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What’s new in UM 9

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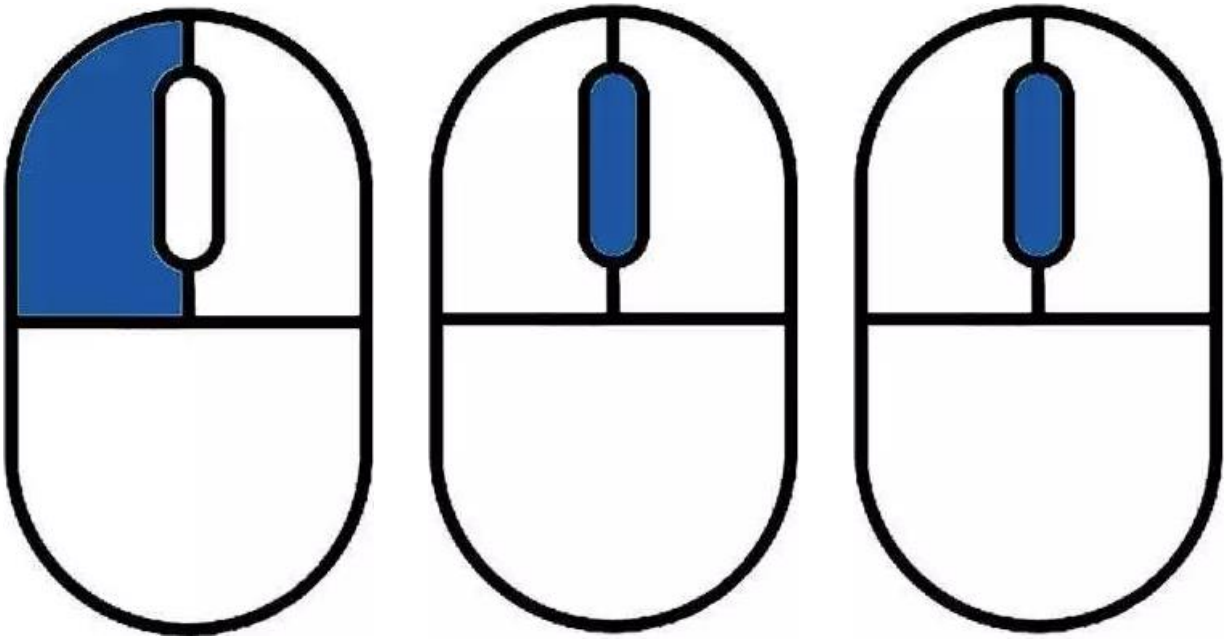
UM Base

- UM 9 includes the new graphical engine in **UM Simulation** program as a basic one. The new graphical engine is based on the Ogre library, https://www.ogre3d.org.
  - New graphical engine provides 5-100 times higher frame rate
  - It effectively supports all modern video cards including ATI Radeon
  - New graphical engine uses new navigation. The only mouse is enough for all basic operations (pan, rotate, zoom). Rotation and zoom use the idea of so-called 'instant rotation center'. The rotation center is the point under the mouse at the beginning of the pan, rotation, or zoom in/out operation. It makes easier the work with lengthy objects.

Pan
Use the left mouse button to pan

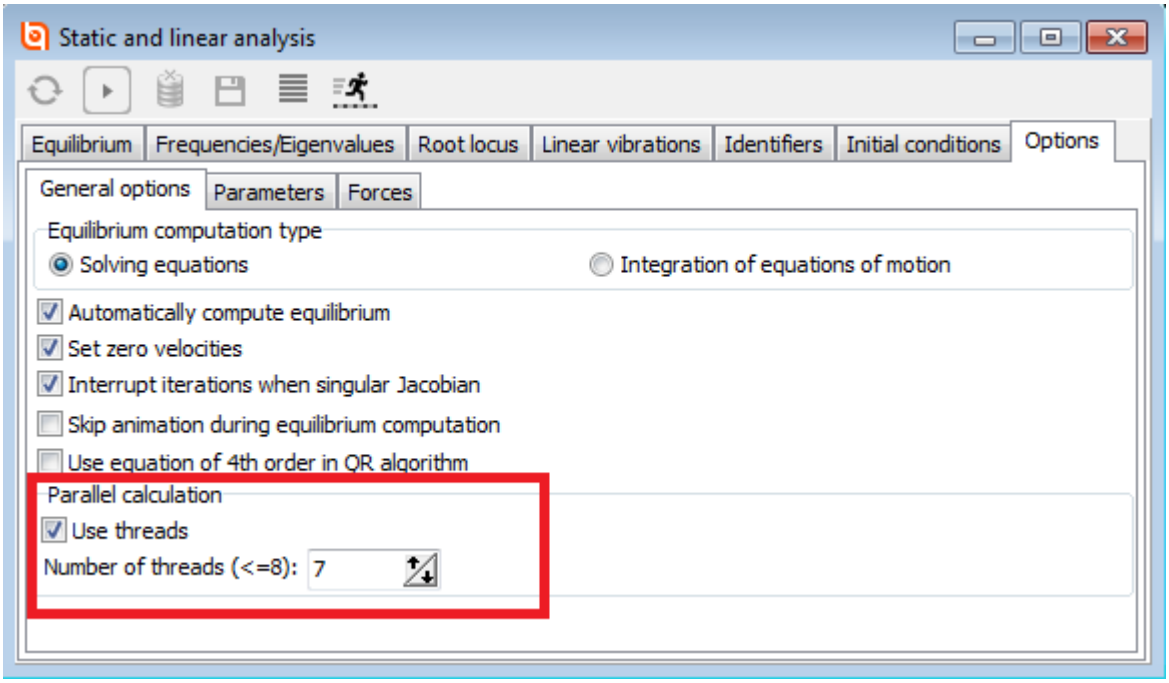
Rotate
Click and hold the mouse wheel and move the mouse

