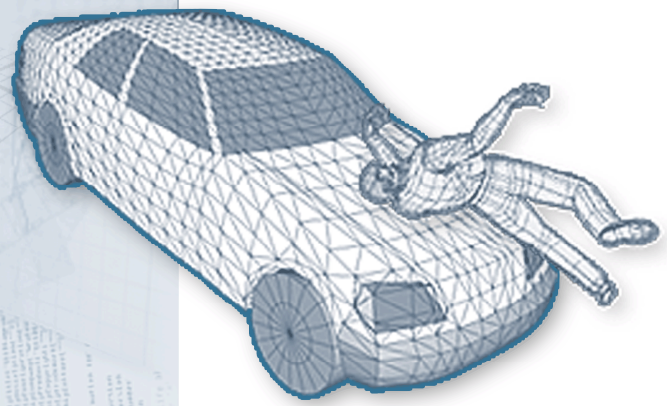
# Virtual CRASH

## User's Manual



www.vcrash.com

# Contents

## 1. Introduction

Virtual Crash is a new generation program for the simulation of vehicle accidents. It takes advantage of the latest hardware and software developments, which allows increasingly complex real-time calculations to be performed on a PC. For maximum versatility, Virtual Crash simulation results can be viewed and output in scale plan, 3D perspective view and in numerous diagrams and tables.

## 2. Hardware requirements

cpu: Pentium 1 GHz
ram: 128 MB (recommended: 256 MB)
video: DirectX 9 compatible VGA card, built-on 32 Mb memory

## 3. Operating system

Microsoft Windows 98
Microsoft Windows 98 Second Edition
Microsoft Windows Millennium Edition
Microsoft Windows NT 4
Microsoft Windows 2000
Microsoft Windows XP
Microsoft Windows Server 2003
Microsoft Windows Vista

## 4. Keyboard and Mouse


*Figure 1.*

Most of the functions of the software are available by using the mouse. The 1. Figure can be seen in the right upper corner of the screen while playing the illustrative software parts. It can be followed continuously step by step on this figure that which mouse or keyboard combination causes a defined function.

The speed of the replay can be slow down to get a better understanding of the steps.

## 5. Installation

The software can be installed in two different ways:

1. From CD:
   Having the install CD the install file can be start to run.

2. By the Internet:
   The latest version of the software can be downloaded from the website: www.vcrash.com

## 6. Hardware key

To use the software all the functions of the software it is necessary to have a hardware key. The hardware key fitted by USB to the computer needs a driver that is installed automatically when it is pushed in at a first time.

## 7. Starting the software

The software can be started after istallation by the icon that is put on the desktop or from the START menu.

Having started the software it is highly possible to get a message of suggestion to download updates (Figure 2.) if the computer is connected to the Internet. Choose „YES" to start the update of the database of the Virtual Crash. The update contains of datas of new makes and types and pictures of 3D visualization of the vehicles, objects, plants, animals and passangers.

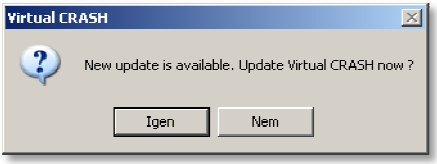



*Figure 2.*

During the time when the update is running an information window appears int he centre of the screen. In this the new data records and pictures can be seen For finishing and exit after the listing is ended the OK button must be pushed.

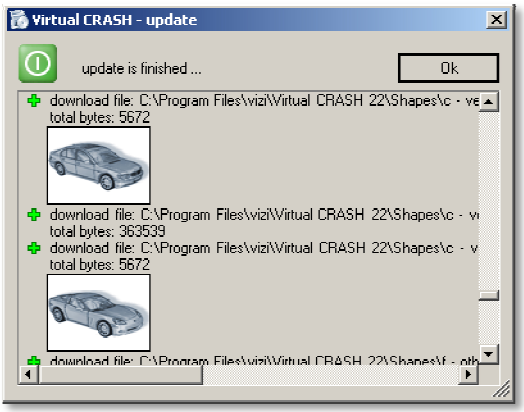



***Figure 3.***

The software must be restart after the update is finished. The last date of update can be red on the top in the header of the software under running (***Figure 4.***).

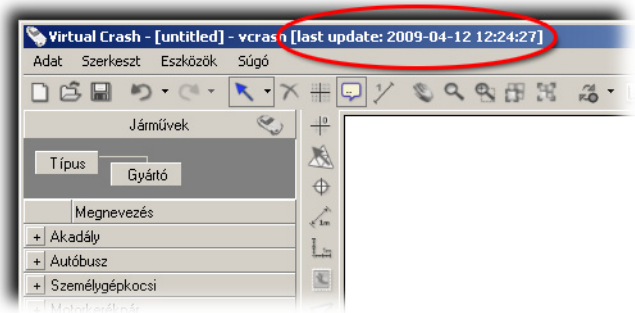



***Figure 4.***

## 8. Menus and Functions

The operation screen of the Virtual Crash consists of systems of windows, menus, data management surfaces and buttons.

The menus of the several options and functions can be pulled down from the manubar located in the top line of the screen. The iconbar can be found in the line just under the manubar. The timetrack is fitted in the iconbar on the right hand side after the icons.

An other iconpost running verticaly in the left third of the screen. The menu post can be found on the left from that and the workarea on the right. Two flaps are seen on the left bottom side of the workarea to change between the 2D and the 3D kind of view.

The bottom line of the screen is the statusbar. The scale of printing is in the right corner in the bottom.

The most important parts of the screen are put on a multicoclour figure to make easier to identify and to find them (***Figure 5.***).

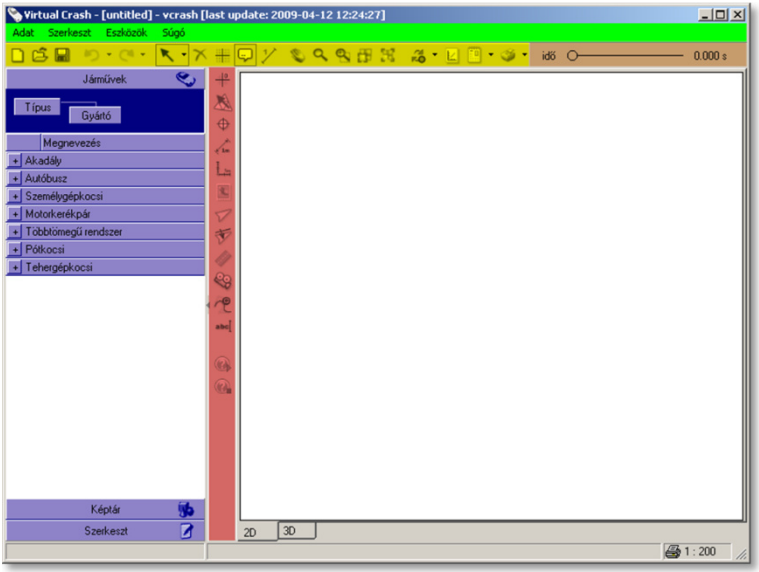



***Figure 5.***

**Menubar**

**Iconbar**

**Menu post**

**Iconpost**

**Timetrack**

## 9. Play Sample

There is an interactive help (Virtual Crash Teacher) built in to the software that shows how to use the program. The wished topic can be chosen by clicking on the icon „Play Sample" after the Virtual Crash is started (***Figure 6.***).

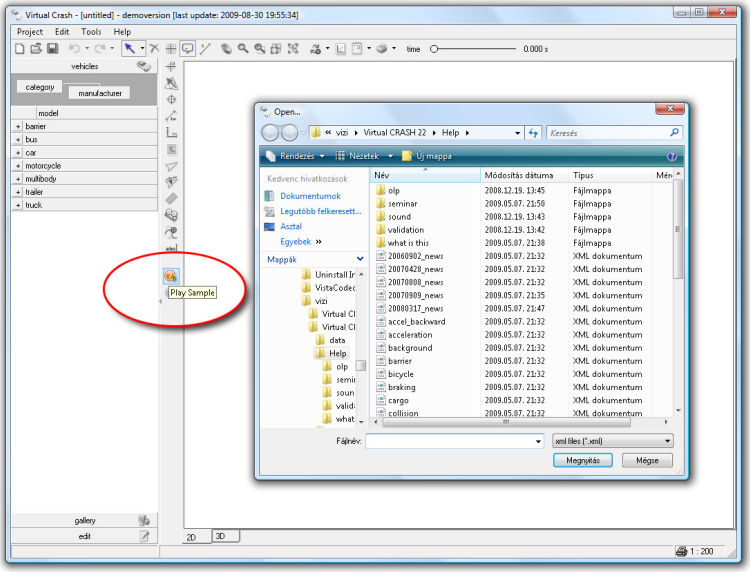



***Figure 6.***

Note.: The speed of the replay can be adjust. The steps of the reconstruction are followable easier on a slower speed.

## 9.1 Acceleration backward

To learn the usage of the acceleration backward is possible by starting the file: **…\Virtual CRASH 22\Help\accel_backward.xml**

This file shows how to edit the whole process step by step: standing vehicle, acceleration backward, steering, braking and then acceleration again forward (***Figure 7.***).

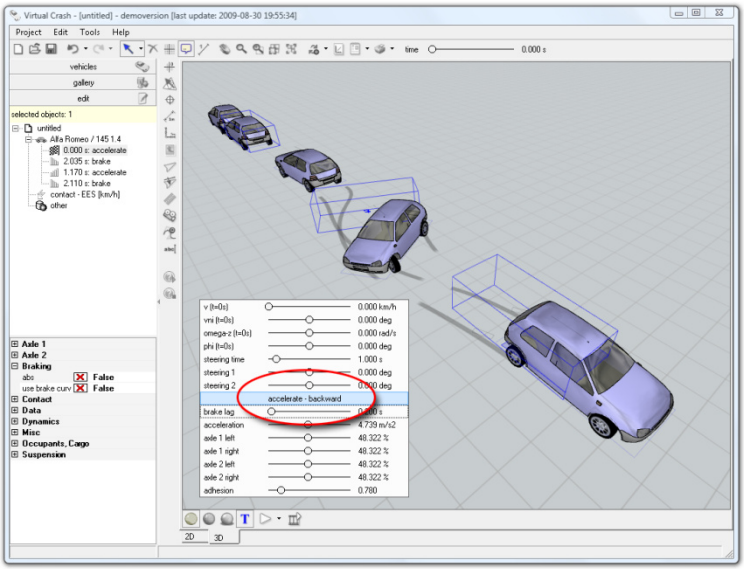



***Figure7.***

## 9.2 Acceleration

To learn the usage of the acceleration forward is possible by starting the file: **…\Virtual CRASH 22\Help\acceleration.xml**

This file shows how to edit the whole process step by step: standing vehicle, acceleration forward and braking (***Figure 8.***).

