

Version 25.0

# Short Guide

In only 11 pages to your AnalyzerPro project

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ANALYZER PRO

# Preface

Dear AnalyzerPro User!

You know how it is: you have a lot on your plate, you don't get to work with the Analyzer regularly and a few steps are forgotten. Searching in the main manual is complicated and you quickly become demotivated. With the short manual, we want to counteract this and have summarized the most important points that make up the operation of the Analyzer on a few pages for you.

On behalf of the AnalyzerPro, I wish you a pleasant time working with AnalyzerPro!

Matthias Schmidt

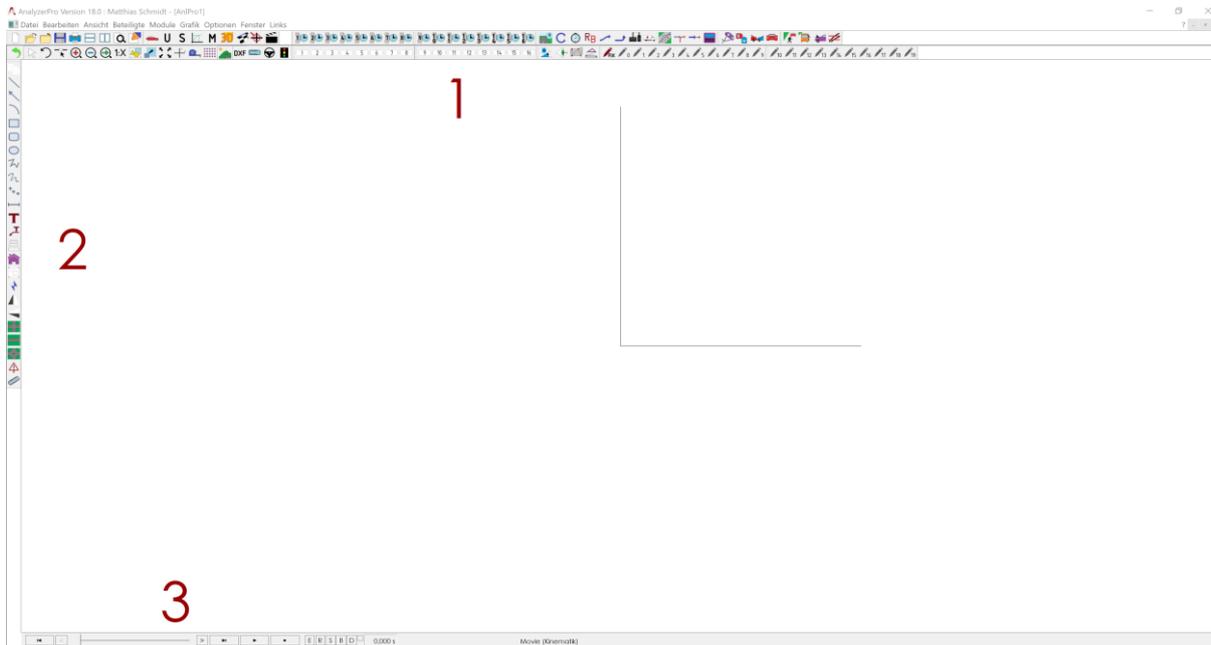
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## GENERAL INFORMATION

When you start AnalyzerPro, you can see the following start screen:



Area 1: The upper monitor bar is divided into three rows: All contents of AnalyzerPro can be reached via dropdown menus in the first row. The middle and lower row comprise buttons providing you with direct access to several modules and tools.

Area 2: To the left of the monitor, you can find a bar with tools to create sketches and other drawings.

Area 3: The lower area of the monitor features tools to control your calculations. The current working time is shown on the bottom right side. The bottom center displays **if you currently work in the kinematics window (Movie) or driving dynamics window.**

### **[Important] – Difference between kinematics & driving dynamics:**

AnalyzerPro differentiates between examinations focussing on kinematics and driving dynamics, mathematically as well as graphically.