Zoom
Rotate the mouse wheel to zoom in/out the model in a window



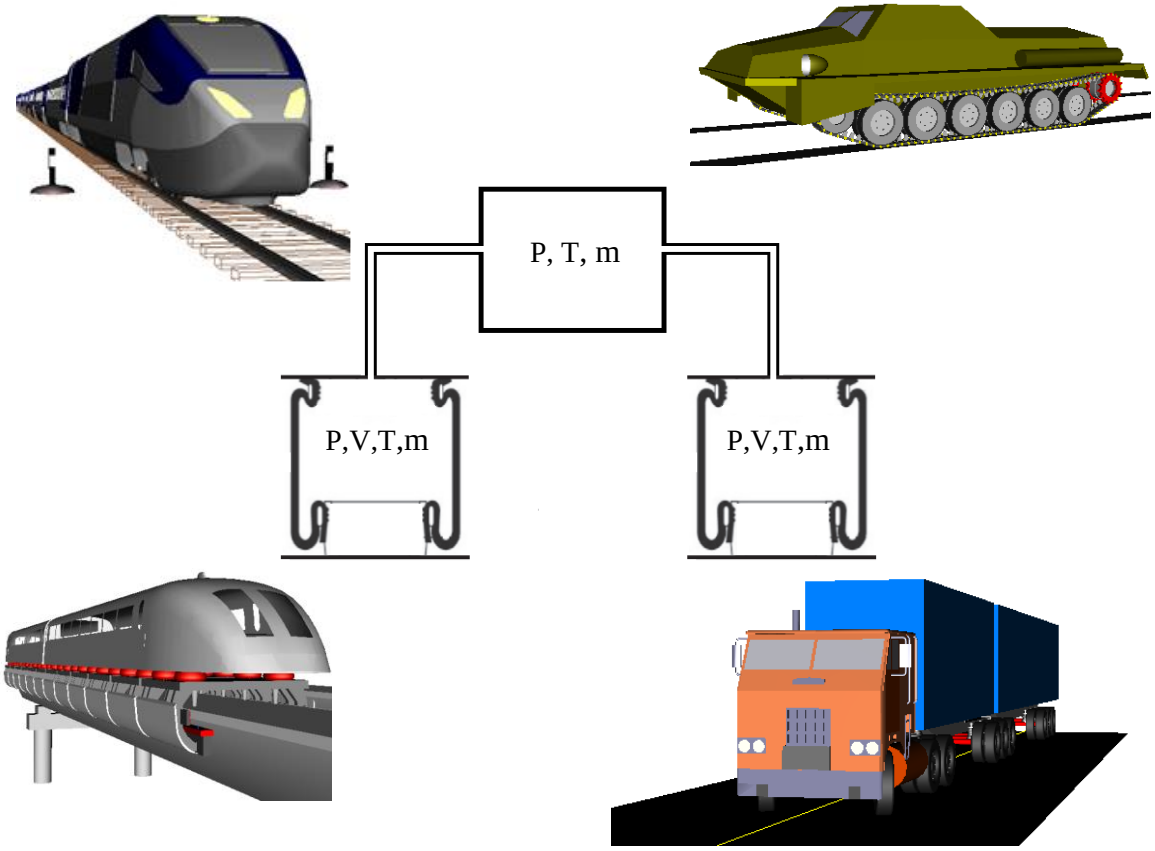
  - Accurate detection of 3D coordinates under the mouse cursor
  - Video recording works correctly even if the recorded window is overlapped by any other windows
  - Transparent objects are now supported
  - List of cameras is introduced
  - Image modes (wired, solid, transparent, invisible) are now available for all model elements, not for bodies only

- Linear and static analysis



✓ Parallel computations on multicore processors for evaluation of natural frequencies are available.