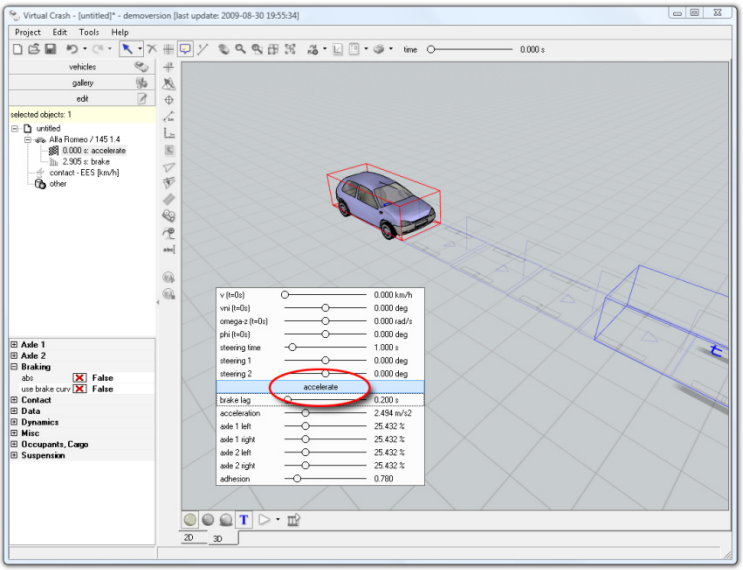



***Figure 8.***

## 9.3 Background

To learn how to create and edit the background of the simulation is possible by starting the file: **…\Virtual CRASH 22\Help\background.xml**

It can be not only a picture simply but a video file eighter. The position, size an dinamics of the background are all adjustable (***Figure 9***).

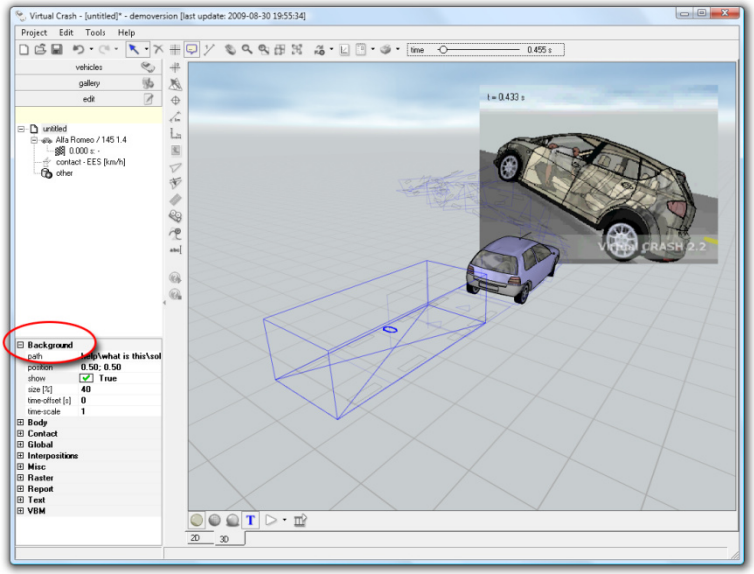



***Figure 9.***

## 9.4 Barrier

To learn the edition and the caracteristics of a barrier is possible by starting the file: **…\Virtual CRASH 22\Help\barrier.xml**

In this video can be seen the effects caused by setting the parameters after pulling one to the work area (***Figure 10***).

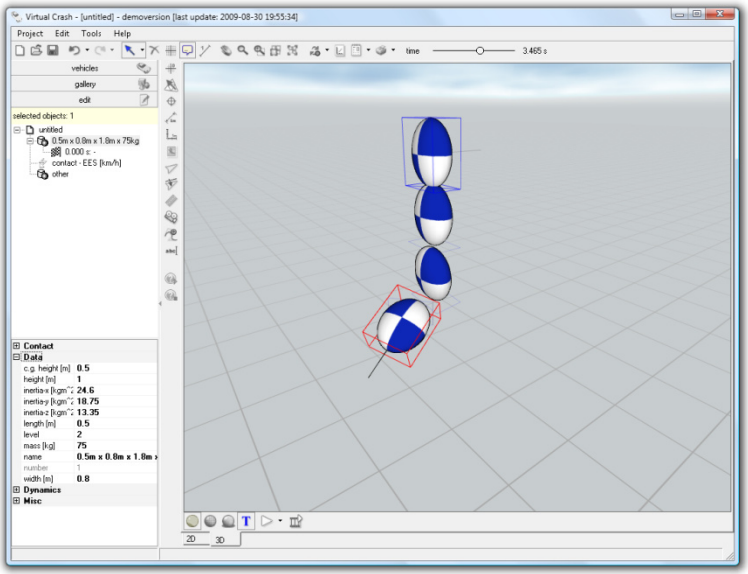



***Figure 10.***

## 9.5 Bicycle

To learn how to create edit and move a bicycle and a biker on it is possible by starting the file: **…\Virtual CRASH 22\Help\bicycle.xml**

This file shows how to edit the whole process step by step in that a bicycle is hit by a car (***Figure 11***).

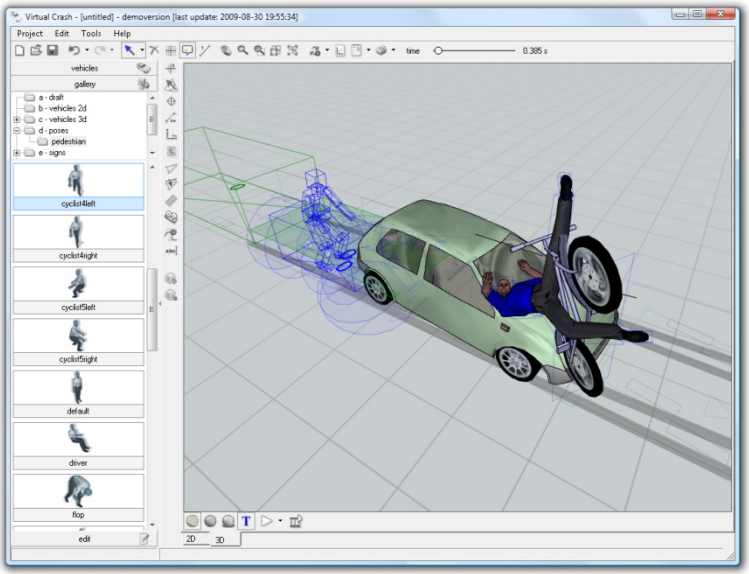



***Figure 11.***

## 9.6 Braking

To learn to brake a vehicle is possible by starting the file: **…\Virtual CRASH 22\Help\braking.xml**

This file shows how to edit the whole process step by step: a vehicle swinging to the left and emergency braking until stopped (***Figure 12***).

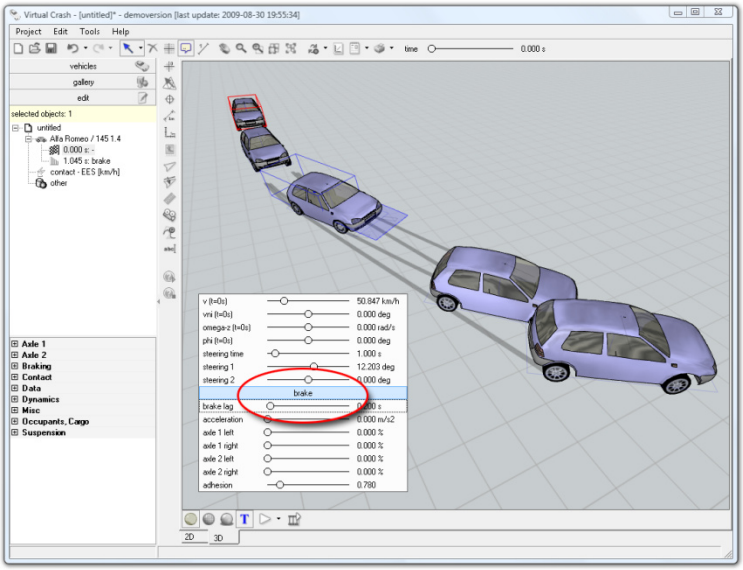



***Figure 12.***

## 9.7 Load (top)

To learn the edition and the caracteristics of that how to load a vehicle is possible by starting the file: **…\Virtual CRASH 22\Help\cargo.xml**

This file shows how to put a parcel onto a roof rack on a vehicle and the effects caused by setting the parameters (***Figure 13***).

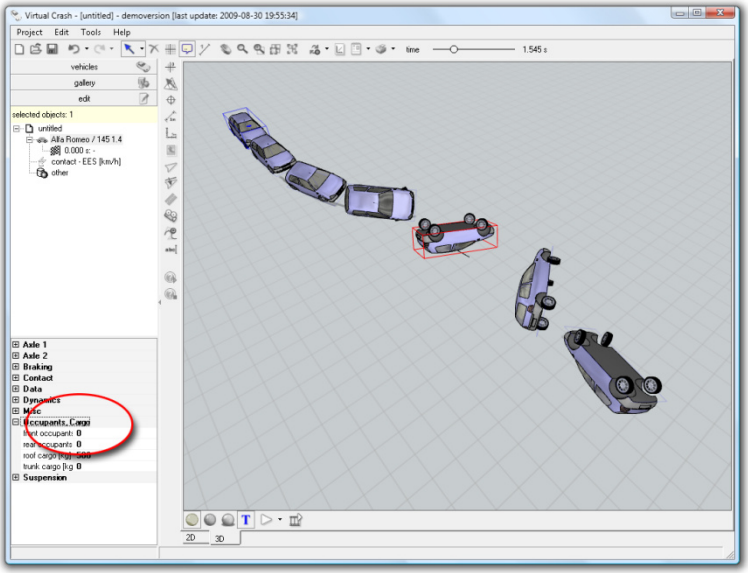



***Figure 13.***

## 9.8 Collision

To learn how to edit the whole process of a collition is possible by starting the file: **…\Virtual CRASH 22\Help\collision.xml; collision2.xml** and **collision3.xml**

Some kind of procedures of crash can be seen in this file step by step (***Figure 14***).

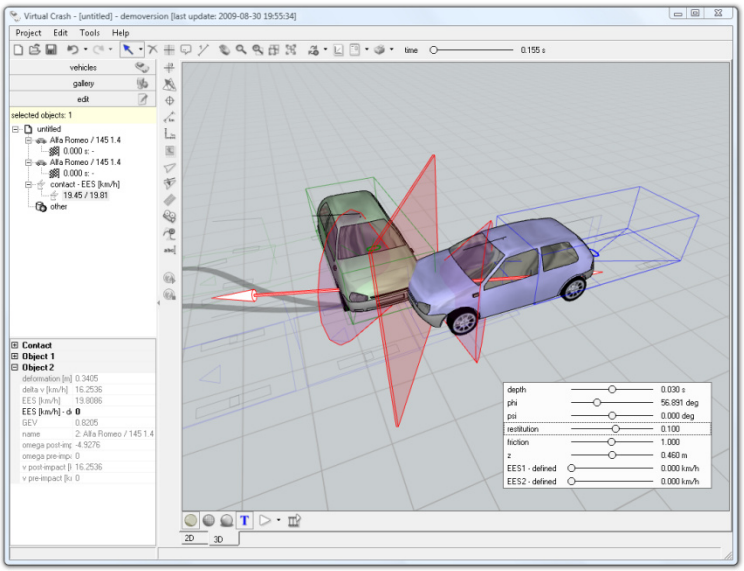



***Figure 14.***

## 9.9 EES limit

To learn how to limitate the maximal EES value during the row of crashes is possible by starting the file: **…\Virtual CRASH 22\Help\eeslimit.xml**

Usually the crash consists of a planty of elementary collitions. In special cases the number of them are too high to deeal with. Setting the limit of EES the software take consideration of them are over the limit that was given (***Figure 15***).