Short Reminder:

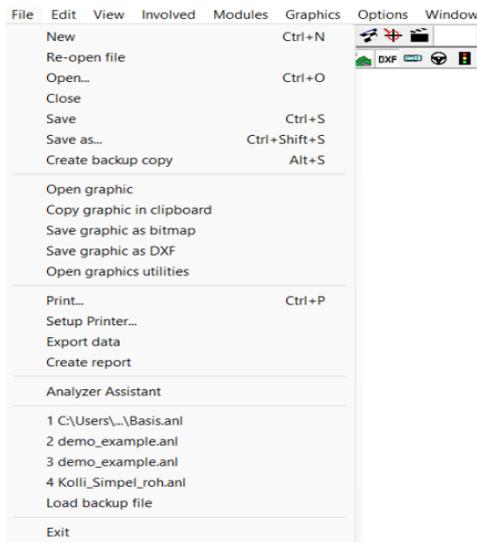
- Kinematics deal with the movement of points in the space without effects to any forces. In kinematics all driving processes are calculated, especially the pre-collision phase, .
- Driving dynamics (resp. kinetics) are used for all calculations in which forces act are carried out here, f.e. collision analyses, skidding and similar driving processes.

Basically, you should always work in the kinematics window (Movie). This is where you carry out all drawings here. Even dynamic driving calculations are exported to the kinematics window after completion.

Tip: You should always be aware of this distinction, especially in the beginning. We recommend that you work with kinematics as a rule.

## SAVE, OPEN & GENERAL SETTINGS

Like in common Windows programs, you find a tab called „File“ in the upper left area of the monitor. Use this menu to create projects, open, save and print them.



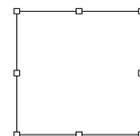
If AnalyzerPro crashes, a backup copy is automatically created. When you restart the programme, you will be asked whether you want to reload it.

When you save an Analyzer file, 2 additional folders called 'Maps' and 'DXF' are created. These contain all the images, DXF drawings and 3D models used in the report. So if you want to copy your case to another PC, copy not only the '.anl' but also these two folders.

**YOU CAN ACCESS GENERAL PROGRAMME SETTINGS UNDER THE 'OPTIONS' TAB AND THE 'SETTINGS' SELECTION.SKETCHES**

The drawing toolbar is located in the left area of the Movie window. The drawing tools are always controlled in the same way. For some drawing objects, a settings window is automatically opened after creation.

You can select objects with the left mouse button. You can recognise the selection by small rectangles around it. If an object is selected, you can move and scale it.



If you want to rotate an object, mark it and press the key „R“ afterwards or press the icon . The small  rectangles change to small circles and a rotation point appears. This can also be moved.

**LINE OBJECT TYPE A**



These lines or areas are drawn by clicking in the window with the left mouse button and drawing the graphic object with the left mouse button held down.

## LINE OBJECTS TYPE B

Icons: 

These lines are created by clicking on the image with the left mouse button. Each additional left mouse click creates a further interpolation point. You can terminate the drawing process with a double left-click or a right-click.

Tip: When you move your cursor on the curved line object, the real length is shown.

## LINE OBJECTS TYPE C

Icons: 

Create this type of objects with a left-click on the desired spot.

## INSERT IMAGES

Icon: 

When you select this button and left-click on the desired spot afterwards, a file browser opens up. You can choose a suitable image and insert it to the sketch with only a few clicks. You can also simply drag and drop images and DXF into the programme.

### **[Important] – Scale image:**

To ensure that the image has the right scale, please mark the image, perform a right-hand click and choose the option „Scale“. The programme instructs you on all further steps.

## GOOGLE MAPS

 Icon:

Here you can insert a map directly from Google Maps. The map is automatically scaled.

