

Impressions of the New SIMPACK Rail

SIMPACK Rail, previously known as SIMPACK Wheel/Rail, has always been one of INTEC's core products and was the main reason for SIMPACK's initial commercial success.

Ever since its original development in 1996, SIMPACK Rail has been in continuous use. The leading railway manufacturers, rail operators, engineering firms as well as component suppliers throughout Europe and across the entire globe have been working with SIMPACK Rail, and it has been instrumental in the development of countless railed vehicles.

As with all older railway vehicles, the time eventually comes for a complete overhaul. A complete redesign was therefore necessary to meet the ever increasing customer demands. The modular structure has also been kept which has allowed the new functionality to be intergrated seamlessly into the new interface.

A BRAND NEW CONCEPT

The foundation of the new SIMPACK Rail is a new modelling element, the 'Rail-Wheel Pair'. This element holds all the parameters for the geometry and contact between the wheel and the rail. All of the parameters are entered within this element, for example the wheel and rail profiles and the friction values.

The calculations are carried out using specialised profile reference Markers and contact Force Elements. The outputs in the PostProcessor are, for the first time in SIMPACK, available as specialised, scalable Result Elements. The parameters for all of these elements are entered in the Rail-Wheel Pair; the centrepiece of the new SIMPACK Rail (fig. 1).

SO WHAT IS NEW?

A number of important improvements have been achieved due to that many of the user requirements were considered right from the planning stages:

- Unlimited number of wheel and rail contact points,
- No differentiation between single or multi-point contact,
- No difference in the approaches used for the tread, wheel flange or back of wheel,
- Equivalent-elliptical or non-elliptical contact patches,
- Vertical profile sections with indentations,
- No restrictions to the kinematic tree, simplifying the set-up of independent wheels or resilient wheels,
- Contact on the side und underside of the rail (roller coasters, fig. 2),
- All data, even the contact method switches, can be parameterised using Substitution Variables,
- No restrictions to the Substructures,
- More contact related PostProcessor outputs (fig. 3),
- Simple and logical to use.

Many tried and tested features from the original SIMPACK Rail are, of course, still available.

For example, the different friction laws (including User Routines) and the quasi-elastic contact point calculation for elliptical contact surfaces can still be found in the new SIMPACK Rail.

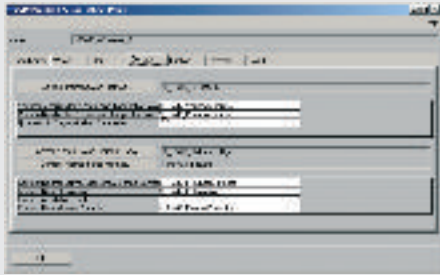


Fig. 1: Rail-Wheel Pair Editor in the Model Setup with Parameterised Entries

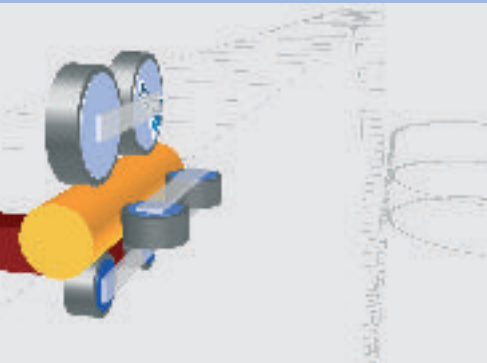


Fig. 2: Roller Coaster Model with Wheels on the Side and on the Underside of the Rail

EXPERIENCED PARTNER

The contact between wheel and rail is one of the most difficult problems to solve for multi-body software and is due to the complicated contact geometry, the high contact stiffness and the extreme discontinuities that occur. The non-elliptical contact approach is therefore being implemented together with ArgeCare, who have experience covering decades in wheel rail contact mechanics.

The ArgeCare contact model is well known to railed vehicle engineers, and especially to those who have worked with the railway dynamics software Medyna.

The model was proven to be compatible with SIMPACK's formalism and solvers in a test project and will be available as an integral part of SIMPACK Rail.

AVAILABILITY

The new SIMPACK Rail is available as a functional beta version with SIMPACK version 8.804. The beta version, with reduced functionality, is available for users who would like to try it out.

The development is, however, still ongoing and has been given the highest priority.

You can already start looking forward to what will be shown at the next [User Meeting](#) in Bonn.

(You will find more information regarding the upcoming User Meeting on page 11!)

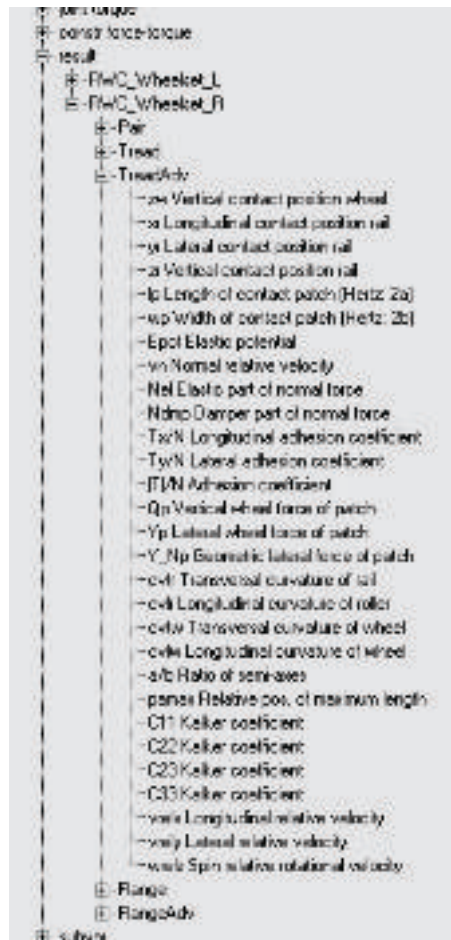


Fig. 3: A Selection of the Available Contact Results

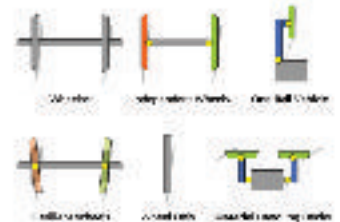


Fig. 4: Many Different Configurations can be Easily Modelled