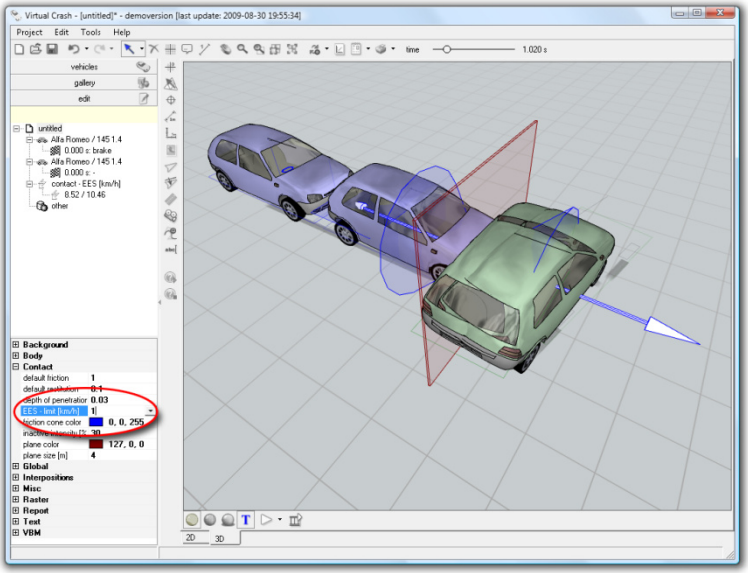



***Figure 15.***

## 9.10 Friction

To learn how to declare a part of surface with a different friction is possible by starting the file: **...\Virtual CRASH 22\Help\friction.xml**

It is shown in this file what happens when a curving vehicle runs through an area of different friction (***Figure 16***).

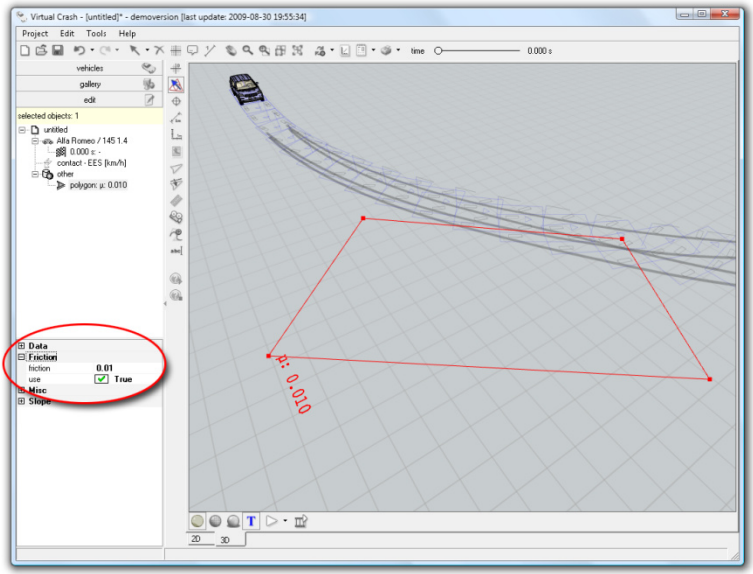



***Figure 16.***

## 9.11 Integration step

To learn how to set the integration step is possible by starting the file: **...\Virtual CRASH 22\Help\integration-step.xml**

The film shows that comes after setting the integration step on a process of hitting a pedestrian (***Figure 17***).

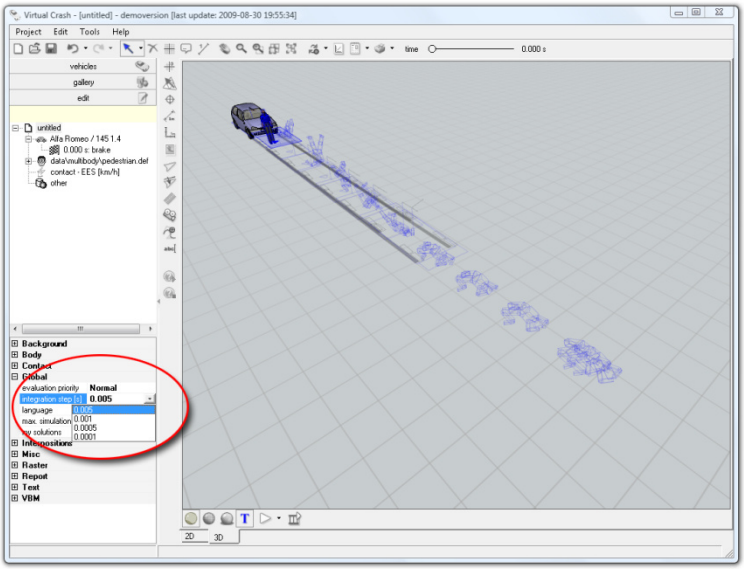



***Figure 17.***

## 9.12 Kinematics

The file **...\Virtual CRASH 22\Help\kinematics.xml** the way of calculation of the locomotion of a vehicle.

It is possible to create the phases of the motion of a vehicles before the starting point of the dinamics simulation using this software unit (***Figure 18***).

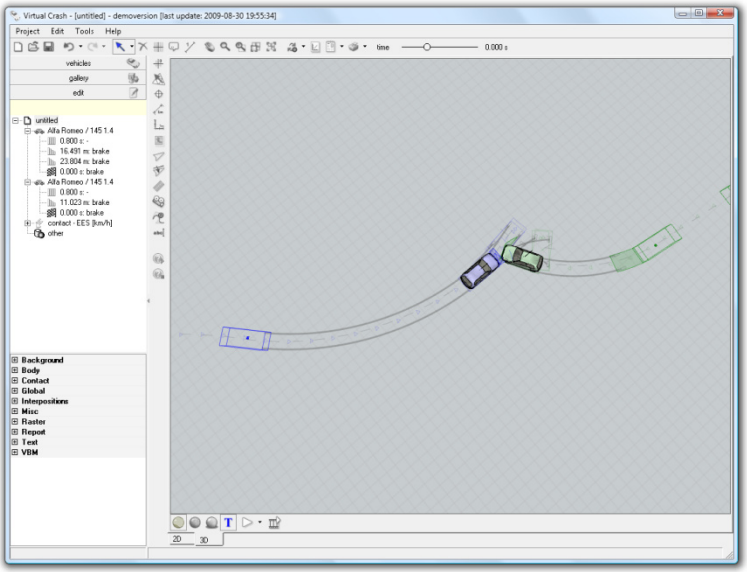



***Figure 18.***

## 9.13 Load (flatbed)

To learn the edition and the caracteristics of that how to load a vehicle on the flatbed is possible by starting the file: **…\Virtual CRASH 22\Help\load.xml**

This file shows how to put a parcel onto a flatbed of a vehicle and the effects caused by setting the parameters (***Figure 19***).

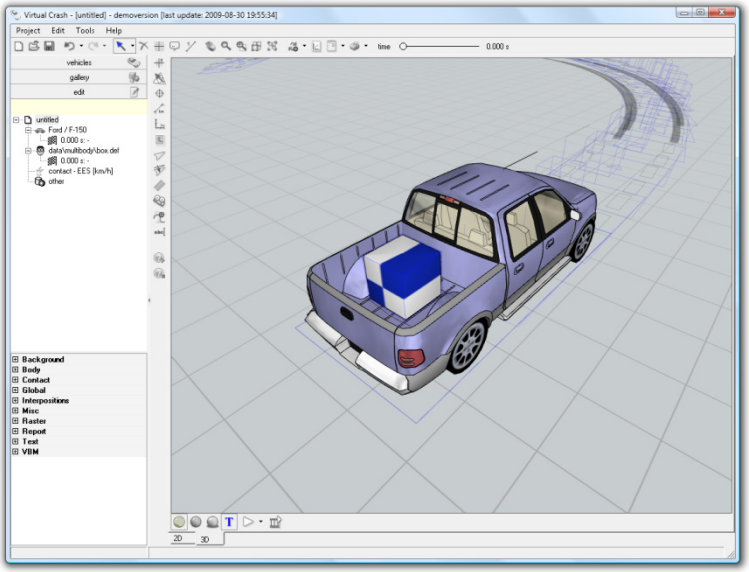



***Figure 19.***

## 9.14 Motorcycle

The file **…\Virtual CRASH 22\Help\motorcycle.xml** shows how to pull a motorbike on to the work area and how to put a biker on it. It is shown in it too how to adjust them to make a predetermined motion.

In this film can be seen the whole process step by step when the motorcycle runs into a car (***Figure 20***).

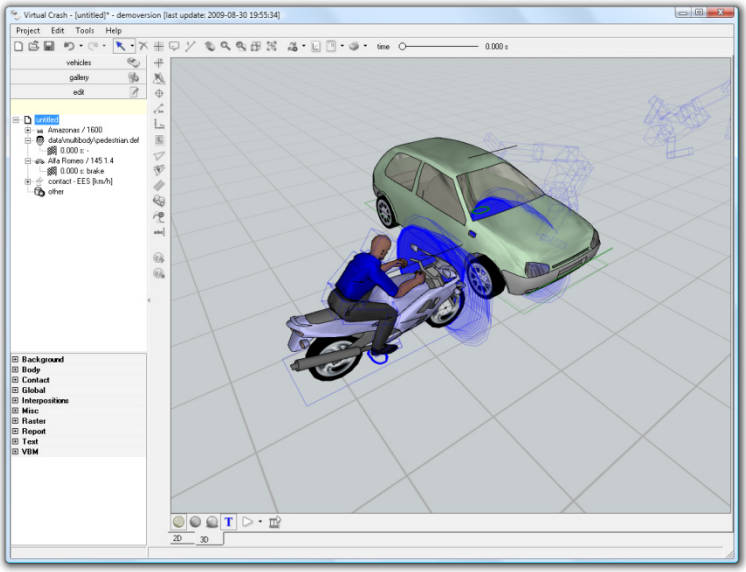



***Figure 20.***

## 9.15 Pedestrian

To learn how to create, edit and move a pedestrian it is possible by starting the file: **…\Virtual CRASH 22\Help\pedestrian.xml**

In this file can be seen the edition of the whole procedure step by step. The pedetrian is shown in standing positions and under motion ***(Figure 21).***

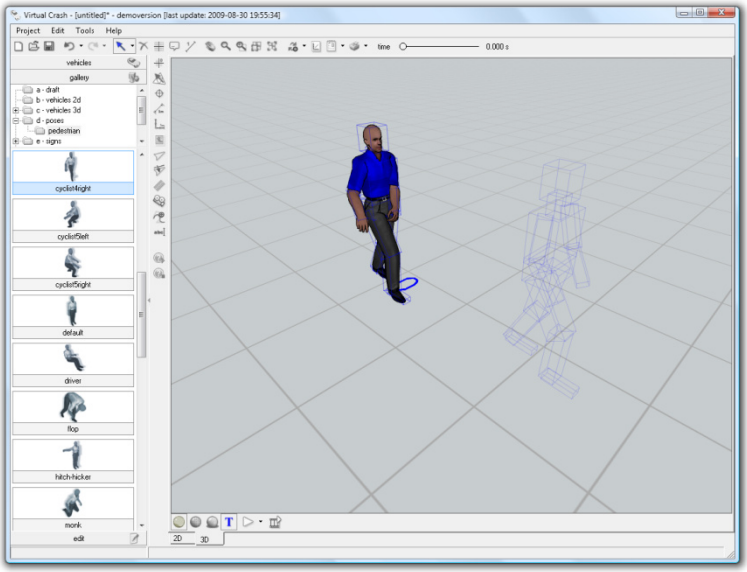



***Figure 21.***

## 9.16 Roll

The file **…\Virtual CRASH 22\Help\roll.xml** shows the roll over of a vehicle.