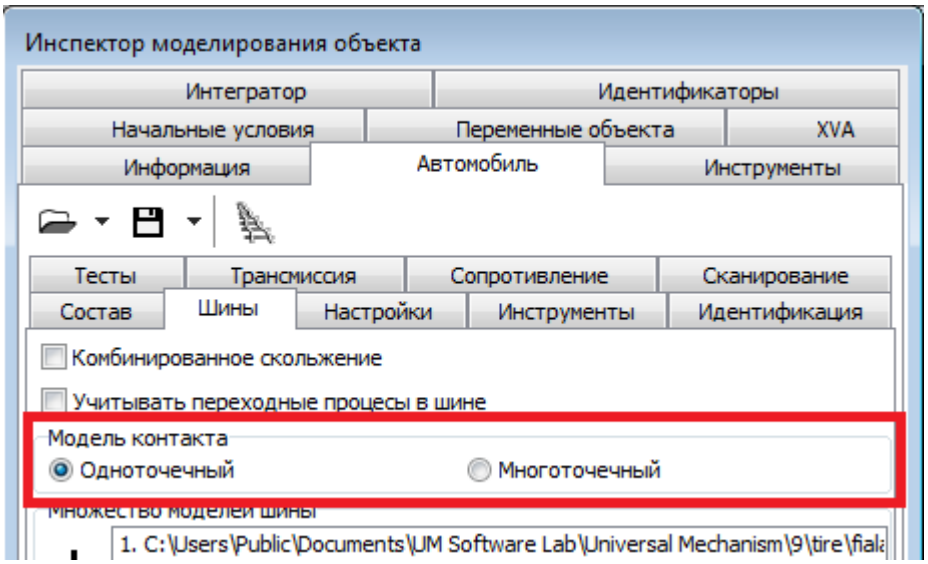
UM Pneumatic systems

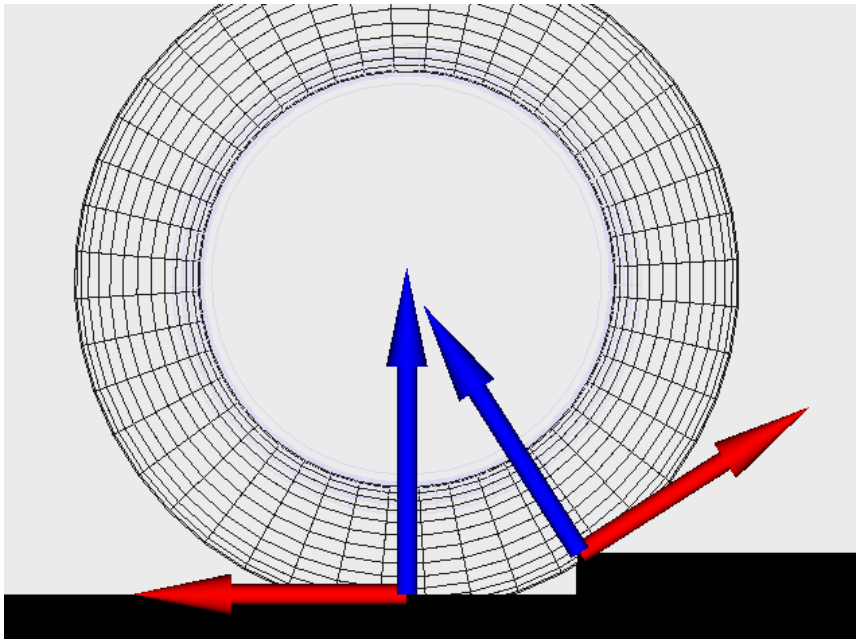


A new specialized module **UM Pneumatic Systems** was developed in UM 9. The module contains tools for simulation of models with pneumatic elements in suspension. The following elements are available in the module:

- ✓ Air springs,
- ✓ Rigid chambers,
- ✓ Pneumatic lines,
- ✓ Orifices.

