

# Model-predictive air system control with MPC

## Challenges and solutions:

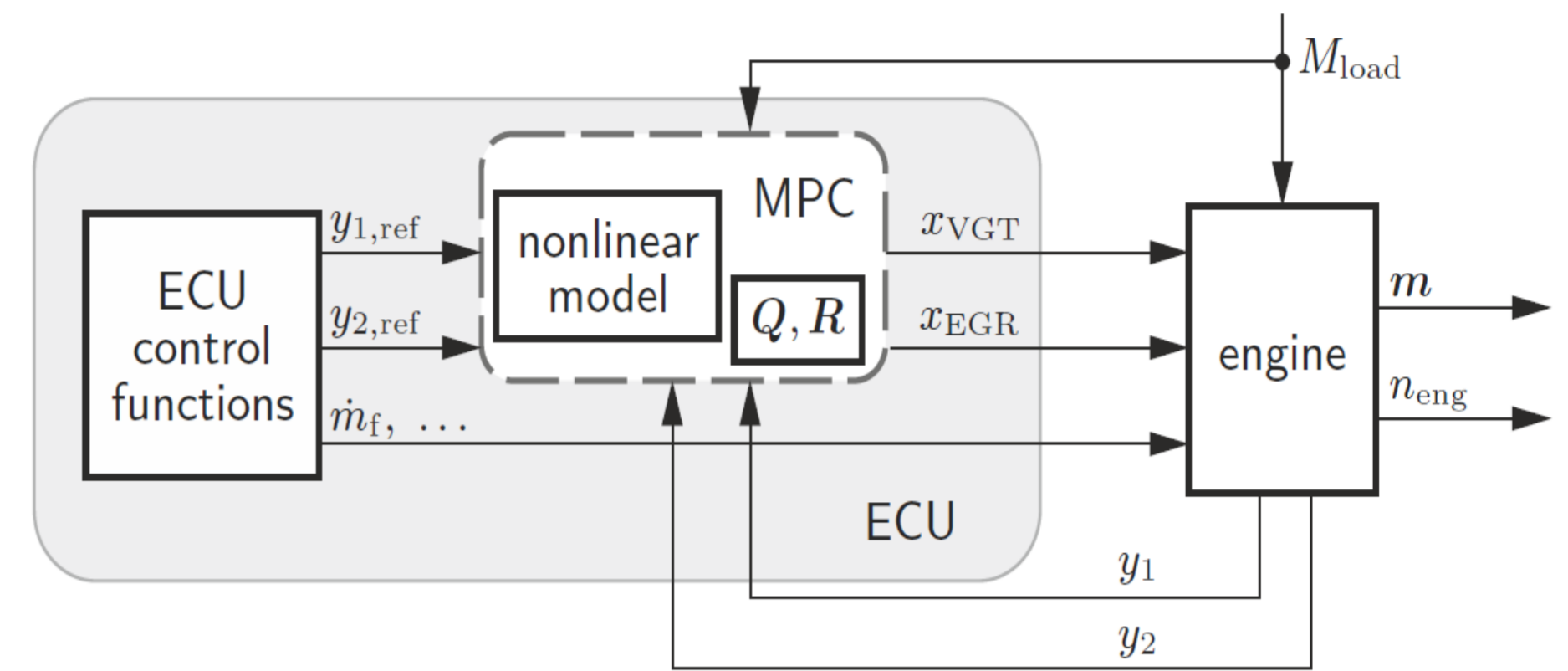
The challenge is to have a new calibration ready in order to be able to perform testing in transient conditions of new hardware including emission testing. The solution is to use so-called “model predictive control” as applied in many chemical plants. These solutions could not be applied to engine control directly and therefore were developed in this project in order to be able to see the benefit in the air path control

## IMPERIUM’s contributions:

Within the IMPERIUM project the concept of one **global model-predictive air system control with feedforward control** (feedback linearization) was developed. The idea is using local “inverse” models as feedforward control components, the overall system is transformed into a standard form. Advantages are that only one MPC required (less evaluation/calculation effort in comparison to Parallel MPC) and no observers are required. The algorithm for the different methods was implemented in Matlab/Simulink and validated by connecting the control algorithm with the plant model (CruiseM Model). After successful pre-validation on MiL test environment, the **MPC Controller was validated on engine testbed at DAF Eindhoven.**

## Impact / what’s next:

The control strategy is available as a SW IP at AVL for engineering projects. The approach was applied for patent at Austrian patent authority and is currently in proofing process. The technology developed is applicable to general control problems and will be used also for other transport sectors and other systems e.g. thermal management or exhaust aftertreatment control. The decision regarding migration toward SOP projects and further industrialization toward TRL 9 is ongoing at DAF.



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