Watching the file can be followed the build up and edition of a rolling process of a vehicle running in curve step by step ***(Figure 22).***

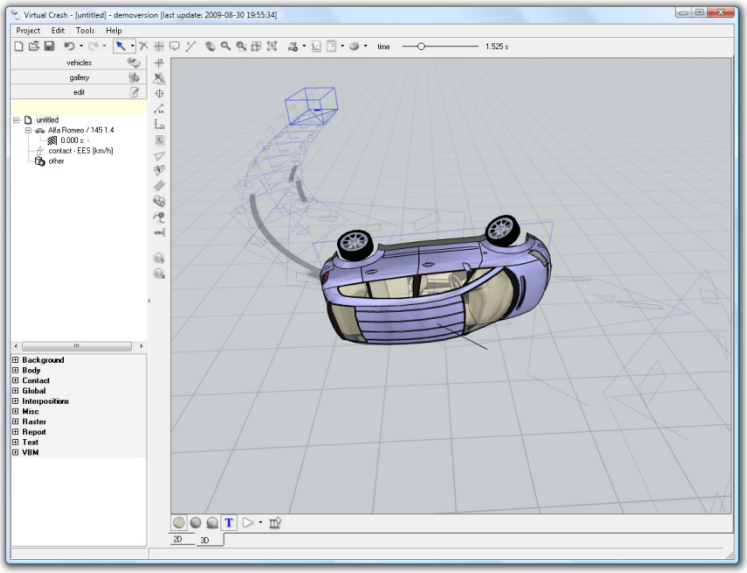



***Figure 22.***

## 9.17 Sequences

The file **…\Virtual CRASH 22\Help\sequences.xml** shows how can different sequences be put one after another.

The file shows how tio build up and edit a process of a vehicle step by step ***(Figure 23).***

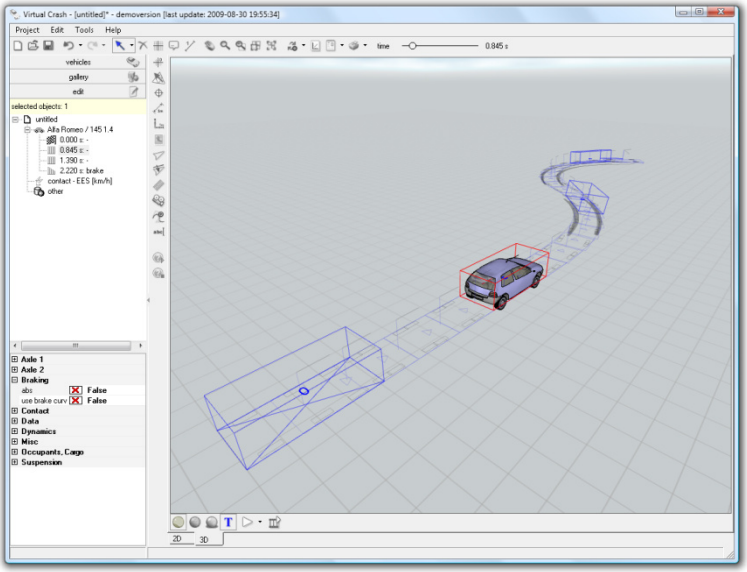



***Figure 23.***

## 9.18 Sign

The file **...\Virtual CRASH 22\Help\sign.xml** shows how can different signs be put onto the defined points of the work area.

The file shows the method to put on the neccesary traffic signs step by step ***(Figure 24).***

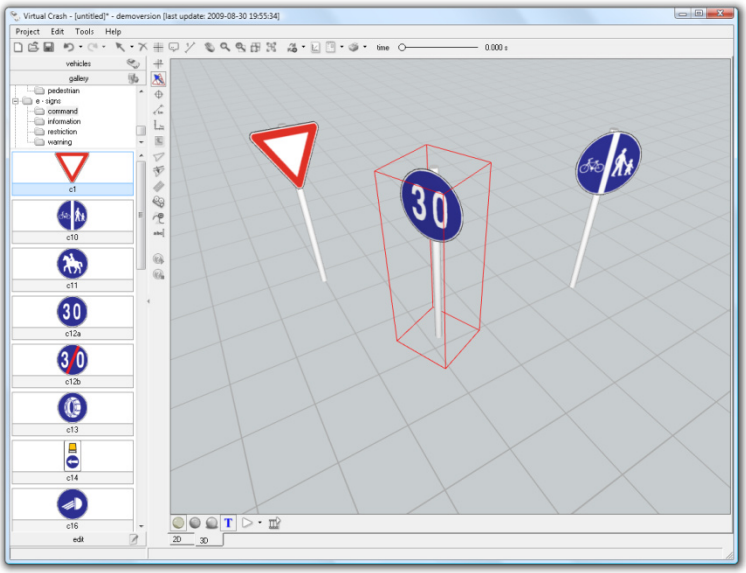



***Figure 24.***

## 9.19 Slope

The file **...\Virtual CRASH 22\Help\slope.xml** shows how to put the road surface to a different angle but horizontal.

Watching the file can be followed the build up and edition of a slope step by step ***(Figure 22).***

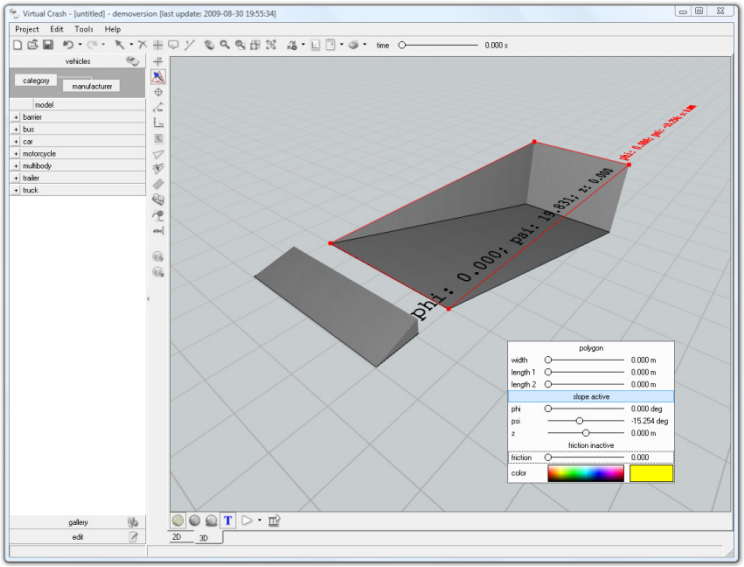



*Figure 25.*

## 9.20 Suspension

The file **…\Virtual CRASH 22\Help\suspension.xml** shows the adjustment of the suspension of a vehicle.

The file shows the method of change the parameters of the suspension of a vehicle (springs, absorbers) ***(Figure 26).***

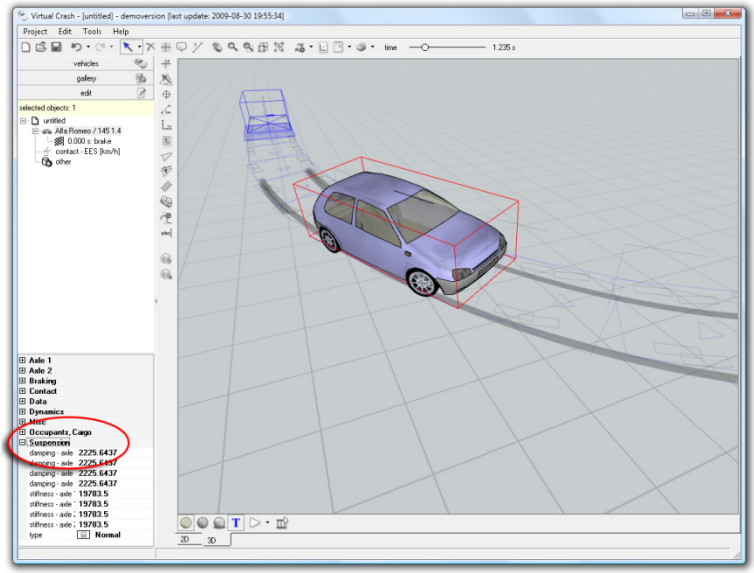



***Figure 26.***

## 9.21 Trailer

The file **...\Virtual CRASH 22\Help\trailer.xml** shows how to build up a vehicle train.

The file shows how to connect a tractor and a trailer and how can be move it on the road ***(Figure 27).***

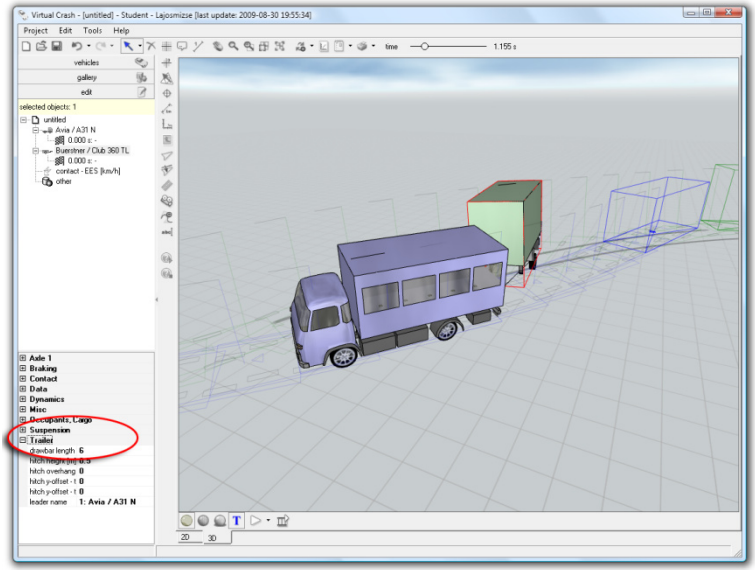



***Figure 27.***

## 9.22 Validation (Dekra)

Starting the file **…\Virtual CRASH 22\Help\validation_dekra.xml** it can be seen the validation of a pedestrian-car accident.