UM Automotive
UM Monorail train



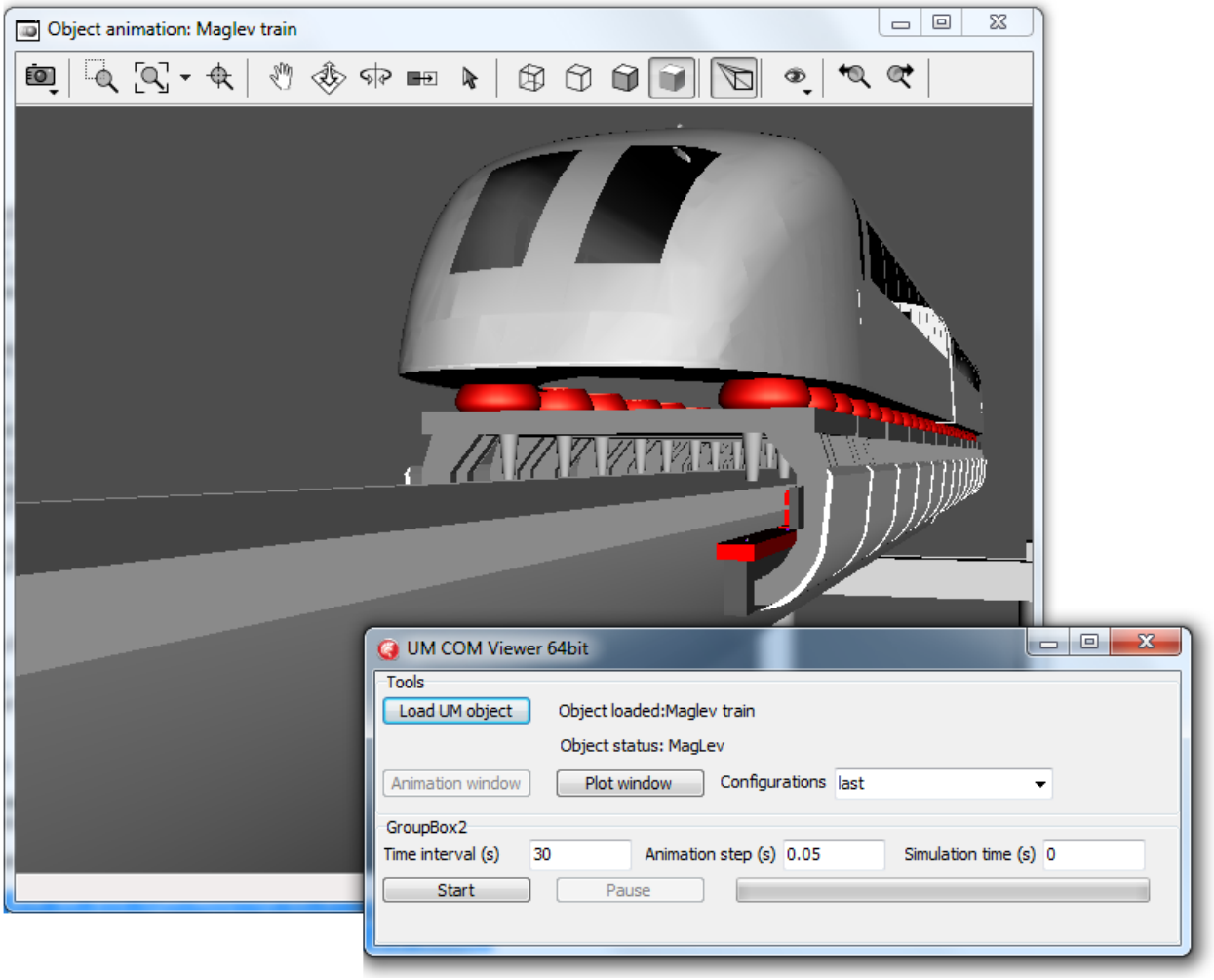


A multipoint tire-road contact was added. This type of contact model is applied when the road has special deviations like obstacles, potholes or something like that. In such cases the tire contact patch may consist of two or more separate sections.

UM COM Solver

- New versions of 32bit (UMComSolver.dll) and 64 bit (UMComSolver64.dll) of COM solver were developed.

  Now the solver supports monorail and maglev trains, flexible bodies and vehicle-bridge interactions.



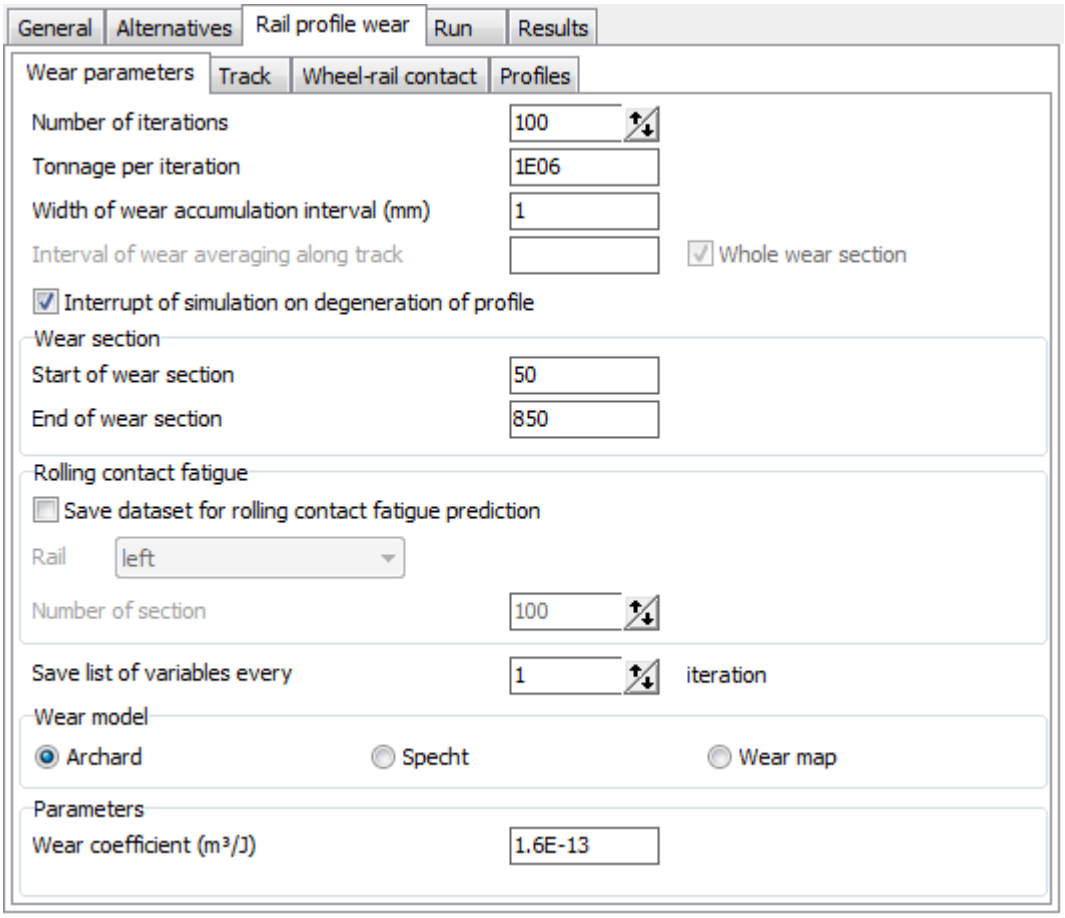
- Examples of use the UM COM solver in the form of viewers of UM models are added (located in \bin directory on UM9 installation path):
  - ✓ UMComViewerDelphi.exe - 32bit viewer
  - ✓ UMComViewerDelphi64.exe - 64bit viewer

