

Speed Profile Calculator

Manual

Speed profile calculator



Compago TLC 2008

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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 important 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. **Acceleration** of vehicle (it depends on mass,power,slope of the path ...)
4. **Deceleration** 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 stop time at 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	Acceler...	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	7,7777...	-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

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 formatted input file:

```
T0;226,04;1,1;-0,8;0;18,055555555555555;-1;0;0;-1;0
T1;19,34;1,1;-0,8;-1;11,1111111111111111111;-1;0;0;-1;0
T2;82,19;1,1;-0,8;-1;18,055555555555555555555;-1;0;0;-1;0
T3;62,27;1,1;-0,8;-1;7,7777777777777777777;-1;0;0;-1;0
T4;46,4;1,1;-0,8;-1;12,222222222222222222222;-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;11,388888888888889;-1;0;0;-1;0
T7;43,2;1,1;-0,8;-1;6,388888888888888888888;-1;0;0;-1;0
T8;249,09;1,1;-0,8;-1;15,555555555555555555555;-1;0;0;-1;0
T9;70,2;1,1;-0,8;-1;13,888888888888888888888;-1;0;0;-1;0
T10;38,92;1,1;-0,8;-1;6,388888888888888888888;-1;0;0;-1;0
T11;81,65;1,1;-0,8;-1;15,555555555555555555555;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.

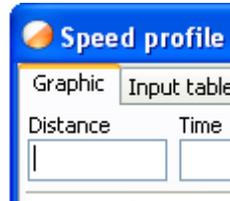
The model used for the calculation is not a “real”,but a rounded model with a constant acceleration.

Outputs

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

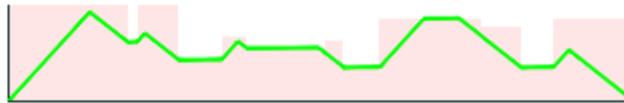
Graphic

The first one is show in the tab page GRAPHIC :



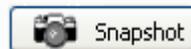
and the drawing is composed by two plot:

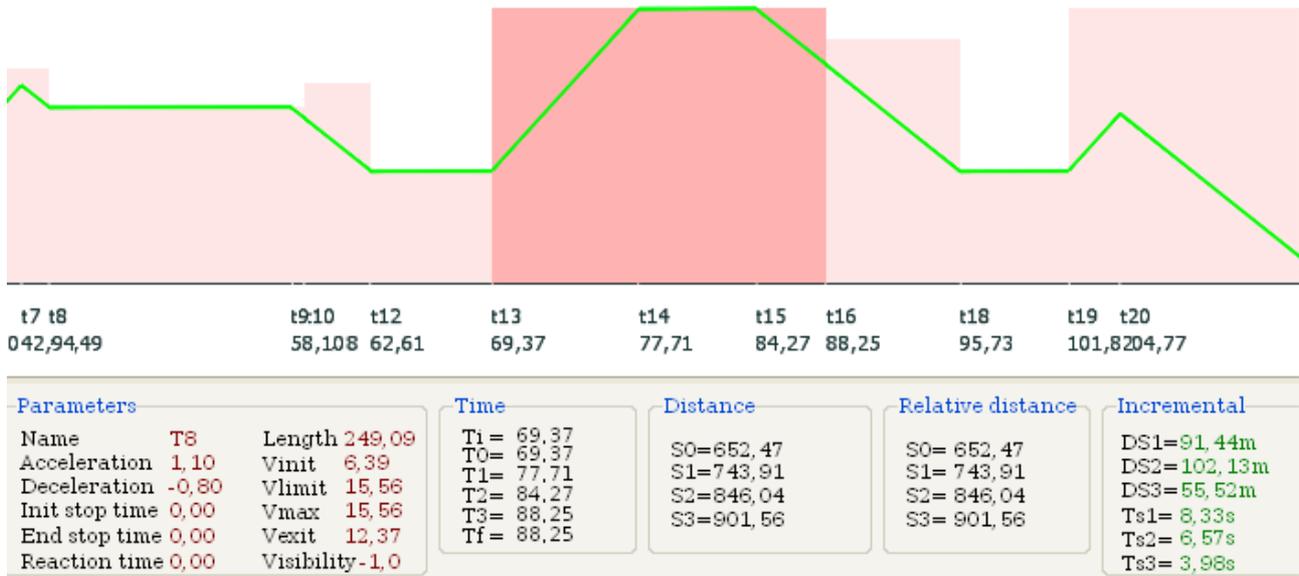
- Time/Velocity plot
- Space/Velocity plot



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.

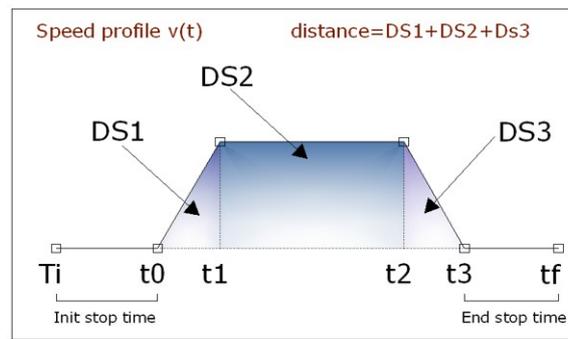




When a part of the path is selected in the bottom are show the functional parameters of this part:

- **Parameters** , is the initial data that define the part of path (Vmax is calculated)
- **Time** , in the time axis there are six odd times:
 - Ti = initial time when vehicle come in the part of path
 - T0 = when the vehicle start to move (if initial stop time is 0 then T0=Ti)
 - T1 = when the vehicle reach the max velocity
 - T2 = when the velocity begin to decrease
 - T3 = when the vehicle stop or reach the Vexit for the next part of path
 - Tf = final time for the exit form the part of the path
- **Distance** and **Relative distance**, in the space axis there are four odd times:
 - S0 = is the distance from origin
 - S1 = is the space covered between Ti and T1
 - S2 = is the space covered between T1 and T2
 - S3 = is the space covered between T2 and T3

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



Text

The second type of output is in text format:

