



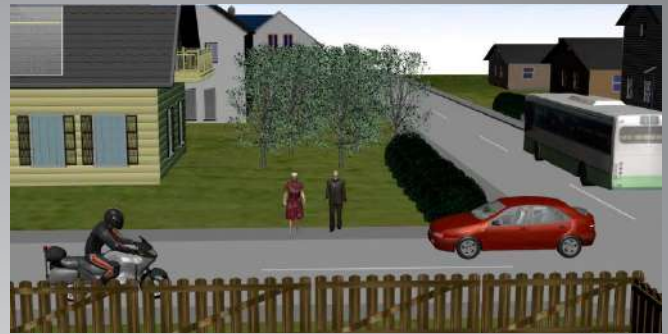
PC-Crash

Software for simulation
of vehicle accidents

PC-Crash enables the reconstruction and analysis of vehicle accidents and other incidents. More than 6000 installations of the software show that it has become one of the leading tools for traffic accident reconstruction. Our main users for research, education and reconstruction are accident reconstruction offices, police stations, insurance companies, automotive industry and universities. The included models are validated during the last 20 years by several publications and countless crash tests.

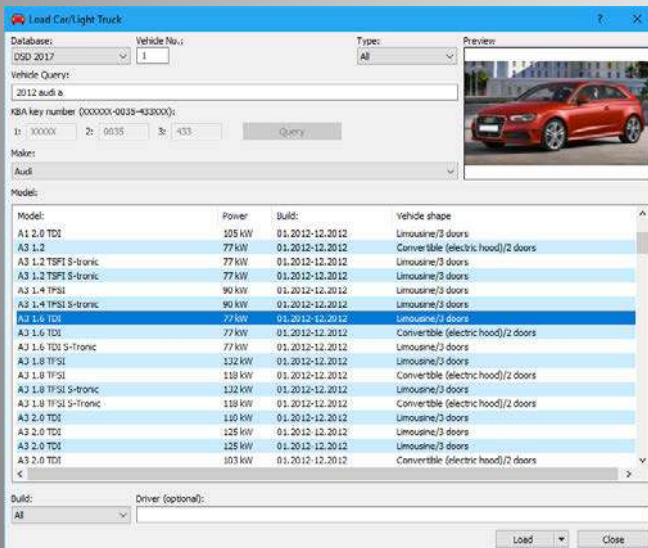
Collisions up to 32 vehicles can be simulated in 2D and also in 3D. Car to car accidents, car to motorcycle, car to pedestrian accidents, occupant movement and also roll over can be calculated.

Several databases of all common cars and motorcycles are included in PC-Crash, special vehicles can be created by the user easily.



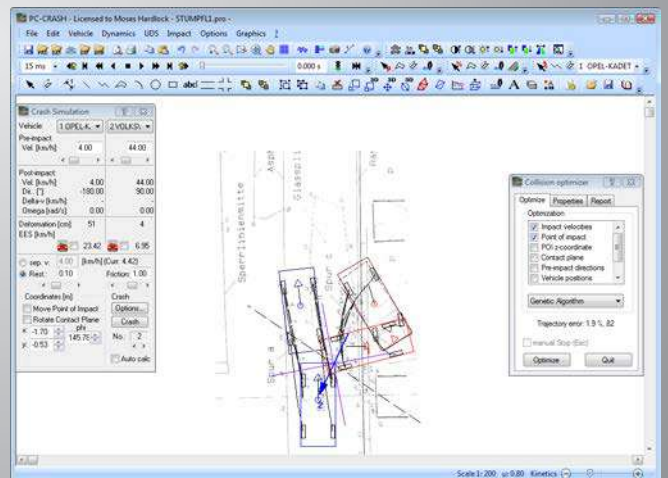
An online database including several hundreds of true to scale images of cars is available with the new version.

