

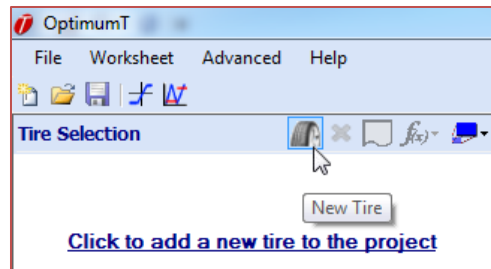
# Tutorial 1 – Importing Data

Welcome to this tutorial in which we will look at how to import raw tire data into OptimumT. In this tutorial you will learn how to:

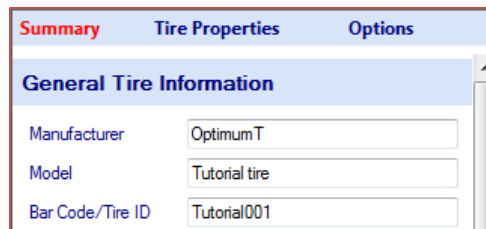
1. Loading files
2. Using *Import Templates*
3. Review the data using both a normal graph and a report graph

## 1. Loading a file

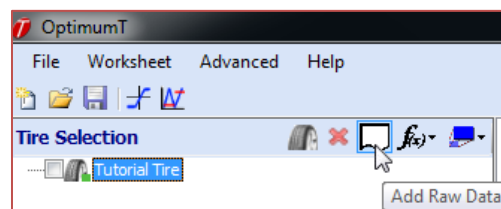
Start OptimumT and create a new project. Click the “New Tire” button to create a new tire. Under each “Tire” you will later be able to store raw tire data, tire models. You can think of a tire as a “folder” which holds these things.



You can now enter additional data about your tire, such as specifications, dimensional data for tire and rim as well as manufacturing information.



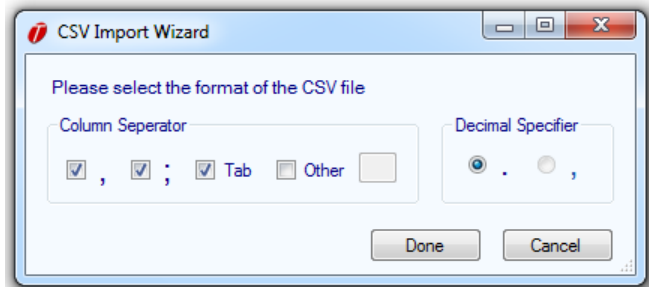
Good, now that we have a tire we have two options, either we create a tire model and manually enter the coefficients. We will look closer how to do that later, instead we are going to import some raw data.



The import window will now popup, select the file you want to open, for example the Tutorial Sample file. The next window that will pop-up will ask you about your file settings if you are importing a .CSV file. Make sure that settings match the one in your data file before clicking “Done”.

## Did you know:

If you have multiple data files in the same format, you can select multiple files in the open file window. The same import settings will be applied to all selected files.



OptimumT will now load the first 100 rows of the data into the *CSV Import Wizard*. In this window we will do all our import settings. The most important settings here is to specify which data is in which column and in what unit the data is stored. In the dropdown boxes above each column, select the appropriate measurement and unit. For example, in the column marked SA we pick Slip Angle as measurement and “Degrees” as unit. Continue to do so for each column you want to import.

Dropdown boxes

Missing values

Coordinate system

SA	IA	RL	RE	P	FX	FY	FZ
deg	deg	cm	in	kPa	N	N	N
-0.001	0.041	21.693	379.05	83.33	-10.01	-37.46	-958.31
-0.001	0.034	21.696	271.13	83.46	-11.04	-36.72	-957.00
0.003	0.041	21.693	548.49	83.46	-16.43	-38.14	-959.07
-0.001	0.040	21.693	358.24	83.40	-8.71	-40.24	-959.27
-0.001	0.040	21.691	527.25	83.46	-15.67	-38.13	-961.35