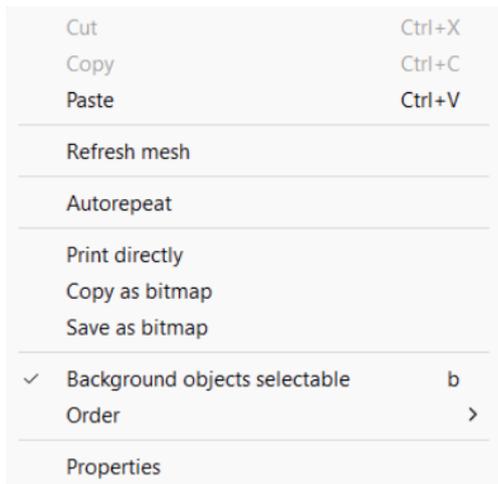
## EDIT GRAPHIC OBJECTS

To edit an object, mark it with a left-click, open the pop up menu with the right mouse button and choose “Properties”. Alternatively, you can also press the „Enter“ button after marking.

The „Properties“ menu allows you to adjust colours, geometry and many other options. Depending on the respective object type, different options are available.

## LAYER & BACKGROUND OBJECTS

You can determine graphic objects as „background objects“ in the tab „Properties“ in the „Properties“ menu. If you right-click on the image without having marked an object, you can



activate or deactivate the option „Background objects selectable“. If it is deactivated, background objects cannot be shifted anymore (unintentionally).

Furthermore, you can assign graphic objects to a certain layer in the „Properties“ menu/“Properties“ tab. Layer are image levels that can be activated or deactivated. As soon as graphic objects are allocated to a layer, the layer is shown in colour and can be activated or deactivated.



## VEHICLE DATA

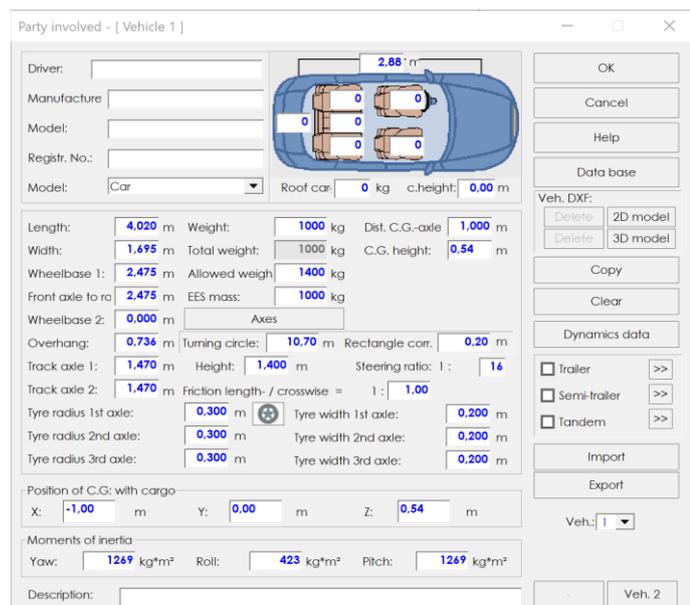
Vehicle data can be inserted via the car icon (  ) in the upper left area. All vehicle-specific parameters can be entered here.

## VEHICLE TYPES

Select the vehicle type in the upper left area of the input mask. You can choose between cars, pedestrian, non-moving obstructions and many more. Please note that you also have define non-moving obstructions as „vehicle“ if you want to use one. Collision analysis with graphic objects only is not possible!