```

Graphic  Input table  Outputs  Options  Help
-----
t0;0;0;0
t1;15,2353277150636;16,7588E
t2;22,2950144343872;11,11111
t3;24,0356144343872;11,11111
t4;25,5460280025007;12,7725E
t5;31,7895133253235;7,777777
t6;39,7956561824663;7,777777
t7;42,9435059875148;11,24041
t8;44,4940216916787;10;436,2
t9;58,0977120743948;10;572,2
t10;58,8816009632837;9,3728E
t11;58,8820580736255;9,3728E
t12;62,6120580736255;6,3888E
t13;69,3737972040603;6,3888E
t14;77,7071305373937;15,555E
t15;84,272721745727;15,555E
t16;88,2485550790603;12,374E
t17;88,2485564034269;12,374E
t18;95,7310564034269;6,3888E
t19;101,822882490383;6,3888E
t20;104,773276630729;9,6343E
t21;116,816179684815;0;1092,

s0;0;0;0
s1;1;1,48323969741913;1,34839972492648
s2;2;2,0976176963403;1,90692517849118
s3;3;2,56904651573303;2,33549683248457
s4;4;2,96647939483827;2,69679944985297
s5;5;3,3166247903554;3,01511344577764
s6;6;3,63318042491699;3,30289129537908
s7;7;3,92428337406972;3,56753034006338
s8;8;4,19523539268061;3,81385035698237
s9;9;4,4497190922574;4,04519917477945
s10;10;4,69041575982343;4,26401432711221
s11;11;4,91934955049954;4,47213595499958
s12;12;5,13809303146605;4,67099366496914
s13;13;5,34789678284838;4,86172434804398
s14;14;5,54977477020464;5,04524979109513
s15;15;5,74456264653803;5,22232967867094
s16;16;5,93295878967653;5,39359889970594
s17;17;6,11555394056826;5,55959449142569
s18;18;6,29285308902091;5,72077553547355