**Specify missing values**

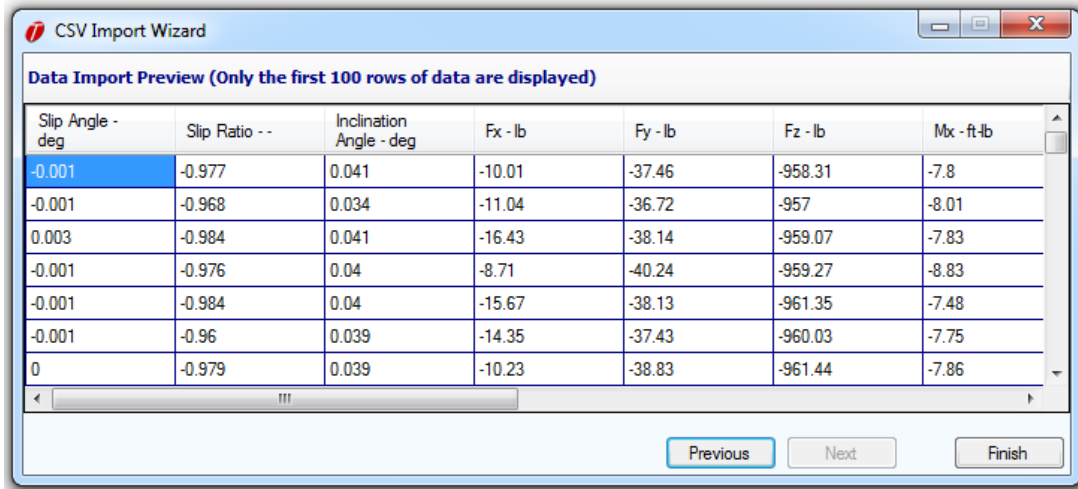
Slip Angle: 0 deg  
 Slip Ratio: 0 -  
 Inclination Angle: 0 deg  
 Speed: 0 m/s  
 Fx: 0 N  
 Fy: 0 N  
 Fz: 0 N  
 Pressure: 0 bar  
 Mx: 0 N-m  
 My: 0 N-m  
 Mz: 0 N-m  
 Loaded Radius: 0 m  
 Wheel Speed: 0 deg/s

Data Coordinate System: SAE, Default  
 Downsampling: User every sample

Buttons: Previous, Next, Finish

You may also specify values that might not be in your data, for example you might not have the wheel speed data. You can then set this as “constant” using the text boxes below. Finally we need to select

which coordinate system the data is recorded in. This is something that typically is specified in a document describing the test data. If you don't know which coordinate system your data is recorded in. You can import data the in any coordinate system and later on convert it to the correct coordinate system. Now click "Next" to see a preview of the import. Make sure that the heading of each column matches the data.



Click "Finish" to finalize the import. OptimumT will now read the entire file and in if you are importing a large amount of data, this might take some time. That's it, we know have tire data imported into OptimumT!

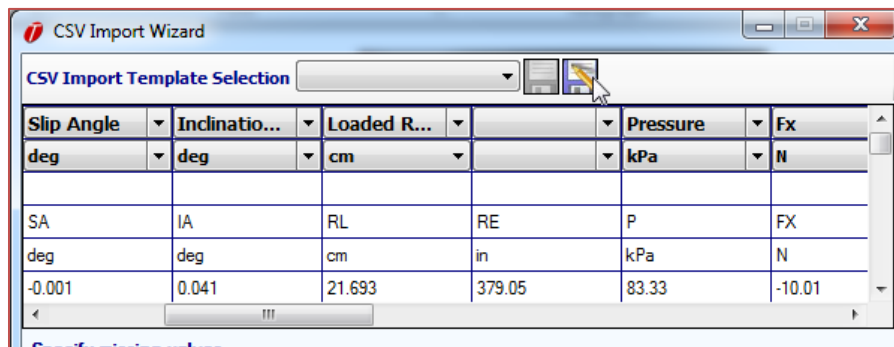
## Did you know:

In OptimumT templates can help you to work more efficient. Create templates for imports, graphs, exports, fitting and cropping. It just saves you time!