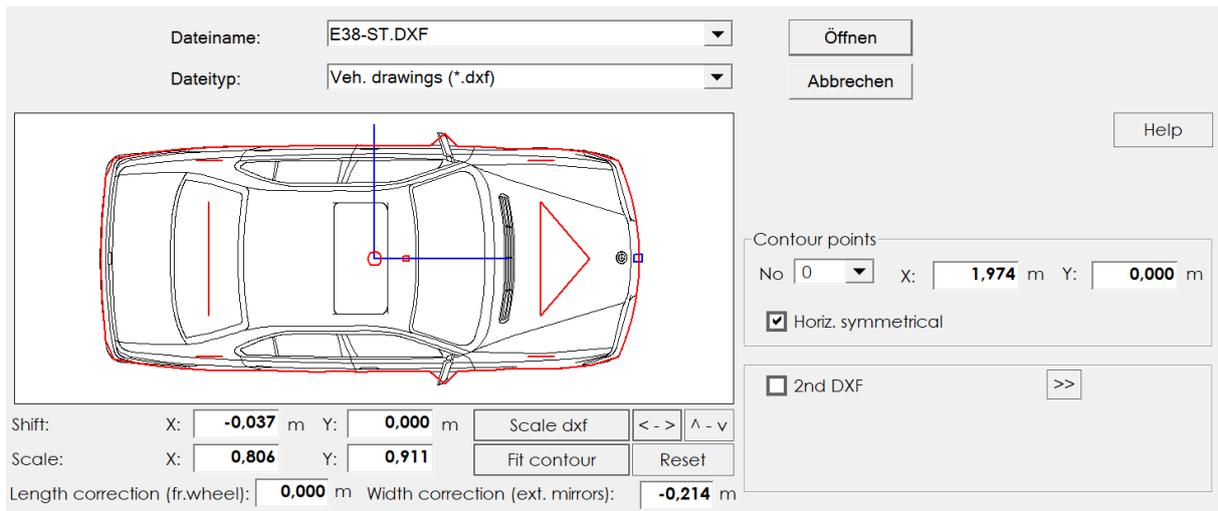
## DATABASE

The button „Database“ leads you to an integrated vehicle database with various searching functions. The database only contains geometrical data, but no data relevant for driving dynamics (f.e. spring stiffness). If you have the Autoview DXF database, you can link it in the database and the DXF will be loaded automatically.



## 2D MODELS

Here you can manually assign DXF drawings to vehicles. A small DXF database is at your disposal in your Analyzer installation folder. This step is only necessary if you have not previously loaded the DXF automatically via the Autoview database.



Use the scaling function to adapt the DXF to the geometrical specifications (red contour). Furthermore, the outline can be adjusted for collision analysis. Usually the following procedure is recommendable: 1. Press „Scale DXF“, 2. Press „Fit Contour“, 3. Leave the input mask via „Open“.

### 3D MODELS

To choose an appropriate 3D model, use the 3D model database in your Analyzer installation folder.

### MAIN DATA WINDOW

 The main data window („Distance-time data“) represents the centrepiece of all calculations in AnalyzerPro. Regardless of the calculation place (directly in the mask, from a module or exported from collision analysis), all information can be found here. The calculations are based on so-called phases which are concatenated. You can open the main data mask via the toolbar in the middle of the monitor.

Person involved

Name:

Car:

Calculation

Forwards (Beg. --> End)

Backwards (End --> Beg.)

OK

Help



|                  | << | 1     | 2       | 3     | 4     | 5    | 6    | 7    | >>               |
|------------------|----|-------|---------|-------|-------|------|------|------|------------------|
| Phase            |    | Brake | Buildup | Reac  |       |      |      |      |                  |
| Final velocity   |    | 0,00  | 42,60   | 45,12 | 0,00  | 0,00 | 0,00 | 0,00 | km/h             |
| Distance         |    | 10,00 | 2,46    | 12,53 | 0,00  | 0,00 | 0,00 | 0,00 | m                |
| Deceleration     |    | 7,00  | 7,00    | 0,00  | 0,00  | 0,00 | 0,00 | 0,00 | m/s <sup>2</sup> |
| Time (interval)  |    | 1,69  | 0,20    | 1,00  | 0,00  | 0,00 | 0,00 | 0,00 | s                |
| Initial velocity |    | 42,60 | 45,12   | 45,12 | 0,00  | 0,00 | 0,00 | 0,00 | km/h             |
| Total distance   |    | 10,00 | 12,46   | 24,99 | 0,00  | 0,00 | 0,00 | 0,00 | m                |
| Total time       |    | 1,69  | 1,89    | 2,89  | 0,00  | 0,00 | 0,00 | 0,00 | s                |
| Position dist.   |    | 0,00  | 10,00   | 12,46 | 24,99 | 0,00 | 0,00 | 0,00 | m                |
| Position time    |    | 0,00  | 1,69    | 1,89  | 2,89  | 0,00 | 0,00 | 0,00 | s                |

Calculate

Zoom

### FORWARDS / BACKWARDS

You can choose between „Forwards“ and „Backwards“ calculation in the upper right corner of the input mask. **Please note that this choice has nothing do to with driving direction!** It rather determines whether you are dealing with an initial or final value problem.

