Speed Profile Calculator

Manual

Speed profile calculator

Compago TLC 2008

Indice generale

Created by Compago TLC 2008

compagotlc@gmail.com

Description

This program calculate a speed profile for a vehicle starting from the description of the path.

It can be used to calculate the max velocity of a car or a train or a tram along a specific path in respect of the visibility of the driver and the particular speed bond.

Another importat function is the calculation of the total time to cover a specified path, with the speed limit choosed.

Input

The inputs are the description of the path, that is divided in many pieces. Every pieces are identified by some parameters:

1. **Name** of the piece

2. **Length** , is the distance in meters

3. **Accelleration** of vehicle (it depends on mass,power,slope of the path ...)

4. **Decelleration** of vehicle (it depends on mass,power,slope of the path ...)

5. **Vinit** (optional), if you use it then the speed profile holds by it, if no is set to -1

6. **Vlimit** , is the max speed allowed

7. **Vexit**(optional), if you use it then the speed profile holds by it, if no is set to -1

8. **Initial stop time**(optional), is an optional stop time before to start in the initial point

9. **End stop time**(optional),is an optional sto timeat the end of the this part of the path

10. **Visibility** , is the max distance from a visible obstacle for the driver

11. **Reaction time** of the driver

Name	Length	Accelera...	Deceler...	Vinit	Vlimit	Vexit	InitStop...	EndStop...	Visibility	Reactio...
T0	226,04	1,1	-0,8	0	18,0555...	-1	0	0	-1	0
T1	19,34	1,1	-0,8	-1	11,1111...	-1	0	0	-1	0
T2	82,19	1,1	-0,8	-1	18,0555...	-1	0	0	-1	0
T3	62,27	1,1	-0,8	-1	7,77777...	-1	0	0	-1	0
T4	46,4	1,1	-0,8	-1	12,2222...	-1	0	0	-1	0
T5	143,63	1,1	-0,8	-1	10	-1	0	0	-1	0
T6	29,4	1,1	-0,8	-1	11,3888...	-1	0	0	-1	0
T7	43,2	1,1	-0,8	-1	6,38888...	-1	0	0	-1	0
T8	249,09	1,1	-0,8	-1	15,5555...	-1	0	0	-1	0
T9	70,2	1,1	-0,8	-1	13,8888...	-1	0	0	-1	0
T10	38,92	1,1	-0,8	-1	6,38888...	-1	0	0	-1	0
T11	81,65	1,1	-0,8	-1	15,5555...	0	0	0	-1	0

Graphic | Input table | Outputs | Options | Help

Name Length Acceleration Deceleration Vinit Vlimit Vexit Init Stop Time End Stop time Visibility Reaction Time

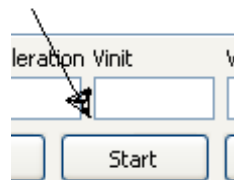Add Change Del Start Load inputs Save inputs Km/h <-> m/s

File input

You can insert the input data using the standard edit box or loading a formated input file:

T0;226,04;1,1;-0,8;0;18,055555555555;-1;0;0;-1;0

T1;19,34;1,1;-0,8;-1;11,111111111111111111;-1;0;0;-1;0

T2;82,19;1,1;-0,8;-1;18,055555555555555555;-1;0;0;-1;0

T3;62,27;1,1;-0,8;-1;7,7777777777777777;-1;0;0;-1;0

T4;46,4;1,1;-0,8;-1;12,2222222222222222;-1;0;0;-1;0

T5;143,63;1,1;-0,8;-1;10;-1;0;0;-1;0

T6;29,4;1,1;-0,8;-1;11,3888888888889;-1;0;0;-1;0

T7;43,2;1,1;-0,8;-1;6,388888888888888;-1;0;0;-1;0

T8;249,09;1,1;-0,8;-1;15,555555555555555;-1;0;0;-1;0

T9;70,2;1,1;-0,8;-1;13,888888888888888888;-1;0;0;-1;0

T10;38,92;1,1;-0,8;-1;6,38888888888888888;-1;0;0;-1;0

T11;81,65;1,1;-0,8;-1;15,555555555555555555;0;0;0;-1;0

Calculate

For start the calculation of the speed profile push the button START :