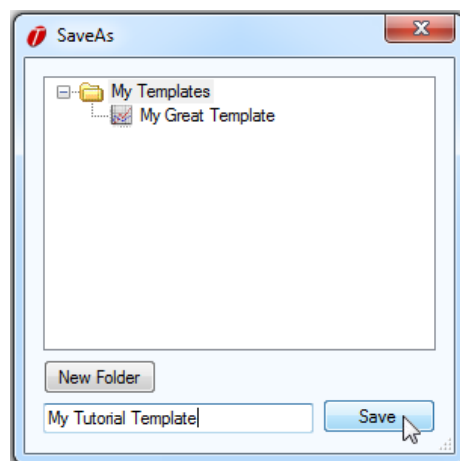
## 2. Using Import Templates

Ok, so now we know how to import a tire data file into OptimumT. The most time consuming part was setting all the dropdown boxes in the import wizard. Having to do this every time wouldn't be very efficient, that's why OptimumT has *Import templates*. Import templates are a way of saving the import configuration so that you don't have to enter all of them over and over.

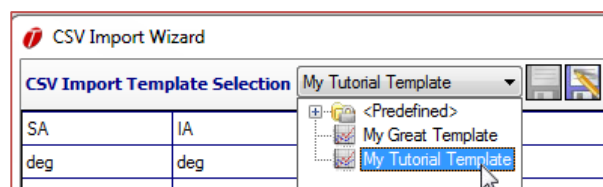
When you have the import wizard window open and you have made all your import settings. Click the save button in the upper part of the window.



This will bring up the *Import Template* save window. As you can see, I already have a template saved (My Great Template). I can click on that one if I want to overwrite it. In this case I'm going to save this template as "My Tutorial Template". I enter the name and hit Save.



Next time I want to use my template, I can just access it from the dropdown box. All the settings will now automatically be filled out. A great time saver!