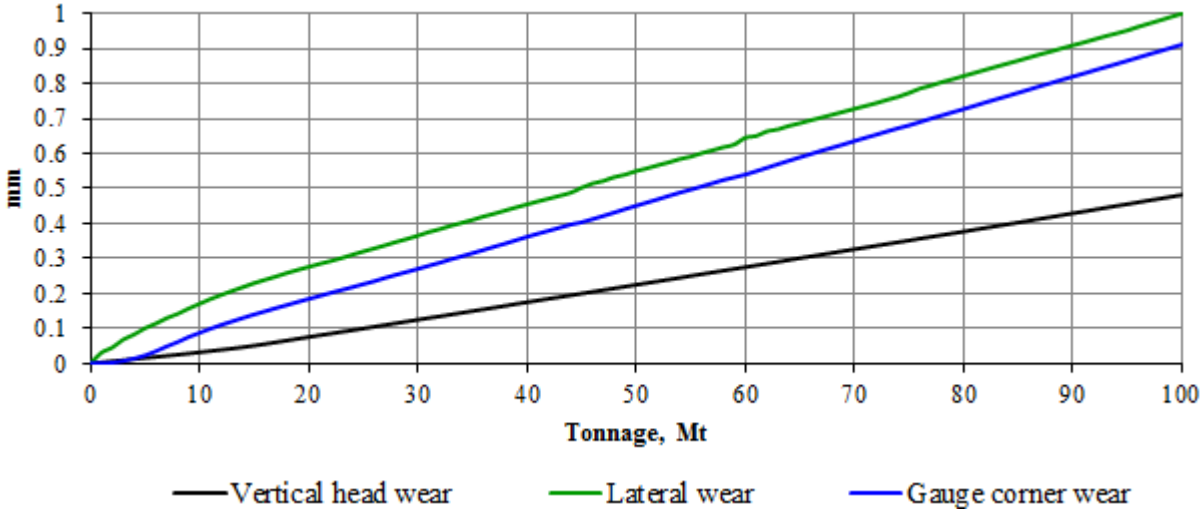
Source code of the viewer is available to the users in the directory

C:\Users\Public\Documents\UM Software Lab\Universal Mechanism\9\SAMPLES\Source\UM COM Viewer Delphi XE8\