„Forwards“: Initial conditions are known; end conditions are to be investigated. F.e.: A vehicle drives off from standstill up to acceleration a. Which distance did it cover after t seconds?

„Backwards“: End conditions are known; initial conditions are to be investigated. F.e.: You know the final position of the vehicle and see skid marks. Where and at which velocity did the vehicle react (see image above)? You will usually work with this variant.

### MOVIE CONTROL

As soon and only if you have calculated in the main data mask, the respective vehicle is shown in the Movie window. **It is NOT possible to show a vehicle without input of distance-time data!**



You can control the Movie sequence with the Play bar in the lower left monitor area. It functions similar to a tape recorder.



**[Important] – Time sequence:**

Time progresses from positive (+) to negative (-). The idea is to position the most important point in time (f.e. the collision) at the temporal zero point; this is advantageous for synchronisation.

## COORDINATE DISPLAY

Icon: 

Click on the icon to open up a window with all relevant information about the depicted vehicles in real-time.

| Coordinates |       |            |      |             |              |                        |
|-------------|-------|------------|------|-------------|--------------|------------------------|
| Position    |       | s = ---- m |      | t = 1,876 s | t from Start |                        |
|             |       |            |      |             | t = 1,014 s  |                        |
| Vel         | s (m) | v          | a    | Phase       | Radius       | an (m/s <sup>2</sup> ) |
| 1           | 12,28 | 45,10      | 0,50 | Buildup     | ----         | 0,00                   |

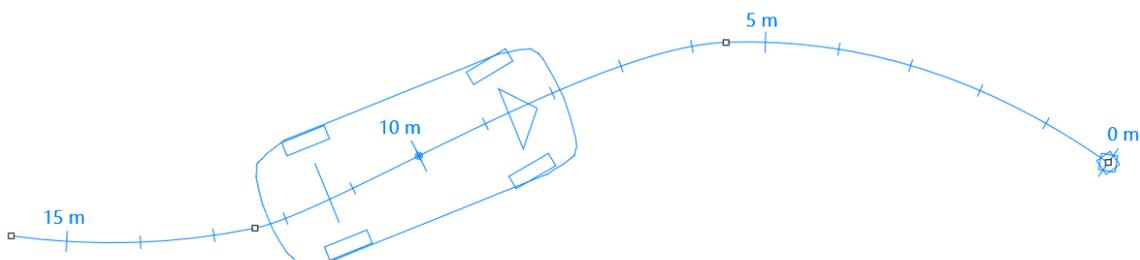
## DRIVING LINE

Every calculated driving process is depicted with a driving line in vehicle colours. In kinematics mode, the centre of gravity moves along the driving line like on rails. **You can shorten or prolong the driving line as you like, the vehicle will always drive exactly the route that you have calculated!**

If you want to curve the driving line, mark it, move the cursor to the desired point until it is depicted as a hand and press the "F9" button. An additional point is inserted that you can use to shape the curve according to your wishes. **Please note that you have to examine yourself whether the curve is still driveable from a physical point of view**, hence, the curves should not be too steep. As a reference value, "an" (= lateral acceleration) in the coordinate display should usually not exceed 6 m/s<sup>2</sup>.

## WHERE IS THE VEHICLE GOING?

The vehicle only ever travels exactly as far as the calculation shows. However, you can draw the driving line as long as you like. The measuring point from which the calculated distance is measured is called the 'base point' and is marked with an asterisk.

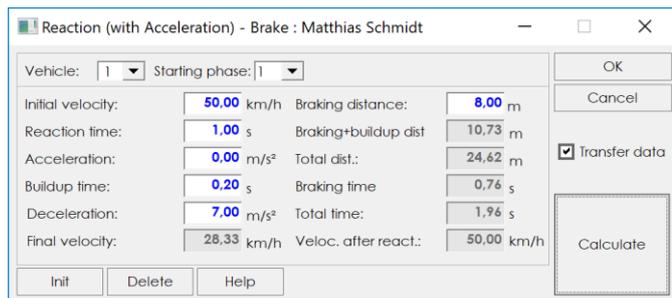


Example: A journey over 10 m has been calculated here. Although the driving line is longer, the vehicle still starts 10 m before the zero point (indicated by the star).