Impact

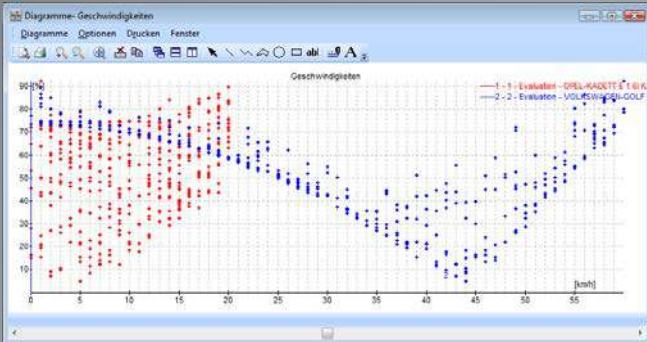


The integrated drawing program enables the user to design scene sketches, predefined road objects (2D and 3D) can be loaded.

With the 3D window the user can see the calculations simultaneously or by using the onscreen animation. The results can be rendered as animations and saved as AVI files. For a more realistic view, several 3D models are provided with the program.



- Calculation of multiple collisions between several cars
- 3-dimensional impact model (based on Kudlich-Slibar)
- Automatic calculation of post collision movement until the vehicle's rest position
- Collision-optimizer: Automatic calculation of impact parameters (pre-impact speeds and point of impact location) using final stop positions. Calculation of bandwidths for the input parameters of the simulation using the „Monte Carlo" optimization algorithm. Tolerances for each input parameter can be determined for a given accepted overall trajectory error.



Kinematics - Kinetics:

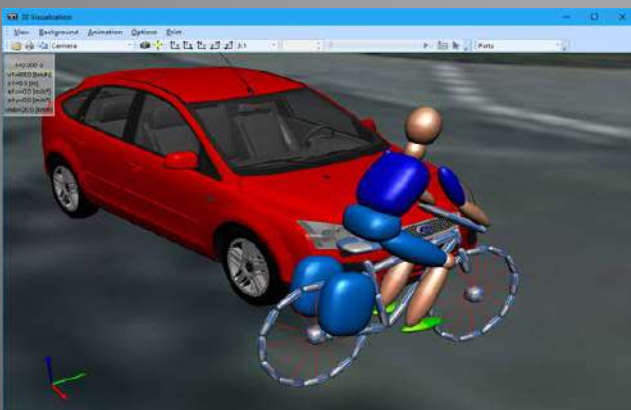
- Kinematic module:
For fast calculations of pre-impact, impact und post-impact movement, additional modules for velocity-distance-time calculations including avoidance, kinematic pedestrian calculation and overtaking calculations.
- The steering kinematics of buses and vehicles with trailer steering can be specified and are taken into account in the simulation.
- Calculation of distance/time relationship (different diagrams with measurement-capabilities).

- Impulse model
- Mesh model:
Mesh force/deflection characteristics can be specified and PC Crash determines contact forces and deformations.
- Automatic calculation of primary and secondary collisions using default parameters.
- Rollover model

Multibody Simulation

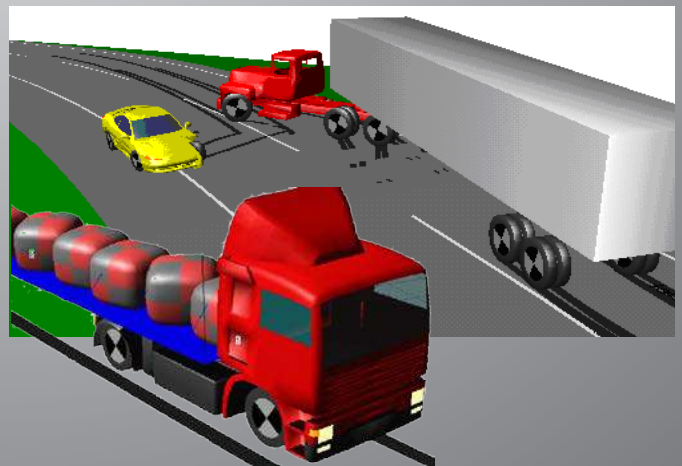
Preprocessor to define and configure multibody systems, the systems can be modified and positioned in a very flexible way.

- Calculation of occupant movements and loads with the PC-Crash multibody occupant and seat model (belted and unbelted). Interaction with the car interior is taken into account.
- Pedestrian model, the real vehicle shape is used in the calculation. Scaleable pedestrians by anthropometrical data.
- Bicycle and motorcycle models - by specification of joints and friction, fork deformation and spinning wheels can be simulated.
- Multibody systems can be loaded as vehicle surface for calculation of rollover and pedestrian contact.