The program find the exact solution without approximation, the accuracy of the results depends on the right initial parameters.
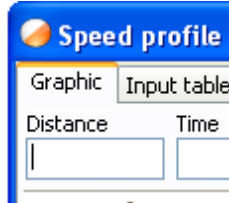
The model used for the calculation is not a "real",but a rounded model with a constant acceleration.

Outputs

The result of calculation are a graphic solution and a text solution.
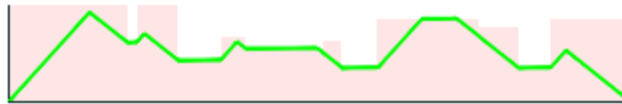
Graphic

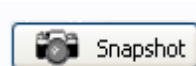The first one is show in the tab page GRAPHIC :

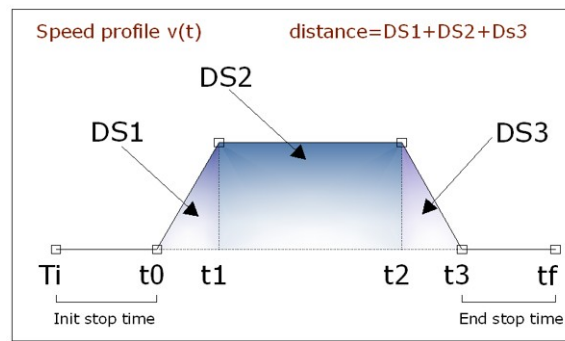and the drawing is composed by two plot:

- Time/Velocity plot
- Space/Velocity plot
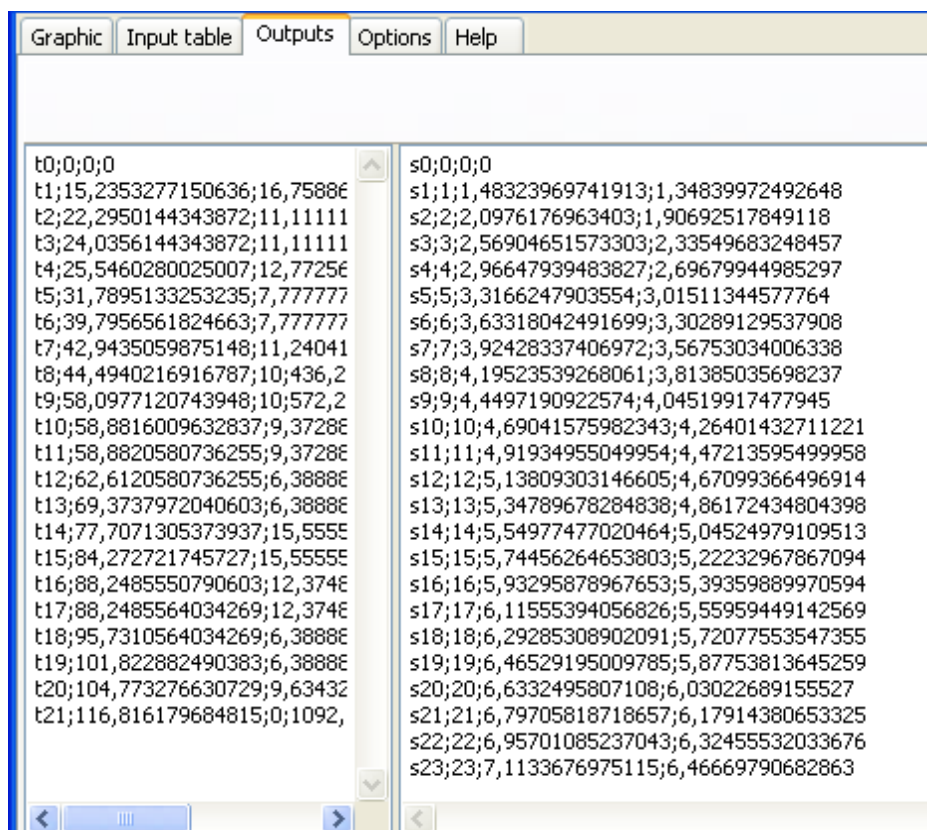