After having been loaded the simulation file the hit of the pedestrian by the car running on different speeds can be seen. The discret points of the end position of the hit pedestrian those come from the calculation of the simulation can be compared with the results of the DEKRA experiments (***Figure 28).***

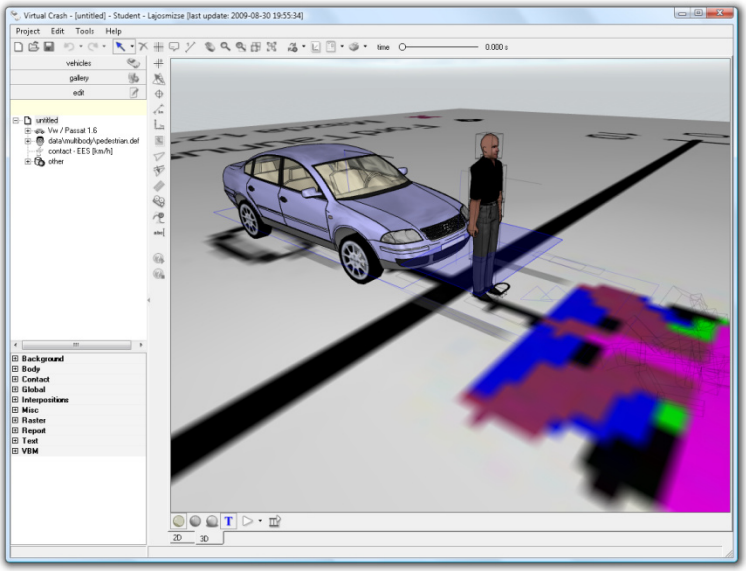



***Figure 28.***

## 9.23 Validation (Pc-Crash 7.3)

The comparation of the calculation made by this software with the simulation made by the PcCrash 7.3 is shown in the file **…\Virtual CRASH 22\Help\validation_pc-crash73.xml.**

In the file the vehicle is driven to its side during an emergency braking until stopped in the end position. As far as it can be seen that is the same as it is calculated by the software PcCras 7.3 ***(Figure 29).***

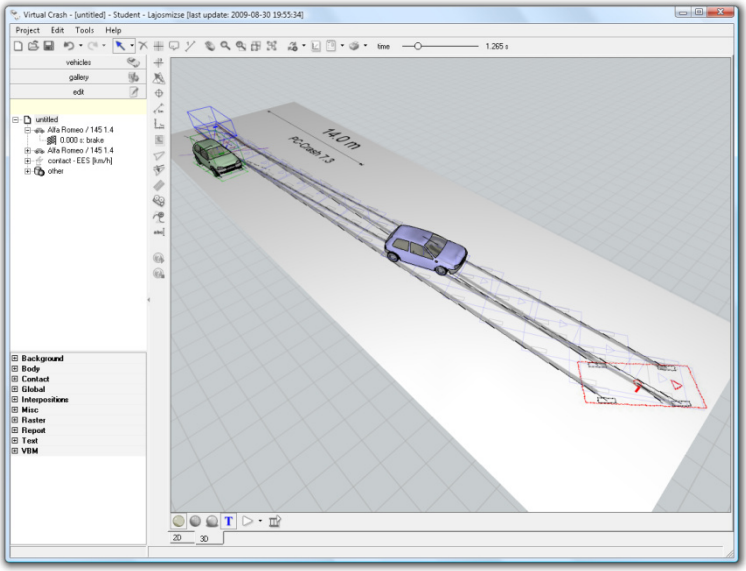



*Figure 29.*

## 9.24 Workspace

The work area can be known started te file **...\Virtual CRASH 22\Help\Workspace.xml**

The workspace is shown eighter in 2D or 3D view. ***(Figure 30).***

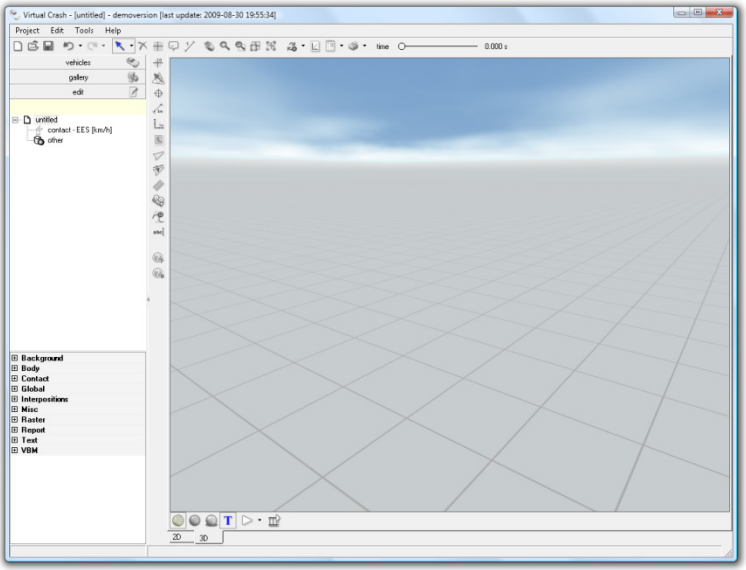



***Figure 30.***

## 10. What is This?

The Virtual Crash Teacher shows the functions of the icons can be found on the iconbar and on the vertical icon post. The wondered point of menu can be chosen as a topic from the **„Help - What is This?"** ***(Figure 31).***

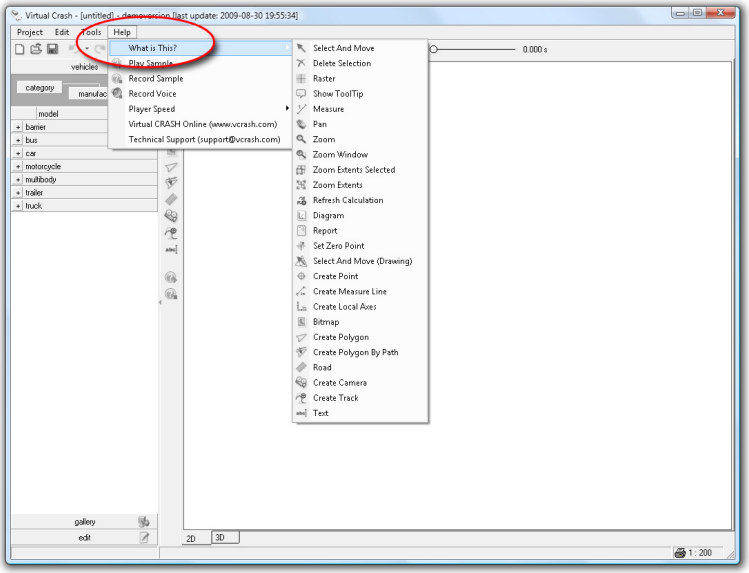



***Figure 31***

The speed of the replay can be adjust. The steps of the reconstruction are followable easier on a slower speed.

## 10.1 Create Local Axes

The file **…\Virtual CRASH 22\Help\what is this\axes.xml** shows how to creat local axes.

This file helpes to know how to position new co-ordinate systems how to set the angle of them, how to adjust the length of the axes to give a better background to localise the participants and the movements of the accident ***(Figure 32).***

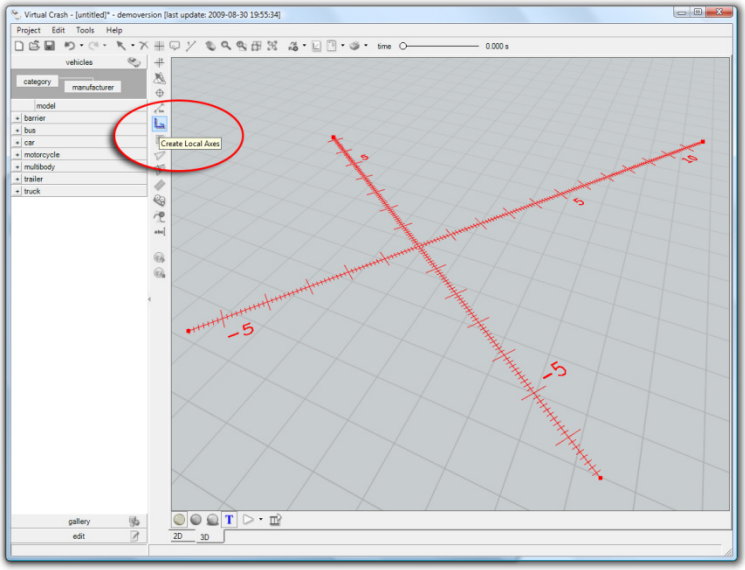



***Figure 32***

## 10.2 Create Camera

The file **…\Virtual CRASH 22\Help\what is this\camera.xml** shows camera function.

This function lets to put a various number of camera to show the simulaton from different positions and from different angles. The cameras can stand in a fix position or can be connected to a vehicle moving together with that. Also can set the camera to stay in a fix angle or to follow an object moving on the work area ***(Figure 33).***

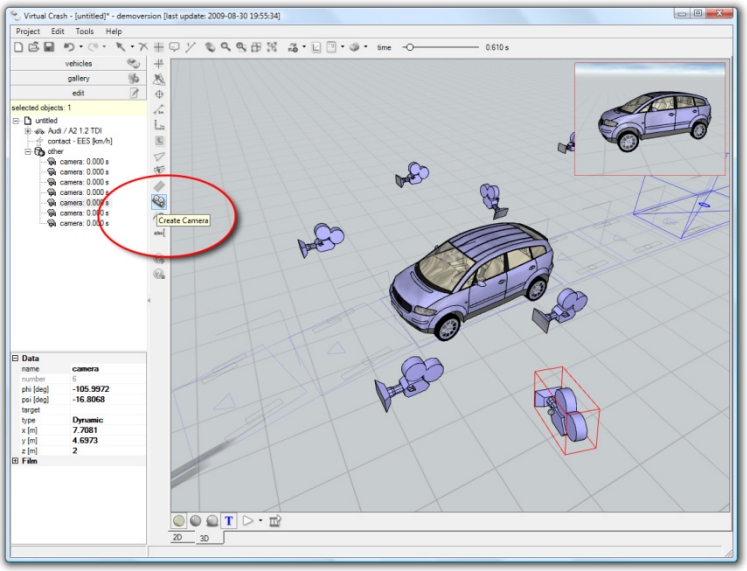



***Figure 33***

## 10.3 Create Point

The file **...\Virtual CRASH 22\Help\what is this\createpoint.xml** shows how to create put points onto the work area.

This function gives the possibility to place several points onto the screen, to mark one or more of them to attach the same text them at one step ***(Figure 34)***.