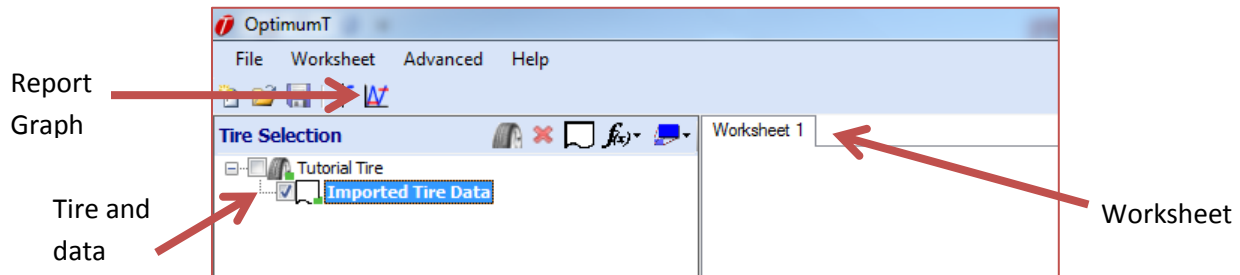


### 3. Review the tire data

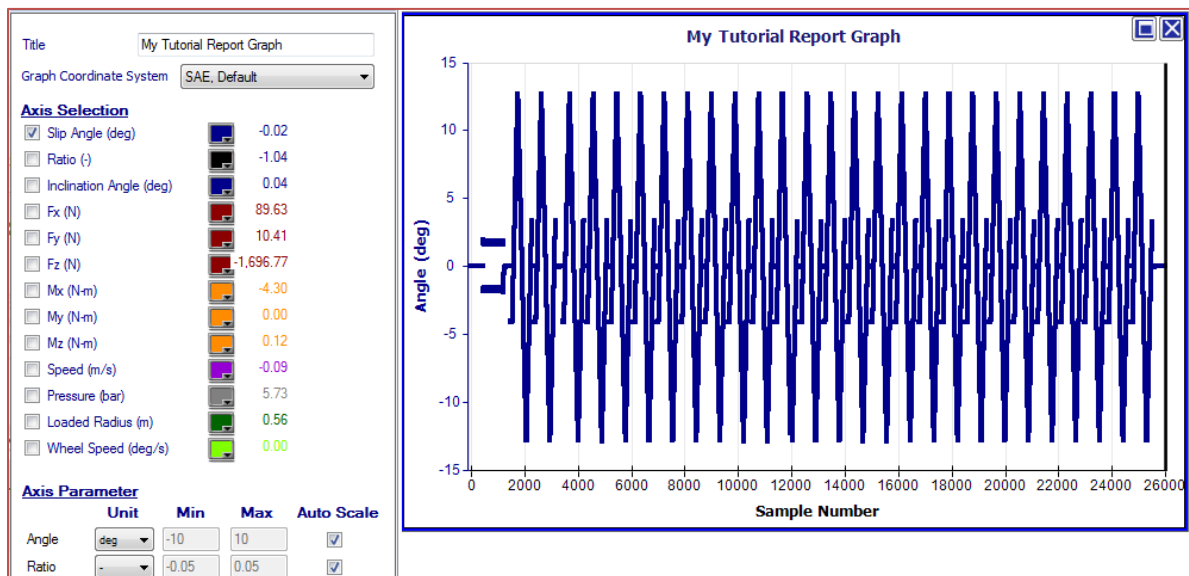
#### 3.1 Report graphs

Now that we have some data in OptimumT, let's take a look at it. In this tutorial we will just use some of the most basic graphing functionality in OptimumT, but in Tutorial 4 we will really dive into it!

We can now see the data in the tree. I have renamed it data to "Imported Tire Data", typically it will have the same name as your data filename. To the right we have our first worksheet; it is by default called "Worksheet 1". By right clicking on it we can rename it or add new worksheets.

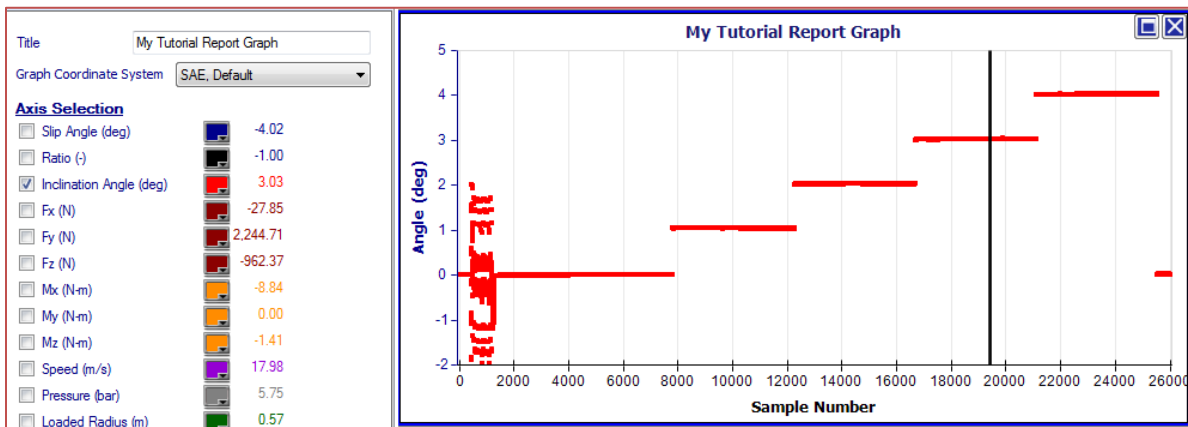


The first thing we will do is to look at the data in a *Report Graph*. This graph allows us to look the data in the order it has been collected. It provides some insight on the testing sequence and helps us understand how the data was collected. Click the *Report Graph* icon in the toolbar. A new window will now appear on the Worksheet. Feel free to move it around and change the size. In the panel to the right all the settings for this graph will appear. Most of the times in OptimumT, any settings for a graph or window will be found in the left panel. In the left panel click the box next to "Slip Angle". In the graph a blue line will appear showing the slip angle value for each data point. I can also add a title for the graph, I will call it "My Tutorial Report Graph".



