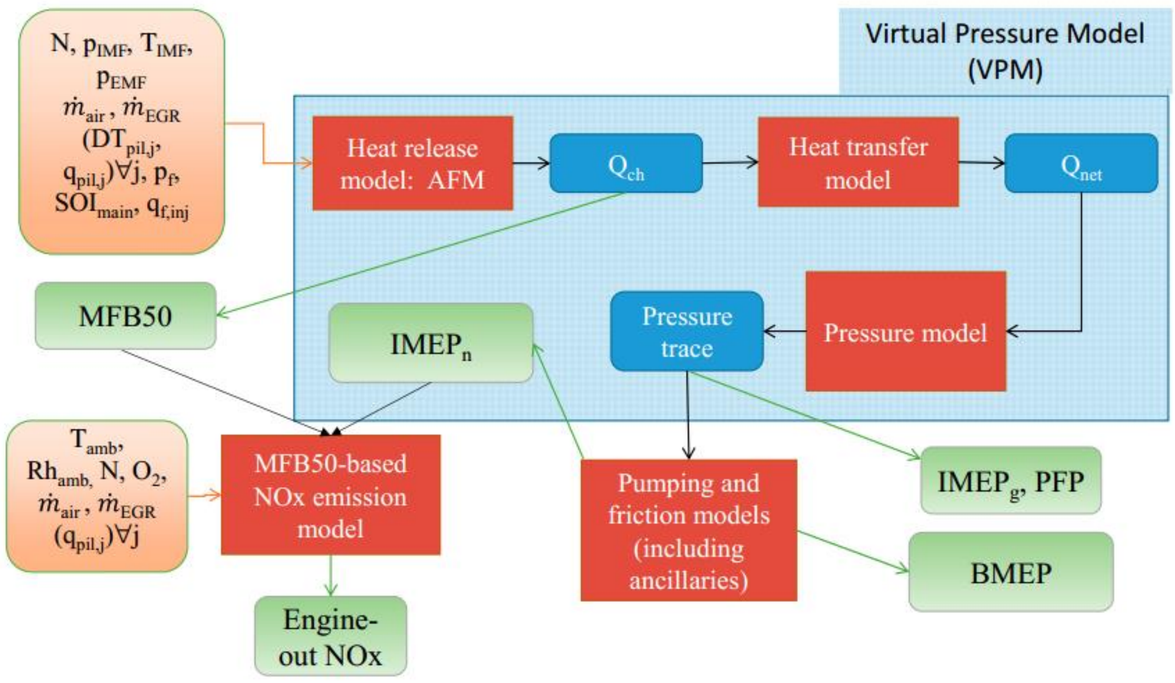
Fuel economy is a key aspect to reduce operating costs and improve efficiency of freight traffic, thus increasing truck competitiveness. Engine optimisation measures are covering a wide range of solutions. They can increase combustion efficiency reduce friction and improve gas exchange losses. Furthermore variable displacement or variable speed pumps can help to improve the overall truck fuel consumption, by tailoring their power absorption depending on engine operating conditions. Within the future scenario of having availability of Energy Management Supervisory Controllers and based on predictive information, emissions and fuel consumption can be optimized through the integration of a combustion controller. The controller can guarantee the right level of NOx emissions, at the lowest fuel cost, by dynamically changing engine calibration parameters.

IMPERIUM's contributions:

The functionality of the combustion optimizer has been positively verified. With reference to the vehicle tests on road, during the 2nd run the combustion controller has been used to keep the NOx engine out at a target given by the Energy Management Supervisor. The target is defined by ATS conditions. In general, the accuracy of the combustion optimizer with reference to the NOx control is good.

Impact / what's next:

At the end of the IMPERIUM project, a TRL 5 (system prototype demonstration in operational environment) was achieved. Some of the engine technologies are showing good results and could be considered for the next developments.



Finesso, R., Hardy, G., Mancarella, A., Marello, O., Mittica, A:, Spessa, E. "Real-Time Simulation of Torque and Nitrogen Oxide Emissions in an 11.0 L Heavy-Duty Diesel Engine for Model-Based Combustion Control" . Energies 12:460, 2019. Doi: doi.org/ 10.3390/en12030460

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