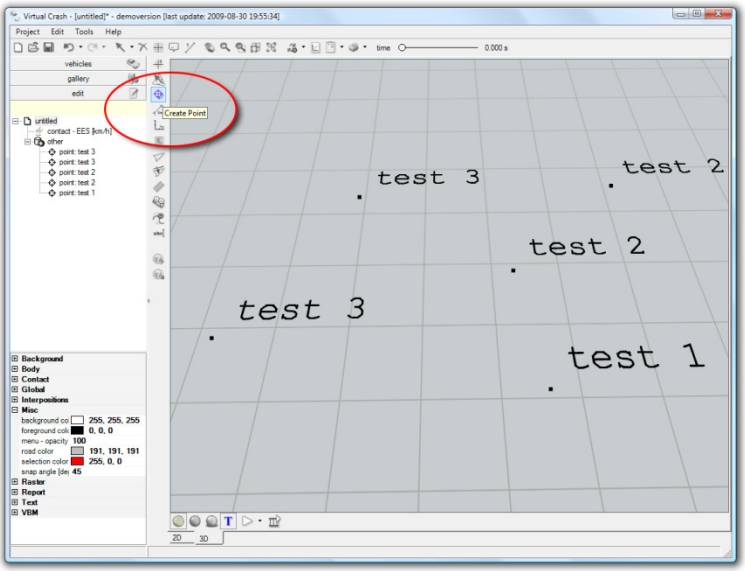



***Figure 34***

## 10.4 Create Polygon

The file **…\Virtual CRASH 22\Help\what is this\createpolygon.xml** shows how to create straights.

This function lets to draw straights or closed polygons. The width, length, length of the breaks, colour of the line, spatial attributions, friction of the closed area can be set ***(Figure 35)***.

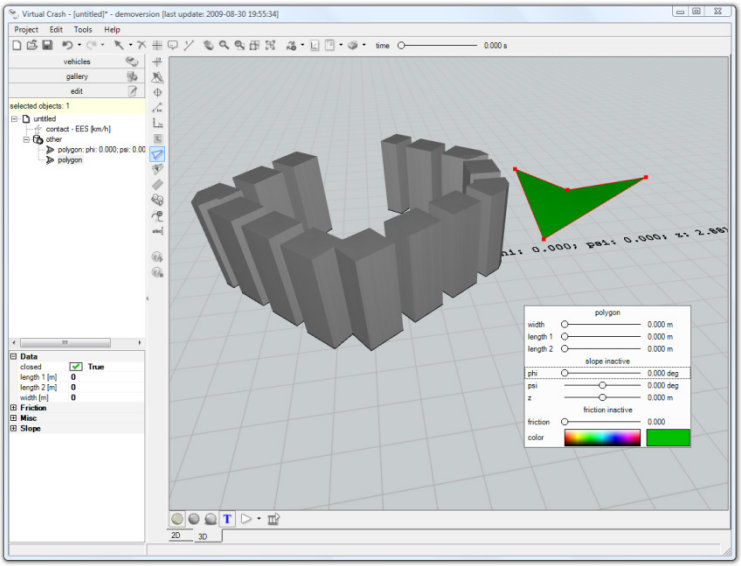



*Figure 35*

## 10.5 Create Polygon by Path

The polygon by path function can be known by the file **…\Virtual CRASH 22\Help\what is this\create-polygonbypath.xml**

This function gives a tool to draw lines paralel by the edge of the road elements in defined distance (that value appears in the informal bal under the work area). The width, length, length of the breaks, colour of the line, spatial attributions, friction of the closed area can be set ***(Figure 36)***.

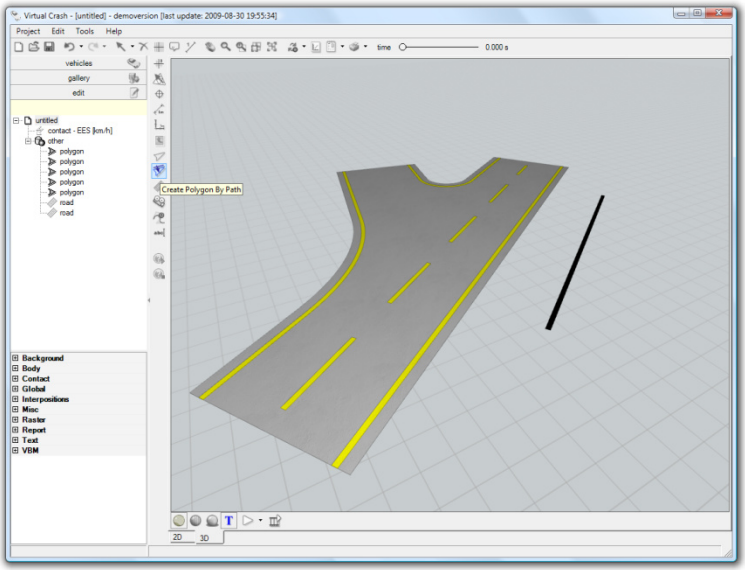



*Figure 36*

## 10.6 Create Text

The file **...\Virtual CRASH 22\Help\what is this\createtext.xml** shows how to place text on the screen.

This function lets to create text on the work area in a wished size, kind of letter style, orientation and colour ***(Figure 37)***.

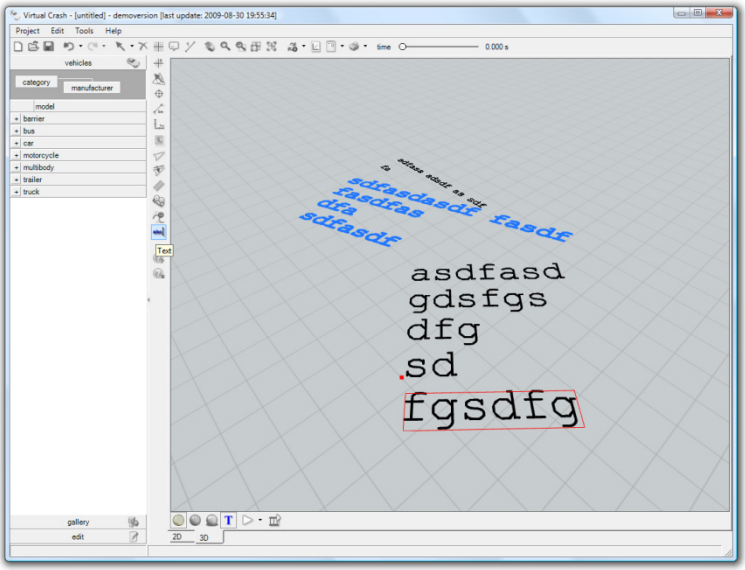



*Figure 37*

## 10.7 Delete

The delete topic can be known from the file **…\Virtual CRASH 22\Help\what is this\delete.xml**

This function lets to erase the desired object from the work area (with its special cursor). It works in both views 2D and 3D. ***(Figure 38).***

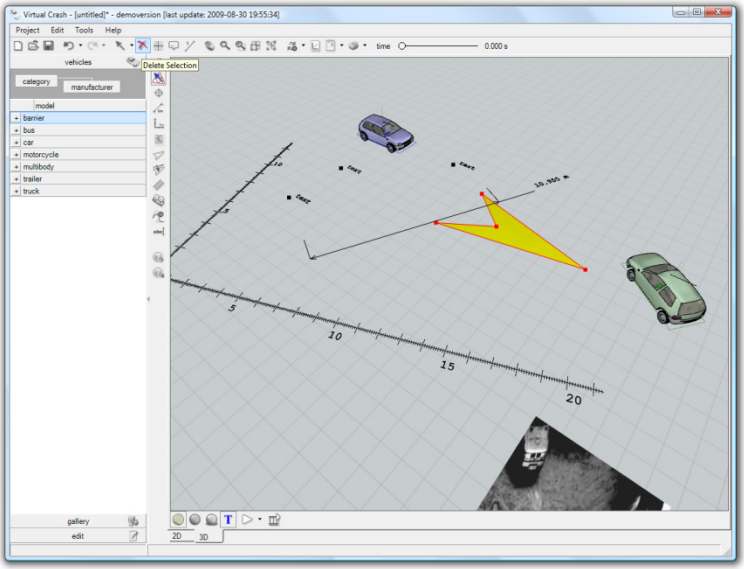



*Figure 38*

## 10.8 Diagram

The file **...\Virtual CRASH 22\Help\what is this\diagram.xml** shows the usage of diagrams.

This function is to display the way, speed, angle, angular velocity, acceleration, retardation, listing, pitching of vehicles or multybody systems gear to time or position. The curves of the functions are adjustable, changeable, moveable printible or saveable into a picture file (.bmp). ***(Figure 39)***.

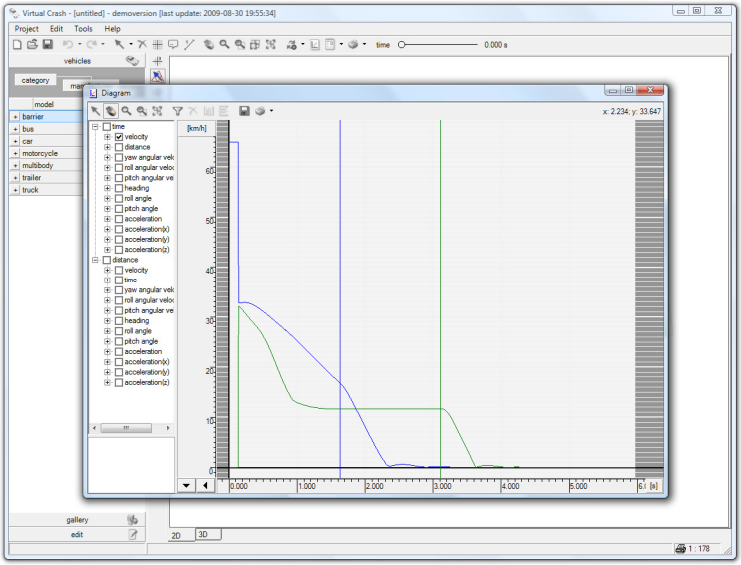


***Figure 39***

## 10.9 Measure

To get known this function start the file **…\Virtual CRASH 22\Help\what is this\measure.xml**

Using the icon „measurement" it it possible to see the distance between two discreet points horizontally (dx), vertically (dy) and diagonally in the information bar under the work area ***(Figure 40)***.