## MODULES

AnalyzerPro comprehends a wide range of modules for various accident situations. The module "React-Brake" shall be used to illustrate the handling of the modules.

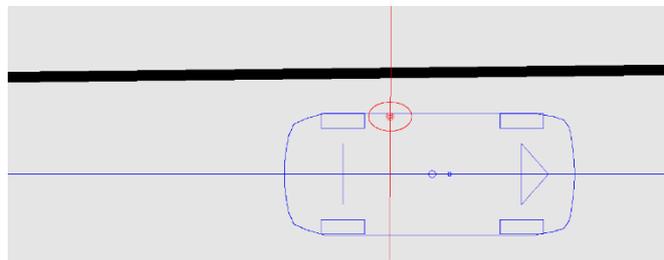
In each module, you can choose for which vehicle and starting with which phase you would like to calculate. **All module calculations are automatically transferred to the main data mask.** This way you have the possibility to add further phases to the main data mask. If you do not want to transfer data to the main data mask, untick the box "Transfer data".



## SYNCHRONISATION

Use the following example to fine-tune the driving processes of two or more vehicles:

A pedestrian shall closely pass by behind a vehicle, however, after completing the calculation, the positioning of the parties involved is incorrect, as shown in the picture. The vehicle is at the right place at the „wrong time“.



1. Keep in mind at which place both parties shall be on the same time.
2. Deactivate one of the parties in the upper middle bar: 
3. Shift the vehicle with the Movie slider into the desired position.
4. Press the button „Shift curves to zero“ . At time  $t = 0$ , the vehicle is located at the previously chosen position now.
5. Perform step 1-4 for the other vehicle as well.

Further possibilities of synchronisation can be found in the main manual.

After the synchronisation, it is possible that the vehicles do not drive off at the same time. Use the icon "Fit starting time"  to add additional phases of constant velocity, so that all involved parties start simultaneously again.

## DIAGRAMS

Open the distance-time diagram via the icon . The data of all depicted vehicles is automatically displayed. Further diagram types can be found in the menu "Graphic" -> „Diagrams“.

If you want to exit the „Diagrams“ window, press the button „X“ in the upper right corner.

## DRIVING DYNAMICS

You can access the driving dynamics menu either via „Modules“ -> "Driving Dynamics" or via the icon  in the upper right area of the monitor. Collision analysis is also conducted in this module. The bar on the lower area of the monitor tells you if you currently work in the kinematics or driving dynamics window:

The following bar appears on the right: 

**Attention: In contrast to kinematics, forces are not considered in driving dynamics!**

Different to the Movie window, vehicles can be activated and deactivated in the driving dynamics window with a click on the vehicle number in the lower bar. Calculations in advance are not absolutely necessary.

**SIMULATION DATA**

Icon: 

You can specify certain driving behaviours in the simulation data. As an example, we take a closer look at the area „Brake / Throttle“ on the right side; the other areas function similarly.

Insert the point in time when the process starts in the column „Time“. Please note that it does not specify time frames! Specify the respective driving process to the right, including the buildup time needed to achieve a desired value. In our example, the driving process can be described as follows:

| Brake/Throttle (Pedal position %) |       |          |         |
|-----------------------------------|-------|----------|---------|
| Time (s)                          | Brake | Throttle | Buildup |
| 1                                 | 0,000 | 0        | 70      |
| 2                                 | 2,000 | 0        | 0       |
| 3                                 | 4,000 | 80       | 0       |
| 4                                 | 0,000 | 0        | 0       |
| 5                                 | 0,000 | 0        | 0       |
| 6                                 | 0,000 | 0        | 0       |
| 7                                 | 0,000 | 0        | 0       |
| 8                                 | 0,000 | 0        | 0       |
| 9                                 | 0,000 | 0        | 0       |
| 10                                | 0,000 | 0        | 0       |

1. Second 0 – 2: The activation of the gas pedal reaches 70% within a second; the activation level is then remained for one further second.
2. Second 2 – 4: Within 0,5 seconds the level decreases from 70% to 0%, afterwards the vehicle continues driving for further 1,5 seconds without braking (only decelerated by friction values etc.).
3. Second 4 – Standstill: Within one second, the braking pedal builds up to 80%. Unless defined in the settings, the simulation continues until all vehicles have reached standstill.