Trailer Simulation

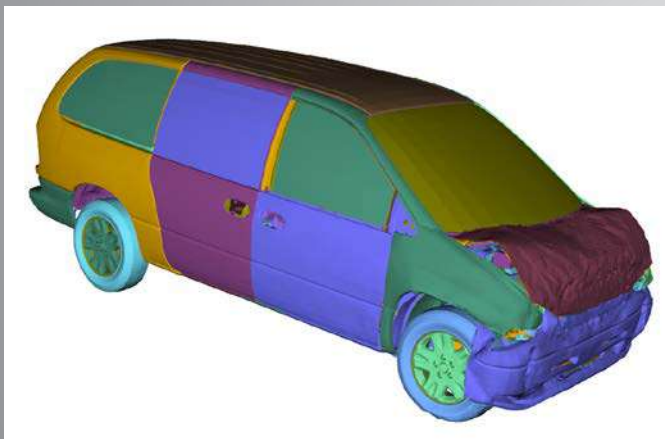
- Simulation and impact calculation of truck / trailer combinations (steered trailers, unsteered trailers and semi-trailers can be modeled) using one or multiple trailers.
- Securing load calculation - simulation of belt attachment



FE- Module

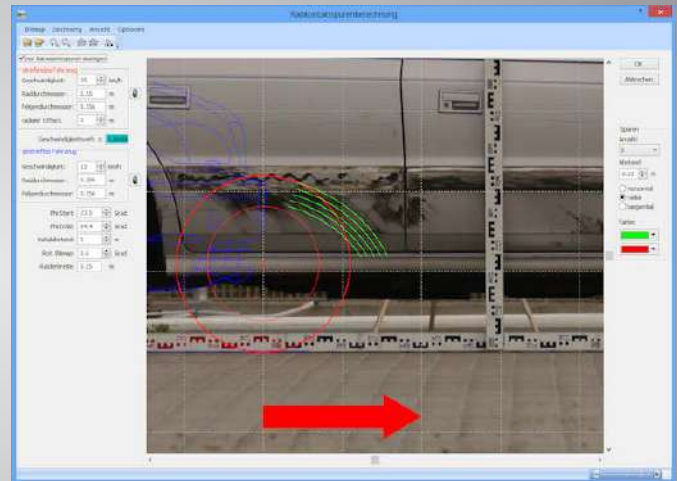
With the integrated FE-calculation module, collisions of vehicles against poles or guard rails can be calculated.

- Calculation of Shells, Solids, Rods with constraints and boundary conditions and different load conditions, contact handling and usage of different materials (elastic, elastoplastic, thermoelastoplastic).
- Import of Gmsh meshes.
- Multiprocessor support, batch processing is possible.
- Color coded visualization of displacements, stresses and strains.



Other Modules

- Crash III module for EBS calculations based on the vehicle damage and the NHTSA crash database.
- Tire contact calculation.
- Axle load calculation
- Import of digital tachograph data (DDD files can be imported)



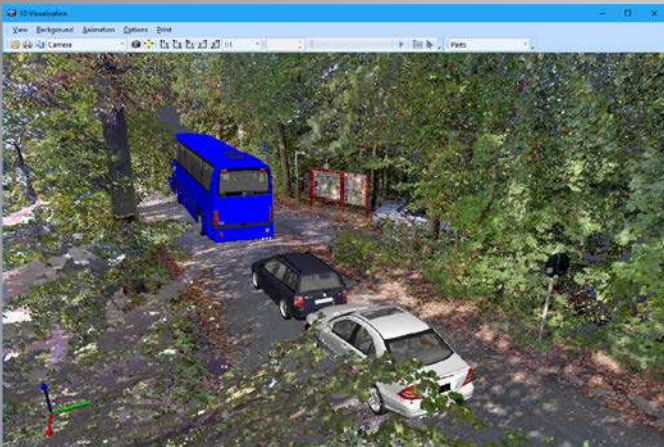
- Securing load calculation.
 - Limit method for calculation of pedestrian accidents.
 - Sideview window to determine contact locations and contact heights especially for serial collisions.
- The simulation results can be represented in 2D (plan view) and 3D animations, the resulting values are shown on diagrams and text output.