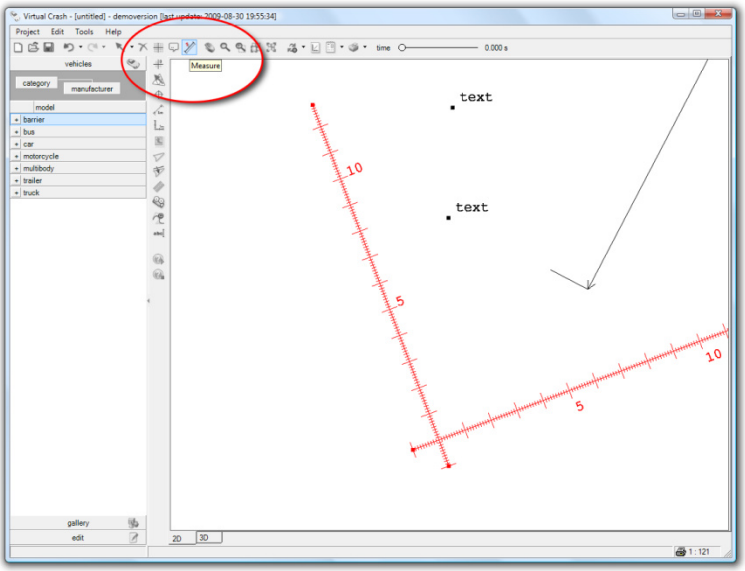



***Figure 40***

## 10.10 Create Measure line

To show how to put a scale on the work area within two points start the file **...\Virtual CRASH 22\Help\what is this\measureline.xml**

This function helps to display the distance between two chosen discreet points on the work area by a scale positioned within them This function helps to display the distance between two chosen discreet points on the work area by a scale positioned within them ***(Figure 41)***.

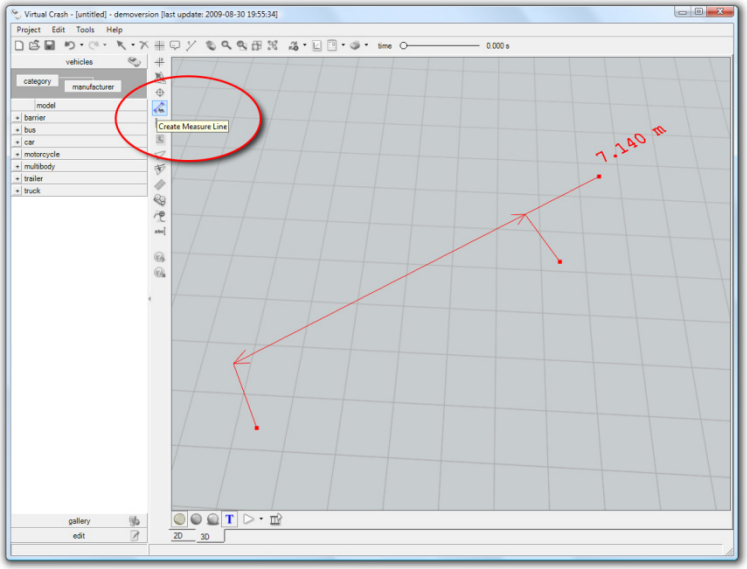



***Figure 41***

## 10.11 Pan

The file …**Virtual CRASH 22\Help\what is this\pan.xml** shows the shifting tool.

This function lets the work area to be moved on the screen in view 2D or 3D both ***(Figure 42)***.

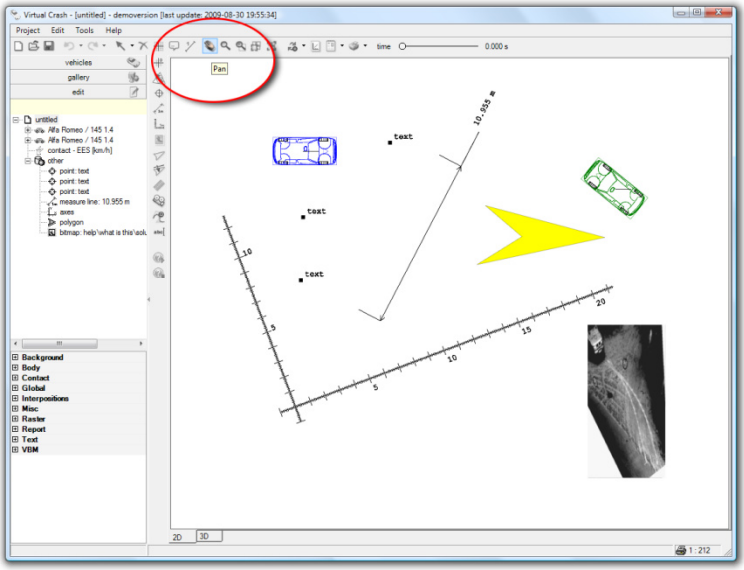



***Figure 42***

## 10.12 Raster

To know how to make the background tetragonal dotted start the file **…\Virtual CRASH 22\Help\what is this\raster.xml.**

This icon switches the dotted raster behind that helps the orientation on the work area ***(Figure 43).***

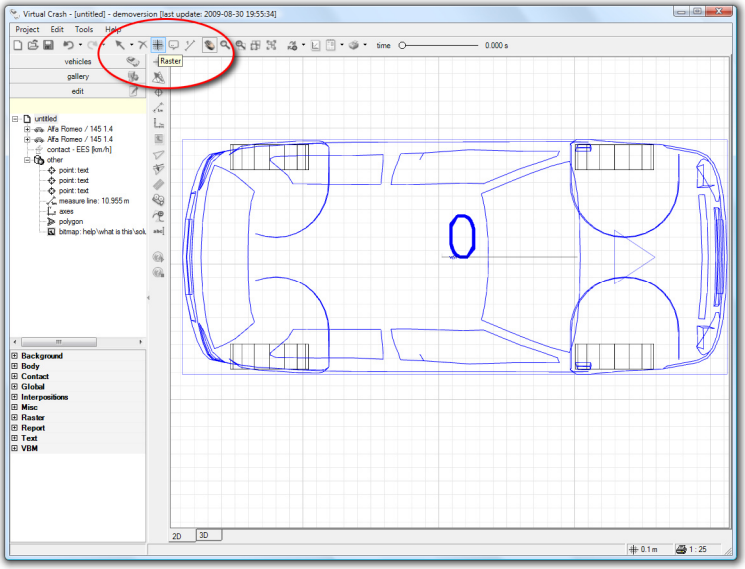



*Figure 43*

## 10.13 Refresh Calculation

The file **…\Virtual CRASH 22\Help\what is this\refresh.xml** shows how to start, stop and restart the calculation.

This funcion let to stop and out back in action the participants. The intermediate phases are not refreshed while the calculation is stopped ***(Figure 44)***.

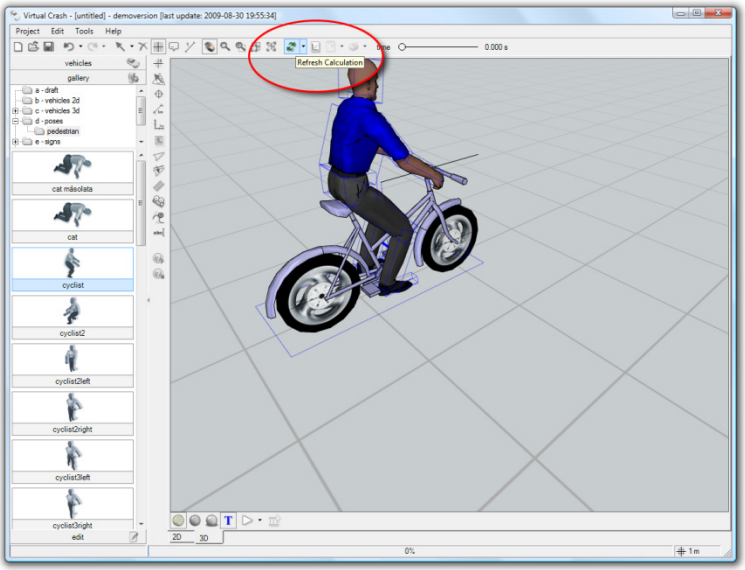



***Figure 44***

## 10.14 Report

The file **Virtual CRASH 22\Help\what is this\report.xml** shows how to create and use a report.

The report lists the value given by the user and calculated by the software eighter systematized into a table: datas of the sequences of the vehicles and other participants, physical representatives of the motion, adjusted parameters etc.. The report is printable or saveable into .html format ***(Figure 45)***.

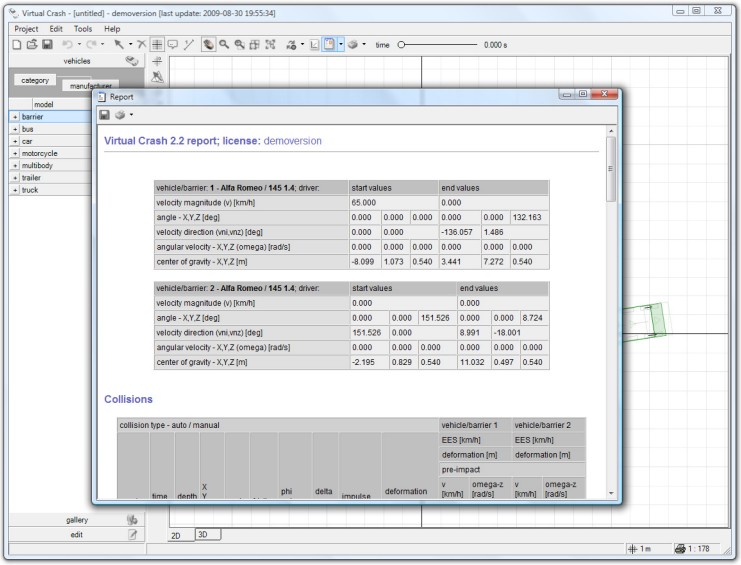



*Figure 45*

## 10.15 Road

How to create a road (roads and/or junctions) can be known starting the file **…\Virtual CRASH 22\Help\what is this\road.xml**

This tool helps to draw streets, highways etc. to the work area following a chosen track in the desired width. To create a junction it is enough to put two roads on the screen crossing in the wished angle each other ***(Figure 46)***.

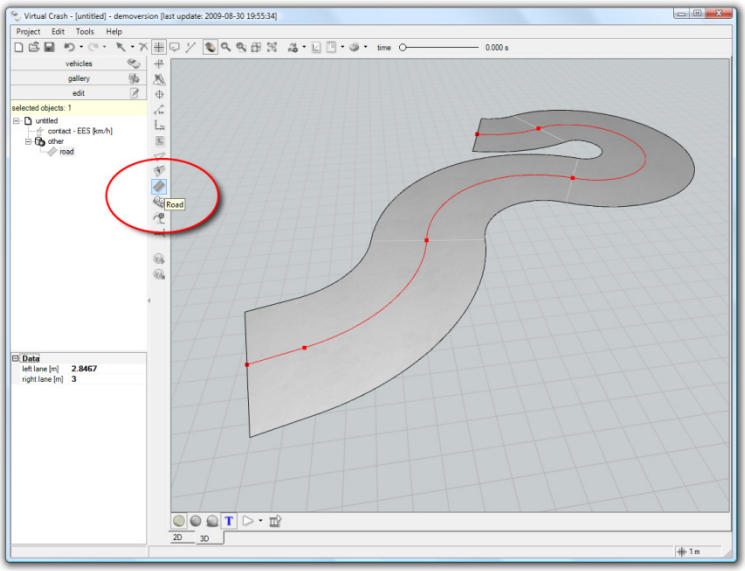



***Figure 46***

## 10.16 Select and Move

The file **…\Virtual CRASH 22\Help\what is this\select.xml** shows how to use the „Select And Move" function.