**BASIC DATA**

If your vehicle shall start with certain pre-conditions, f.e. an initial velocity, please use the Basic Data menu (icon  in the right bar) to specify them.

**DRIVING DYNAMICS DATA**

To specify vehicle-specific data for driving dynamics, open the menu „Vehicle data“ (Icon: ) and click on the button “Dynamics data”.

**COLLISION ANALYSIS**

The simplest way to carry out a collision analysis is the ‘Automatic collision analysis’, which you will find under ‘Modules’ under this name. Follow the module steps from 1 - 5:

- 1. Specify collision positions
- 2. Specify end positions
- 3. Enter parameters
- 4. Calculate
- 5. Result

1. Enter the presumed collision position of the vehicles at the time of the deepest penetration (NOT the first contact).
2. Indicate the final positions of the vehicles.
3. Specify which accident parameters you know and which you want to know. There is always a range 'from - to' and a tick with a fixed value. If you know the value, select the tick and enter the value, otherwise enter a range.

4. 'Calculate'. AnalyzerPro will now find 10 independent optimum solutions in several hundred calculations. The 'Quality' indicates how close the desired end position is to the calculated end position.
5. Result: Here you can view the various solutions graphically and select the desired solution for further processing.

|             |                                   |   |                                    |                                     |                                   |      |
|-------------|-----------------------------------|---|------------------------------------|-------------------------------------|-----------------------------------|------|
| Speed       | <input type="text" value="10,0"/> | - | <input type="text" value="100,0"/> | <input type="checkbox"/>            | <input type="text" value="50,0"/> | km/h |
| Brake pedal | <input type="text" value="10"/>   | - | <input type="text" value="90"/>    | <input checked="" type="checkbox"/> | <input type="text" value="80"/>   | %    |

### COLLISION ANALYSIS USING THE PULSE FORWARD METHOD (MANUAL)

You can also carry out the collision analysis manually. To do this, select 'Modules' -> 'Collision analysis pulse forwards'. Details can be found in the manual.

### TRACKING ANALYSIS & MOMENTUM BACKWARDS

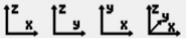
For collisions with easily visible skid marks, you can use the module „Tracking analysis“ followed by the submenu „Momentum backwards“ in the collision analysis. Please consult the main manual for further information.

### 3D

Open the 3D view with the icon  to show your calculated driving processes in 3D. You can depict and play several windows at a time.

### NAVIGATION

The buttons in the upper toolbar of the 3D window allow you to move the camera. 

Alternatively, you can use the mouse wheel to zoom and press the left mouse button to move the camera. Press and hold the centre mouse button to move the view. Use the coordinate buttons to switch to different viewing modes. 

You can guide the 3D sequence like in the Movie.

### LIGHT AND SUN

Icon: 

This menu is equipped with features to adjust the sources of light or calculate the correct position of the sun during the collision, based on time and geographical information.

## CAMERA POSITION

Icon: 

Use this icon to position the camera in relation to the vehicle. The button "Relative to vehicle X" positions the camera on the driver's seat. The option „Look at vehicle X" instructs the camera to follow one specific vehicle.

## EXPORT

Having completed your report, AnalyzerPro offers you several options to export it.

### CREATE REPORT

Under 'File' -> 'Create report', you can automatically create a report of your calculations. This contains not only the input and output values, but also the formulas used.

## VIDEO

Icon:  With this button, you can create a video of your accident analysis. Choose the desired point in time in the input mask and tick the box "Generate .avi file". It might take some minutes until the video creation is completed.

## PRINT / PDF

The menu „File“ -> „Print / PDF“ respectively the icon  leads you to a preview window in which you can either directly print the document or save it as PDF.