

DyMoRail: A Modelica Library for modelling railway buffers

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This paper gives an overview of the DyMoRail library. The aim of this Modelica library is the simulation of longitudinal dynamics of entire railway trains. In our presentation, we will illustrate the functionality of the DyMoRail library, shown in Figure 1, by the example of Flirt multiple units.

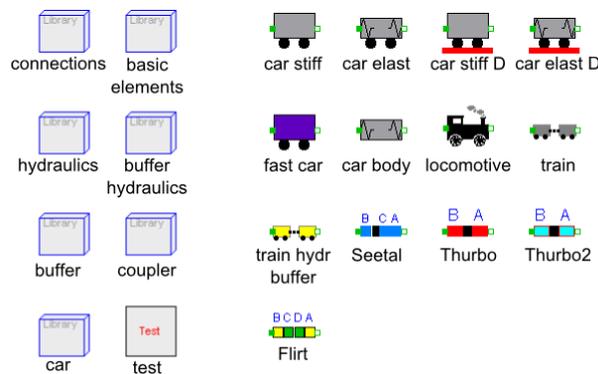


Figure 1: DyMoRail library structure

Buffers and couplers are an essential part of the railway wagon. They have to be optimized for new wagon types to work for different train compositions. They have to absorb minor impacts, take up slack between locomotive and wagons and bear the load of preceding wagons when pushing. Years ago it was good enough for couplers and buffers to fulfil UIC (International Union of Railways) standards. But nowadays manufacturers only survive in this competitive market if they are able to offer optimized solutions regarding force, energy absorption, and driving comfort. Modelling plays an important role in this optimization process. One of the main requirements to this rail model are that it should allow easy substitution of components and handling of different combinations of subsystem parts.

DyMoRail allows to model longitudinal of complete train compositions in various configurations. The library contains a number of different car models, buffers, couplers equipped with both friction and elastomer springs, as well as the center-buffers for multiple units (such as Seetalbahn, Thurbo, Flirt). Furthermore we are able to simulate the entire motion cycle during a collision (retraction of the buffer, force increase with stroke of the buffer, extension of the buffer, and finally the separation of the wagons).

References

- [1] Maurer W. Puffer nach Mass. Eisenbahn Revue 3, 2003, p.118-119.
- [2] Maurer W. Simulationsgestützte Entwicklung von Puffern und Dämpfern für Eisenbahnzüge. Proceedings of the 18th Symposium on Simulationstechnique ASIM 2005, Erlangen, Germany, ASIM September 12-15 2005.