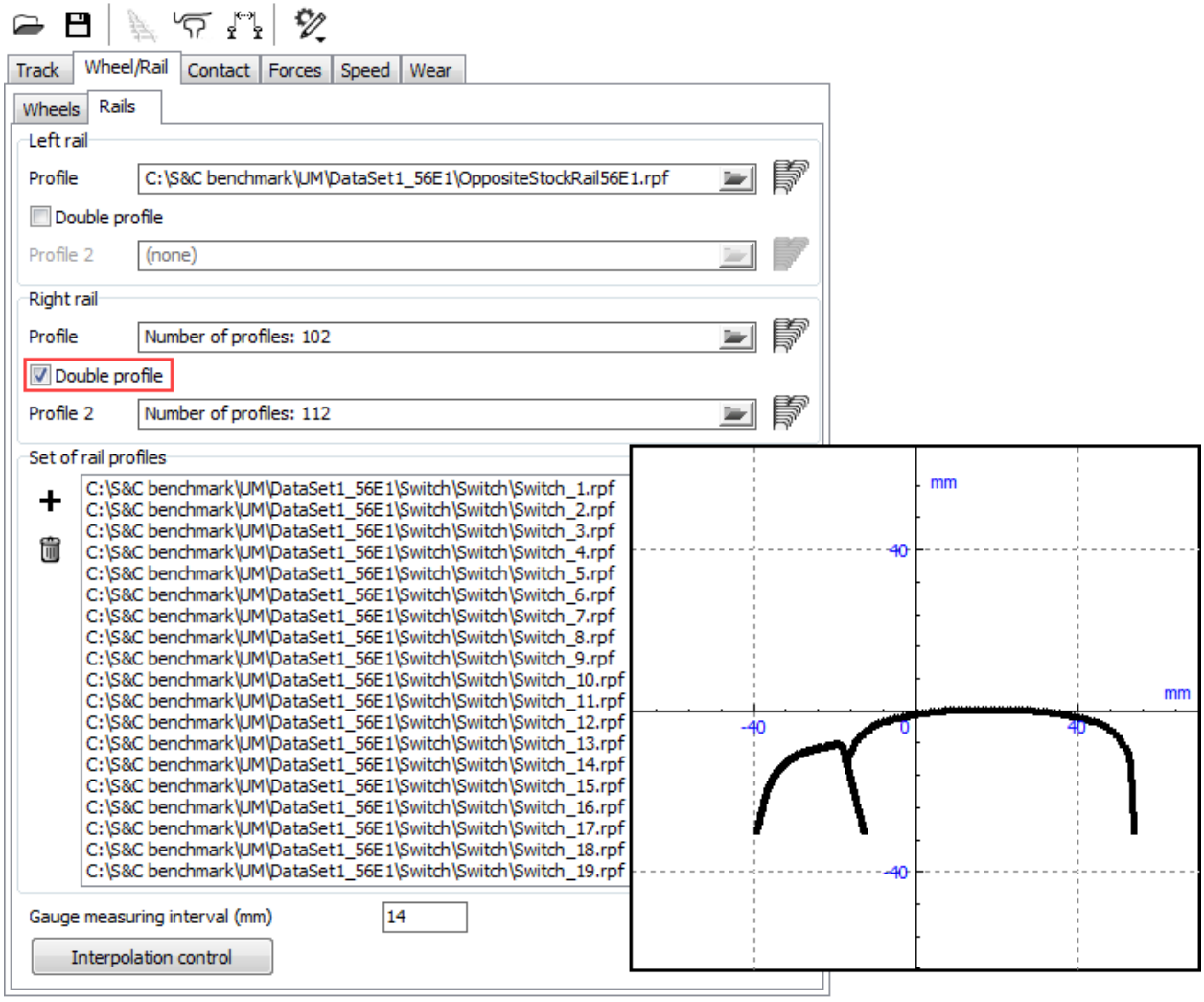
UM Loco/Rail Profile Wear Evolution

The completely new **UM Loco / Rail Profile Wear Evolution** tool is released in UM 9. This tool is aimed at predicting wear of railway rail profiles.





UM Loco

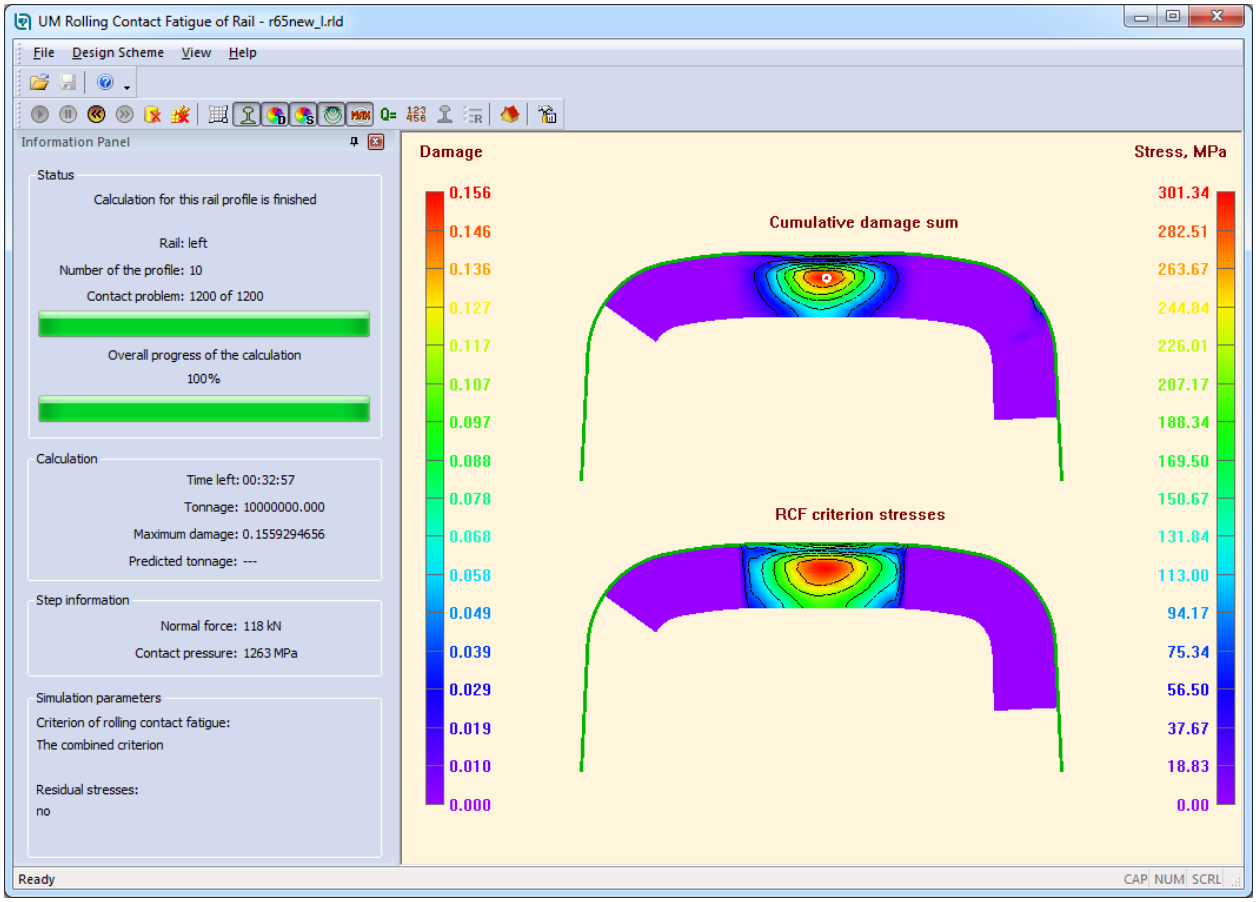


A double rail model is implemented. The double rail model is used for the improved modeling switch rail, check rail etc.