In the graph we can see that there appears to some sort of warm up sequence before the real test starts. This is something we probably want to trim away before doing any fitting, more on how to do this in the next tutorial.

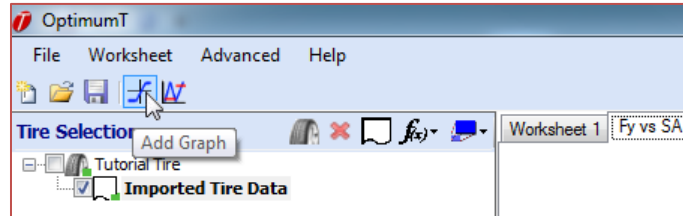
We can add more click more of the boxes to show more parameters in the graph. I unselect Slip Angle and select Inclination Angle. I also change the color of the data point to bright red. From the data I can see that tire appears to be tested at five different inclination angles. We can also clearly see the warm-up phase. Finally we can click anywhere on the graph to move the data cursor, which is represented by a black line. In left panel to the left we can also see the values for the data point.



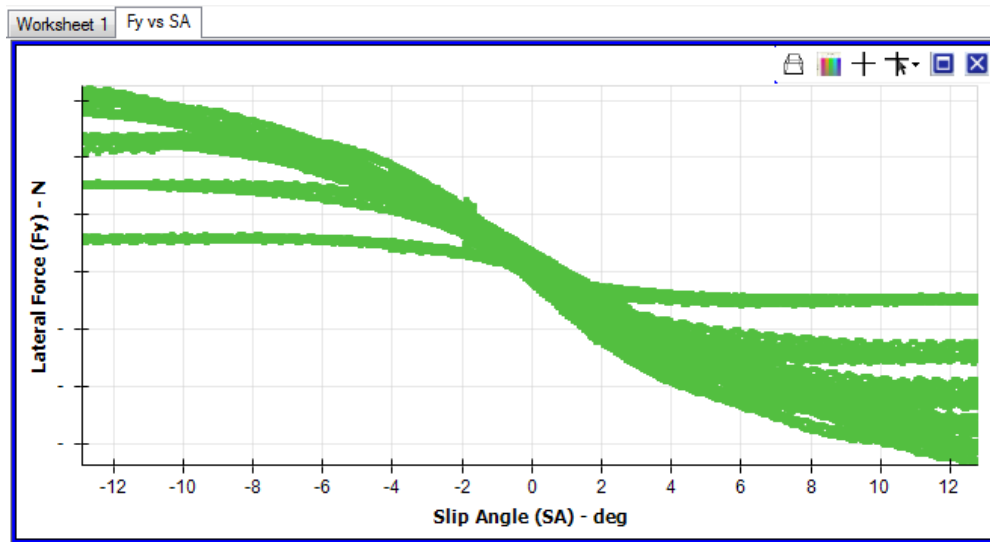
We have now seen how we can use the *Report Graph* to understand the tire data and how it has been collected. The next step we will be to look at the Force and Moment characteristics of the tire.

### 3.2 Graphs

At this point we are ready to start digging into the real characteristics of the tire. This means looking how forces and moments are generated. First thing we will do is to create a new Worksheet, right-click on "Worksheet 1" and create a new one, then let's rename it "Fy vs SA". Now click the the *Graph* button in the toolbar to add the graph.



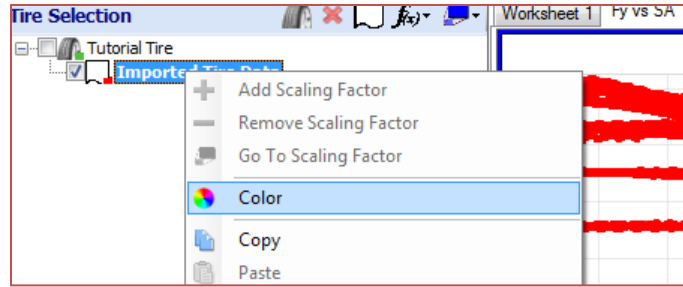
A graph will now appear in the worksheet, per default it will show lateral force versus slip angle. We can see that all each data point is represented by a little green marker.