Time/velocity plot sample

The visualization of the drawings can be adjusted with pan and zoom (middle button of the mouse and wheel) and exported in bmp picture file format, using the snapshot button.

t7 t8		t9:10 t12	t13	t14	t15 t16	t18	t19 t20
042,94,49		58,108 62,61	69,37	77,71	84,27 88,25	95,73	101,8204,77

Parameters
Name T8	Length 249,09
Acceleration 1,10	Vinit 6,39
Deceleration -0,80	Vlimit 15,56
Init stop time 0,00	Vmax 15,56
End stop time 0,00	Vexit 12,37
Reaction time 0,00	Visibility -1,0

Time
Ti = 69,37
T0= 69,37
T1= 77,71
T2= 84,27
T3= 88,25
Tf = 88,25

Distance
S0=652,47
S1=743,91
S2=846,04
S3=901,56

Relative distance
S0= 652,47
S1= 743,91
S2= 846,04
S3= 901,56

Incremental
DS1=91,44m
DS2=102,13m
DS3=55,52m
Ts1= 8,33s
Ts2= 6,57s
Ts3= 3,98s

When a part of the path is selected in the botton are show the functional parameters of this part:

- **Parameters** , is the initial data that define the part of path (Vmax is calculated)
- **Time** , in the time axis there are six odd times:
  - T_i = initial time when vehicle come in the part of path
  - T_0 = when the vehicle start to move (if inititial stop time is 0 then T_0=T_i)
  - T_1 = when the vehicle reach the max velocity
  - T_2 = when the velocity begin to decrease
  - T_3 = when the vehicle stop or reach the Vexit for the next part of path
  - T_f = final time for the exit form the part of the path
- **Distance** and **Relative distance**, in the space axis there are four odd times:
  - S_0 = is the distance from origin
  - S_1 = is the space covered between T_i and T_1
  - S_2 = is the space covered between T_1 and T_2
  - S_3 = is the space covered between T_2 and T_3

  in DISTANCE the space measures are calculated by a origin value set in option tab

  in RELATIVE DISTACE this initial value is 0.
- **Incremental**, in this case the values are only three DS1,DS2,DS3 and are calculated from the origin of this part of the path.

Speed profile v(t)   distance=DS1+DS2+Ds3

Text

The second type of output is in text format:

That can be imported by other programs like Excel, Openoffice Calc.

You can find these files in the program directory with the name "*sv.txt*" and "*tv.txt*".

Options

The title is the string that is showed in the graphic page drawing.

The typical parameters are the values usually setted for all the part of the lines.

You can choose the font of the title or the font of the plot in the drawings,the colors of the two ploted profiles.