Drawing Program – Bitmaps – Point Clouds

An integrated drawing program enables the creation of accident sketches in 2D and 3D.

- Intersection, roundabout and roads are included.
- 3D road objects can be created easily.
- 3D drawings can be imported and exported.
- Laser scanner data (asc, xyzrgb, e57 format) can be read and edited (also triangulated).



- Real-time sightlines can be drawn in 2D and 3D view. It is possible to determine the point at which sightlines are unobstructed.
- Traffic lights with adaptive phase plans can be loaded, and displayed in the simulation.
- Multiple bitmaps can be loaded and merged in the 2D view. For png format, the transparency is supported.

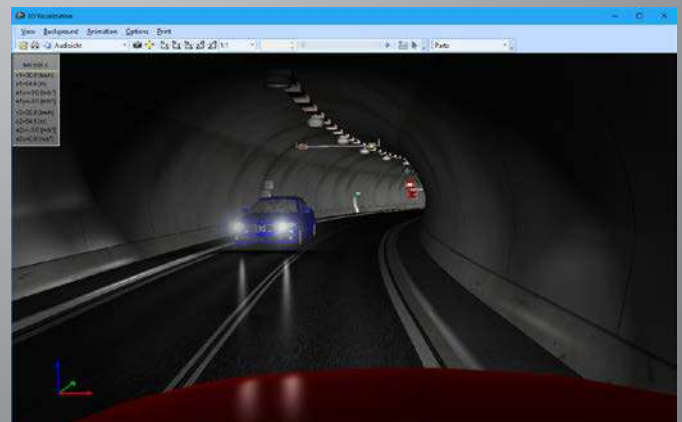
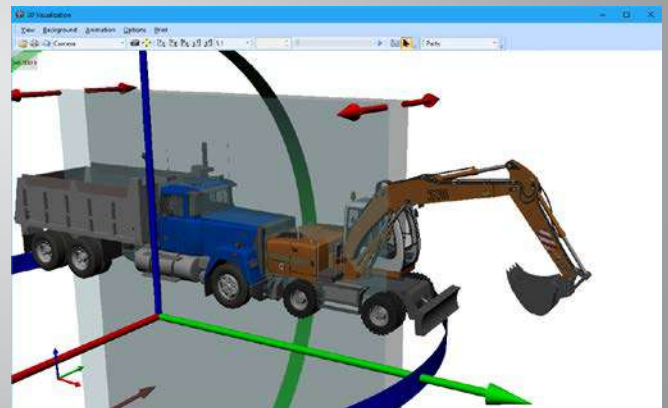
Diagrams - Values

- The calculation results are shown in diagrams with measurement capabilities or in the values window.
- Filter selection (CFC filters) for smoothing curves for time dependent graphs.
- Diagrams can be exported as DXF or as Excel data sheet.
- The text of the values window can be exported in rtf format.

3D View

In the 3D window, vehicles and drawing objects are displayed in perspective view, either during the calculation or as onscreen animation. The direction is determined by placing the camera. Bitmaps can be used as ground picture (also on slopes) and as background image.

- Easy positioning of fixed or variable cameras, the positions can be imported and exported.
- Automatic generation of video animations, which can also be saved as individual images.
- 3D vehicle models for a more realistic representation and animated objects (pedestrians, horse and rider, animals) are included.
- Via a clipping tool also view sections can be created.



- Shadows, light sources, also moving with vehicles and sun position can be displayed.
- Via a clipping tool also view sections can be created.

Expertise

In order to integrate the calculation results in a report, several options are available:

- Simulation protocols and simulation reports can be freely configured.
- A DDE interface to all office applications is available, which can be used to exchange data and results with PC-Crash. Calculation sheets can be designed in any office application and the data fields are filled by PC-Crash.
- Document templates for fast processing of standard accident situations.

Hard- and Software Requirements

PC-Crash is suitable for all Windows computers, running Microsoft Windows Vista/Windows 7/Windows 8, 10. PC-Crash will run with 32 bit and 64 bit versions of these operating systems. DirectX 10 graphics processor is necessary.

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