UM RCF Rail

The completely new module for modelling of the processes of accumulation of the rolling contact fatigue damage in rails is released in UM 9. Module **UM RCF Rail** allows the user:

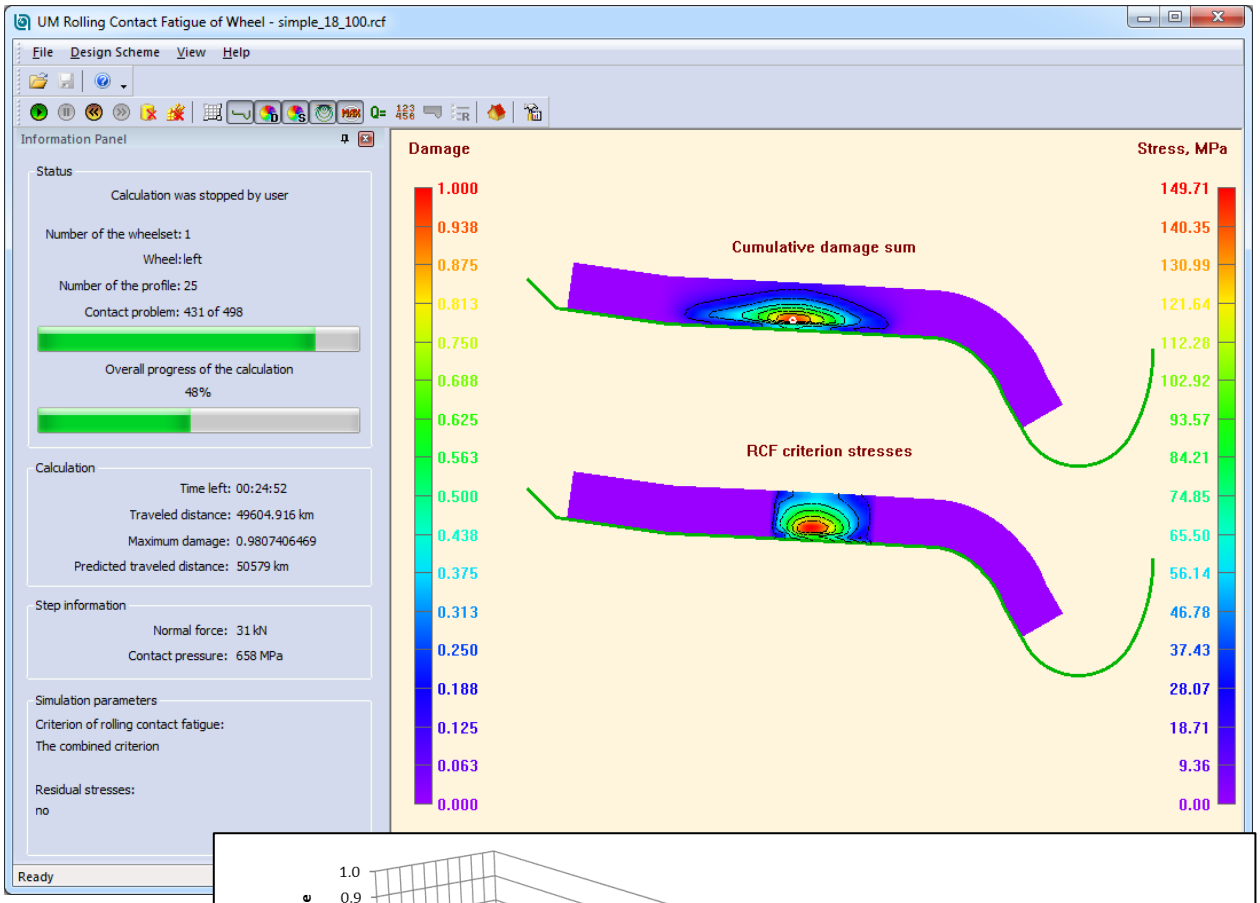
- to define the velocity of the accumulation of RCF damage in rails with the different tread surfaces by using the data which are obtained by simulation of the railway vehicle dynamics by means of the **UM Loco**;
- to use the four RCF criteria for modelling of the accumulation of RCF damage;
- to take into account rail profile wear-out effect on the rate of accumulation of RCF damage using the **UM Loco/Rail Profile Wear Evolution** tool;
- to take into account residual stresses effect on the rate of accumulation of RCF damage;
- to represent processes of the stress modelling and the damage accumulation in the rail with the help of graphic interface including isolines and coloring.