This tool is to choose a vehicle or multibody system to pull that into the work area (to load it) or to select one or more of them, to move them (all the parameters can be changed) in a view 2D or 3D both ***(Figure 47)***.

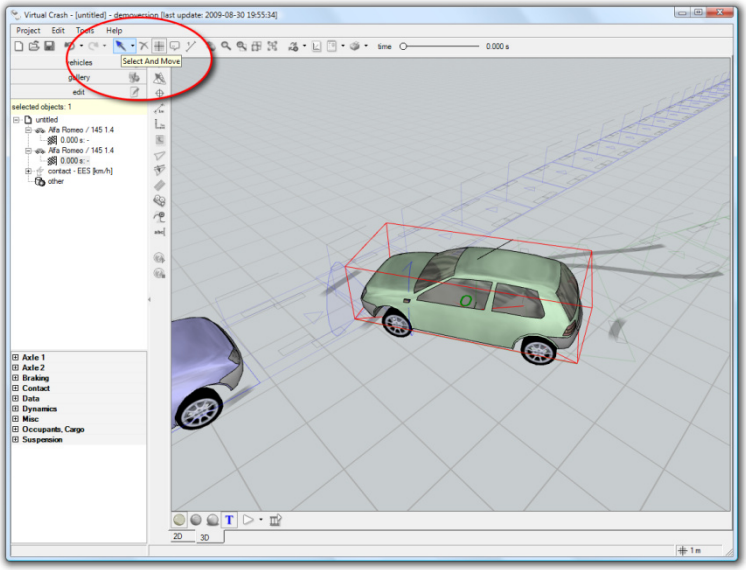



*Figure 47*

## 10.17 Select and Moving Drawing

The file **...\Virtual CRASH 22\Help\what is this\selectdrawing.xml** shows how to use the „Select And Move Elements of Drawing" function.

This tool is to choose an element of the drawing, to change its position on the work area, to select one or more of them, to edit them (all the parameters can be changed) in a view 2D or 3D both ***(Figure 48)***.

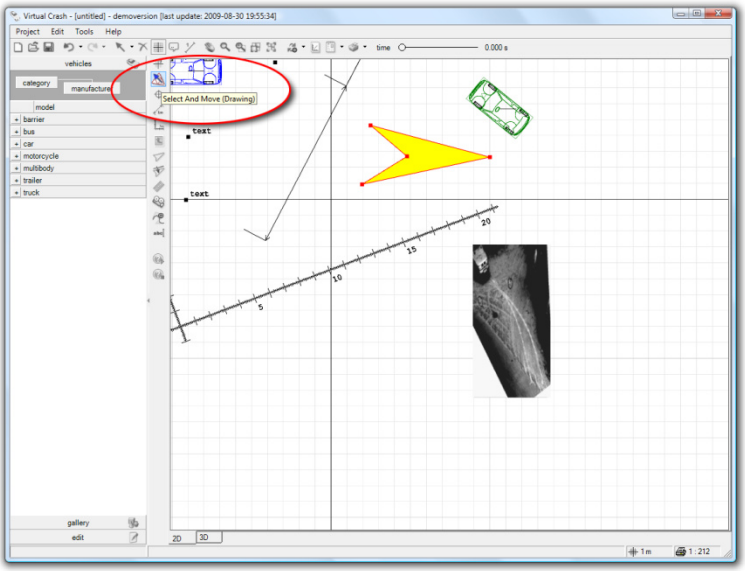



***Figure 48***

## 10.18 Show ToolTip

The „Show Infobox" function can be known starting the file **…\Virtual CRASH 22\Help\what is this\showtooltip.xml**

Swiched on this tool is to an information rectangle appears with all the important datas when the cusor arrow shows on an object (vehicle, multibody system, point of collision, polygon of different sloping or friction etc.) in a view 2D or 3D both ***(Figure 49)***.

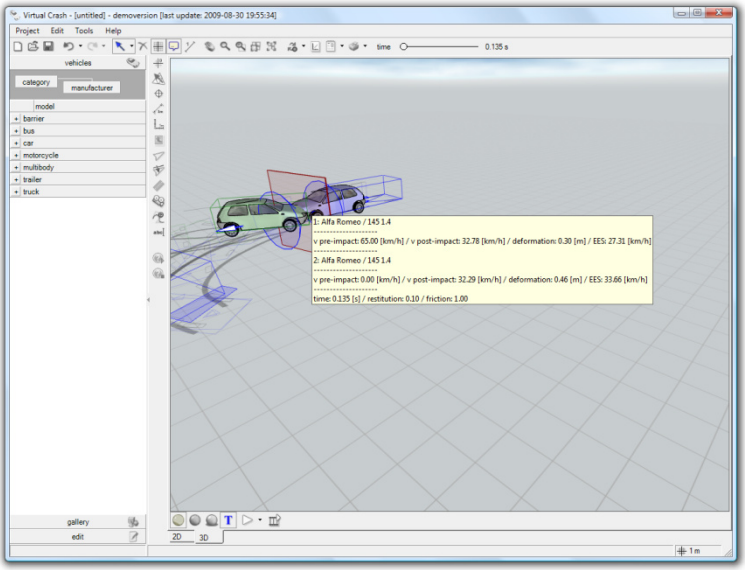



*Figure 49*

## 10.19 Create Track

The „Create Track" function can be known starting the file **…\Virtual CRASH 22\Help\what is this\track.xml**

This tool lets to define a curve of points on the screen that will be tried follow by the vehicle controlled by the adjusted parameters ***(Figure 50).***

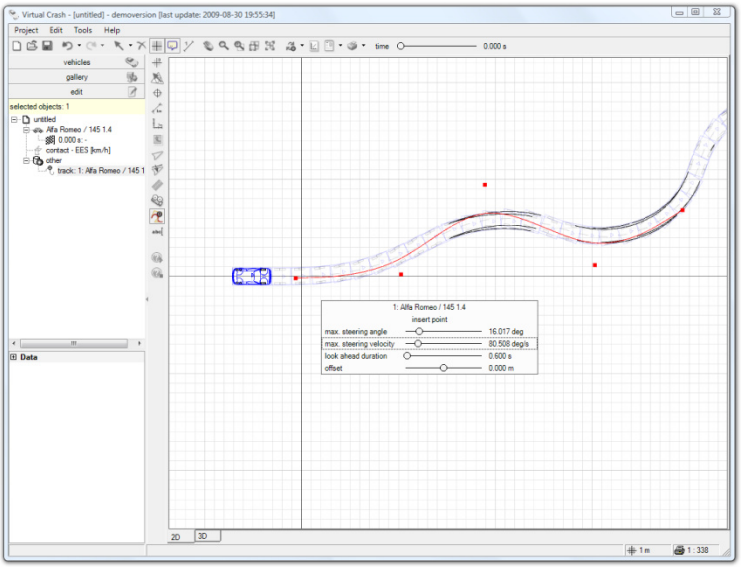



***Figure 50***

## 10.20 Set Zero Point

The possibility of setting a starting point can be known started the file **Virtual CRASH 22\Help\what is this\zeropoint.xml.**

This tool lets to choose another starting point (zeropoint) that is different from tha original given by the software automatically ***(Figure 51).***

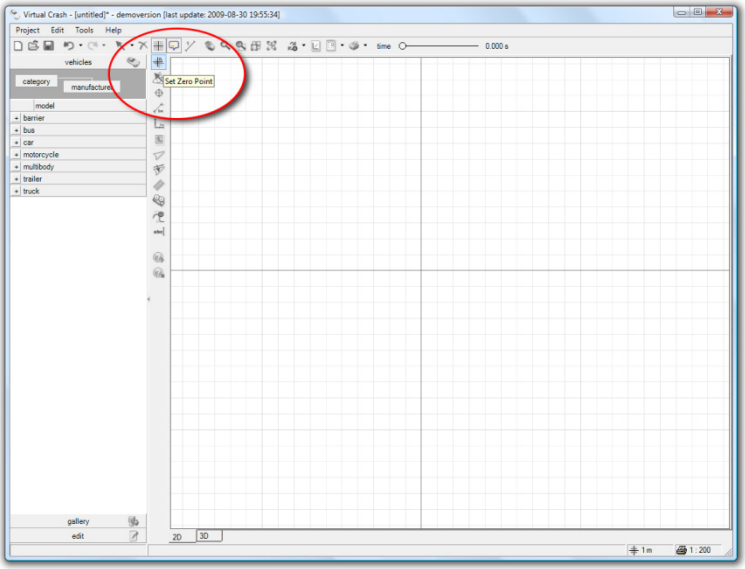



***Figure 51***

## 10.21 Zoom, Zoom Extents, Zoom Extents Selected, Zoom Window

The zoom function can be known by starting the file **Virtual CRASH 22\Help\what is this\ zoom.xml**

A part of the drawing screen can be chosen and magnify (up or down) by this tool using the buttons of the mouse and pulling the mouse itself into the adequate directions ***(Figure 52).***

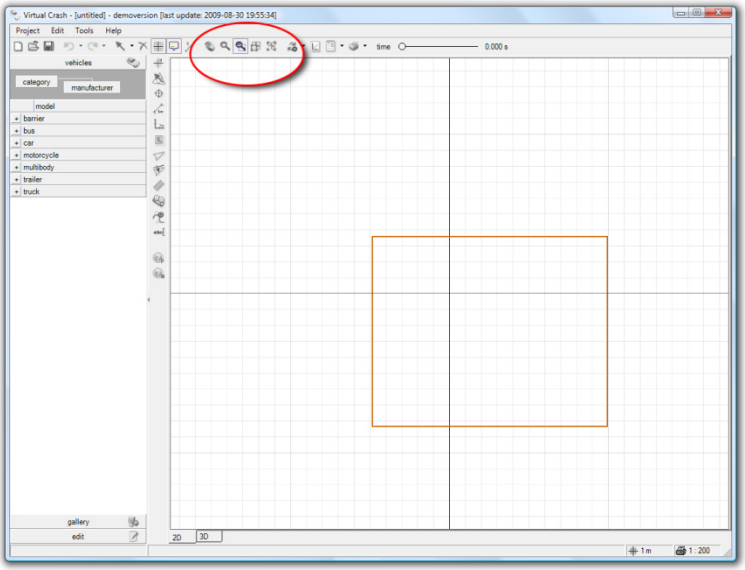



*Figure 52*

The function „Maximum view" is shown in the file **…\Virtual CRASH 22\Help\what is this\zoomextents.xml**.

Using this function it is possible to reduce the edited field to the size that all the created, loaded, and calculated object will be visible in the work area in a view 2D or 3D both

The „Maximal Zoom of Selected Part" function can be known by starting the file **Virtual CRASH 22\Help\what is this\zoomextentsselected.xml**.

This tool lets to choose an optional element or group of objects on the work area and to magnify it to the size of the drawing window in a view 2D or 3D both.

The „Zoom" function can be known by starting the file **Virtual CRASH 22\Help\what is this\zoomwindow.xml**.

This tool lets to choose an optional rectangular part of the work area and to magnify it to the size of the drawing window in a view 2D or 3D both.