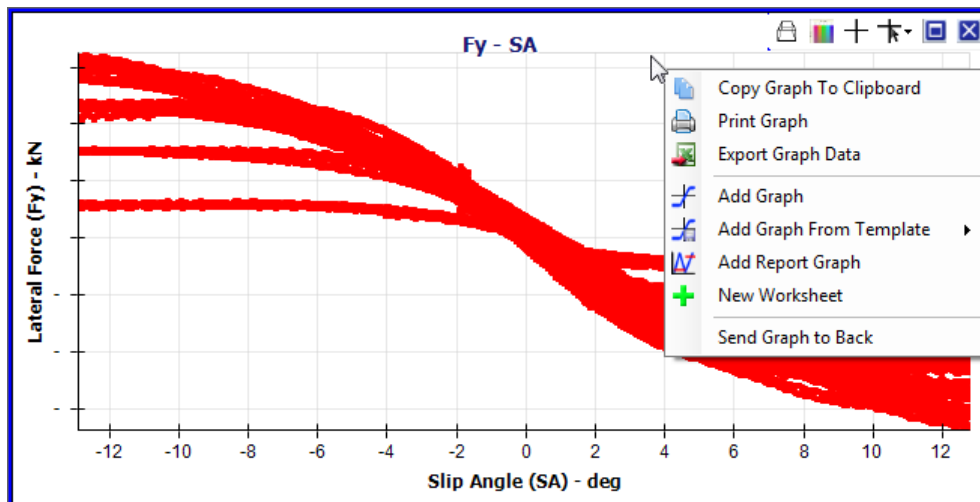
If we want to change color of the dots, we just go back to the tree on the left. We can see how both the tire and the data have a little green box next to it. This shows the color which is used for the tire/data in the graph. By right-clicking on the tire in the tree, we can change to color to red instead, or whichever color you prefer.

#### Did you know:

You can easily zoom with the mouse in a graph. Just press down the scroll wheel and select the area which you want to zoom in!

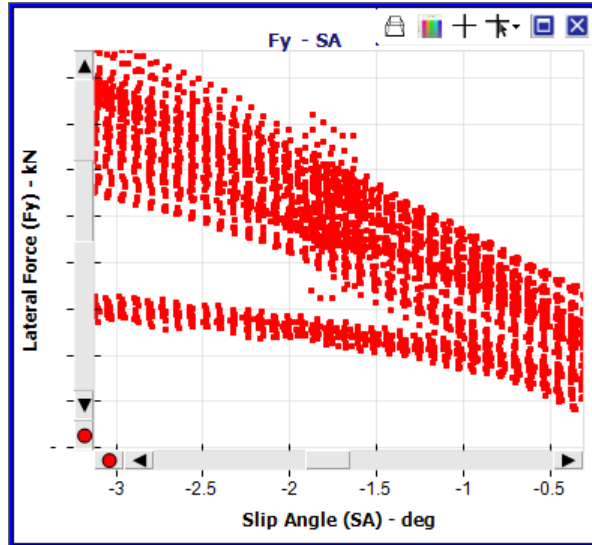


Next step will be to look at some of the tools built in to the graph. First, let's right-click on the graph. Here we can easily select options to get the export either the graph or the graph data into Excel or the clipboard. Very handy when creating reports or presentations. We can also see that we can create graphs from templates, more on graphing templates in Tutorial 4. Looking at the top left corner, we see a couple of icons. With these we can add legends (more in Tutorial 4), change the configuration of the axes and create Data Selection Cursors. Data Selection Cursors allows us to see information on a certain data point.



Before we end this tutorial, let's have a look at data in some more detail. If we study the graph above, it appears that there is something weird going on at around -2 degrees of slip angle. Let's zoom in!





It appears that what we see between -1.5 and -2 degrees of slip angle, is data from the warm up sequence. In the next tutorial we will look at how easily OptimumT can trim this data out. We will also look at how we can have OptimumT to color the graphs by test case (vertical load, camber etc.)