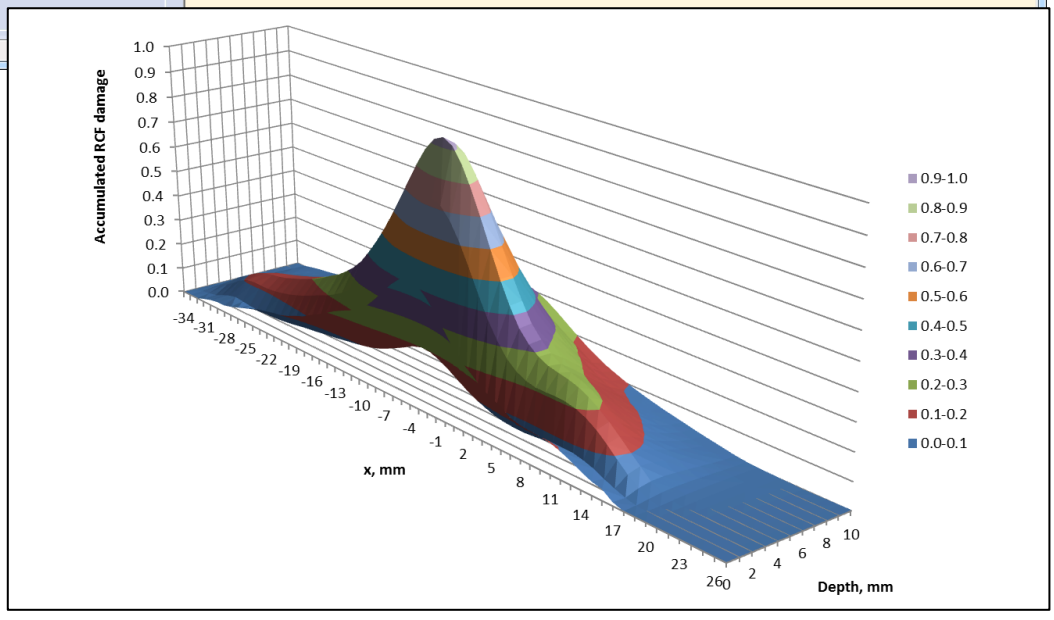


UM RCF Wheel

The module for modelling of the processes of accumulation of the rolling contact fatigue damage in railway wheels is renewed in UM 9:

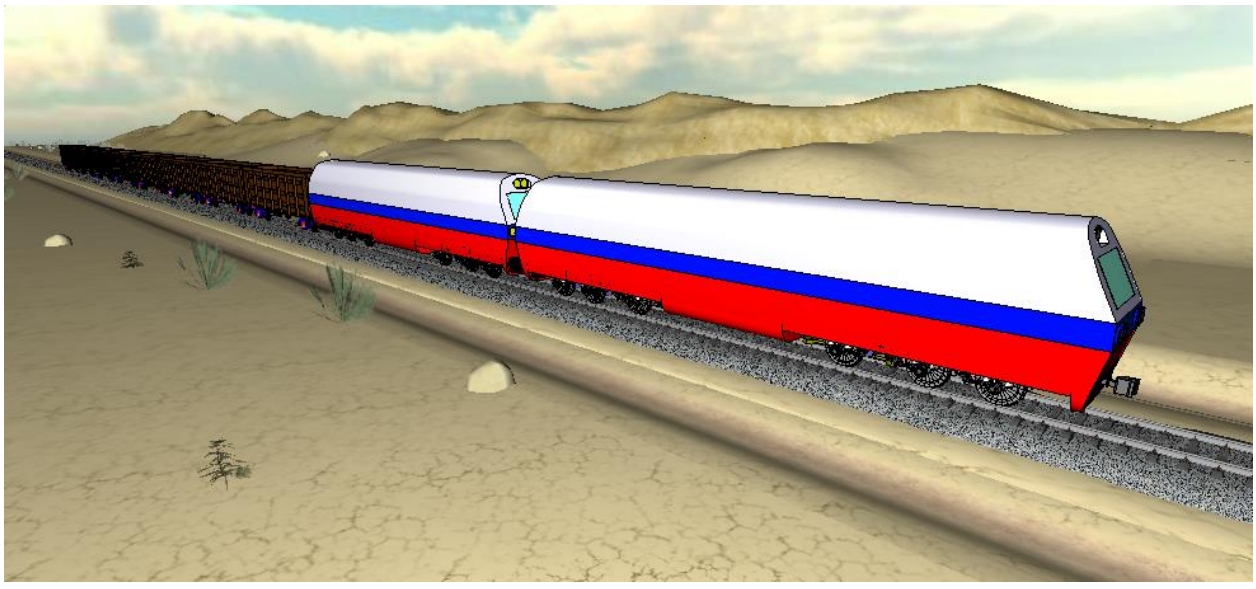
- export simulation results to Excel sheets is added;
- the algorithm of construction of FE model of the wheel fragment is enhanced;
- the interpretation of the lubrication coefficient is extended.





UM Scene

New UM Scene module is intended for creating a more realistic environment for UM models. UM Scene includes a collection of typical buildings, plants, street elements and cars. It might be useful for preparing the good-looking environment for road, railway and monorail vehicles.



UM Quick Track

The UM Quick Track module is aimed for advanced visualization of the railway track for single rail vehicles and trains. The advanced track is drawing automatically based on the giving track macrogeometry. UM Quick Track includes additional drawing of the concrete or timber sleepers and optional drawing of the ballast bed. This module does not affect dynamics of the system. It changes the visual representation of the railway track. The UM Quick Track may be used along with the UM Scene for the better cumulative effect.

Preparing the advanced railway track does not require lots of computer resources or time. The track is recreated one time on changing of macrogeometry parameters and it takes a few seconds for a typical railway track of 1-2 km length.