Advanced function

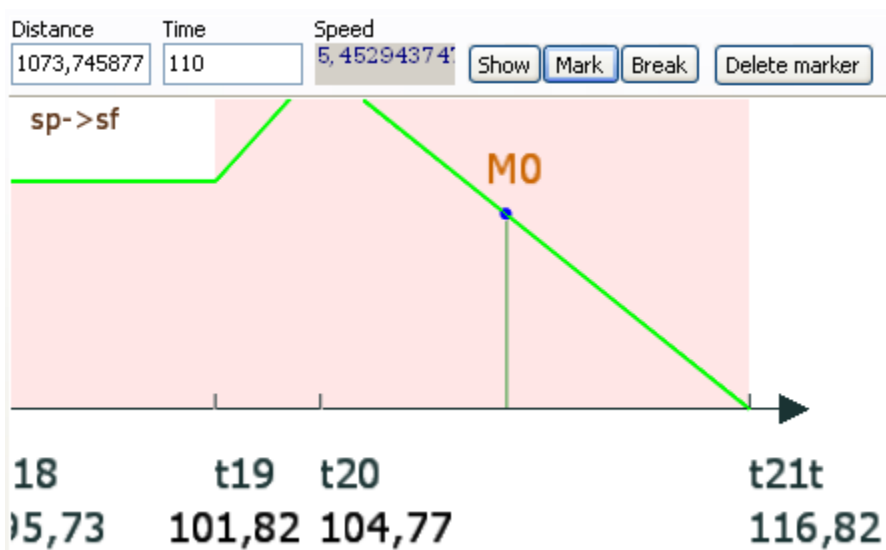After calculation of the plot you can do some change of the plot :

- Show
- Mark
- Break

The show function **draw** a single point after that you choose the "coordinates" on the profile:
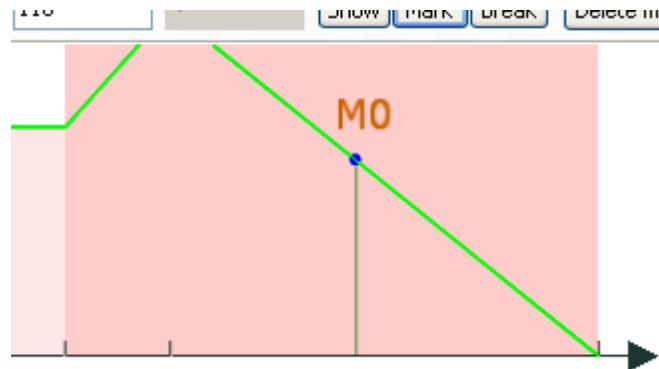

The function **mark** draw a mark in the point that u choose:

The selected mark can be delete using "delete mark" button.

The function **break** splits the part od the path in two part. This function doesn't change the result cause, in the break point, are mantained the speed continuity rules, but after this you can change the new parts and then calculate again the new profile.
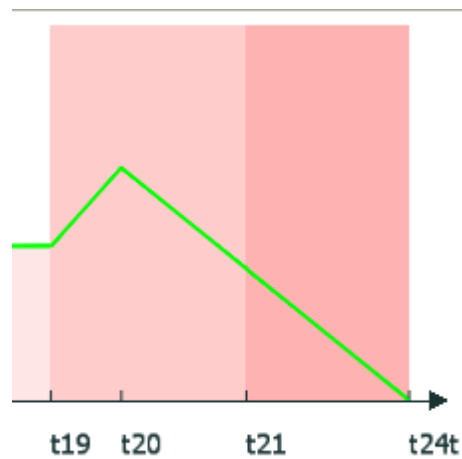

Before:

| T10 | 38,92 | 1,1 | -0,8 | -1 | 6,38888... | -1 |
| T11 | 81,65 | 1,1 | -0,8 | -1 | 15,5555... | 0 |

after:

T10	38,92	1,1	-0,8	-1	6,38888...	-1
T11	63,0658...	1,1	-0,8	-1	15,5555...	5,45294...
T12	18,5841...	1,1	-0,8	5,45294...	15,5555...	0

Now T11(81,65m) is splited in T11(63,0658m) and T12(18,5841m).

Load external plot

The program can load external plot from text file

the external file have to be in this format "*space* **;** *velocity*"or "*time* **;** *velocity*":

#sv

0;0

1;1,41

2;2

3;2,45

4;2,83

5;3,16

6;3,46

7;3,74

8;4

.....

when the points list begin with #sv means that the profile is space/velocity otherwise #tv means is time/velocity profile.