Modeling Vehicle Drivability with Modelica and the Vehicle Dynamics Library

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This paper highlights the use of multi-domain physical models for simulation of vehicle drivability applications. The models are implemented using the Vehicle Dynamics Library and Engine Dynamics Library from Modelon. The application examples include vehicle launch, vehicle start-stop, and transmission shift events. The examples are structured to illustrate how increasingly sophisticated models provide additional model fidelity or increase the drivability phenomena observed. The applications also include different modeling approaches for the engine with both a conventional automatic and dual clutch transmission.
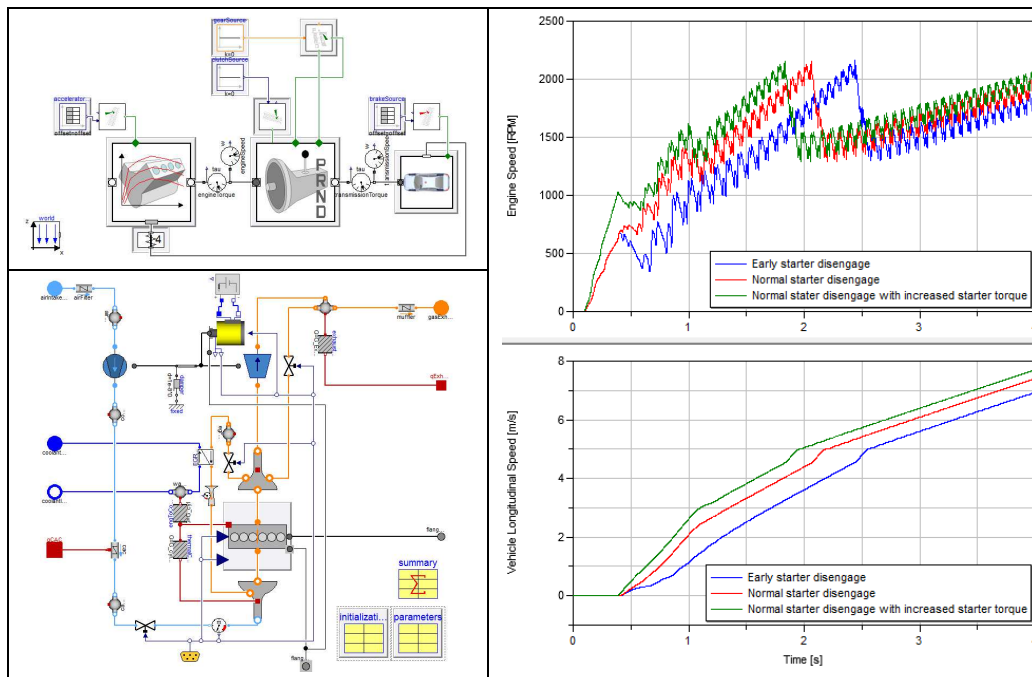
Figure 1. Launch model for drivability applications (upper left), start-stop launch results (right), and engine model from Engine Dynamics Library (bottom left)

References

[1] Andreasson, J., "The Vehicle Dynamics Library: New Concepts and New Fields of Application", *Proceedings of 8th International Modelica Conference*, 2011.

[2] Andersson, D., and Dahl, J., 2012, "Gas Exchange and Exhaust Condition Modeling of a Diesel Engine using the Engine Dynamics Library", *Proceedings of 9th International Modelica Conference*, 2012.