s19;19;6,46529195009785;5,87753813645259
s20;20;6,6332495807108;6,03022689155527
s21;21;6,79705818718657;6,17914380653325
s22;22;6,95701085237043;6,32455532033676
s23;23;7,1133676975115;6,46669790682863

```

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

Graphic Input table Outputs Options Help

Title

sp->sf

Typical parameters

Acceleration -1

Deceleration 1

Initial chainage 0

Visibility -1

Reaction Time 0

Step 1

Update

Font

Select font Scale 6

Tahoma 14 c\WindowText

Select font title

Tahoma 22 c\WindowText

Colors

Time / Velocity plot color 0 1 0

Space / Velocity plot color 0 1 0

Update colors

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 plotted profiles.

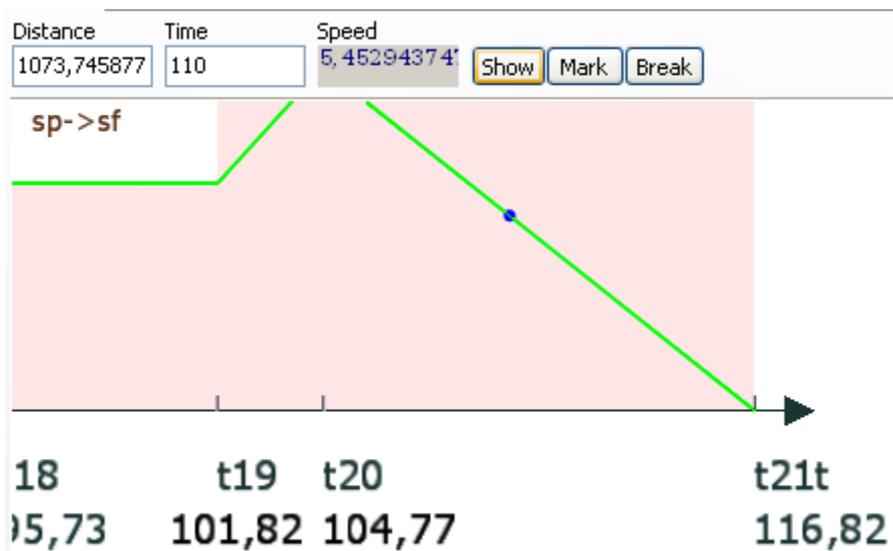
Advanced function

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

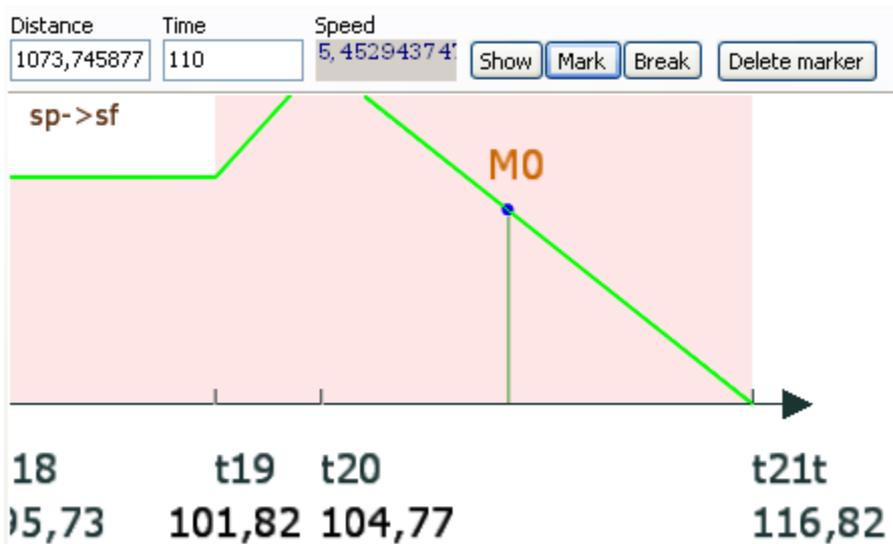
- Show
- Mark
- Break

Graphic	Input table	Outputs	Options	Help	
Distance	Time	Speed			
<input type="text"/>	<input type="text"/>	<input type="text"/>	Show	Mark	Break

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

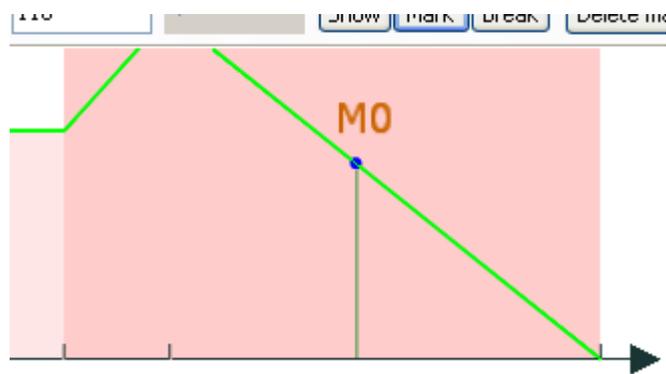


The function **mark** draw a mark in the point that u choose:



The selected mark can be delete using “delete mark” button.

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



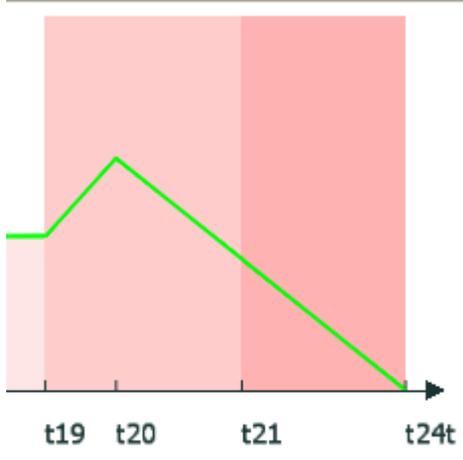
Before:

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

after:

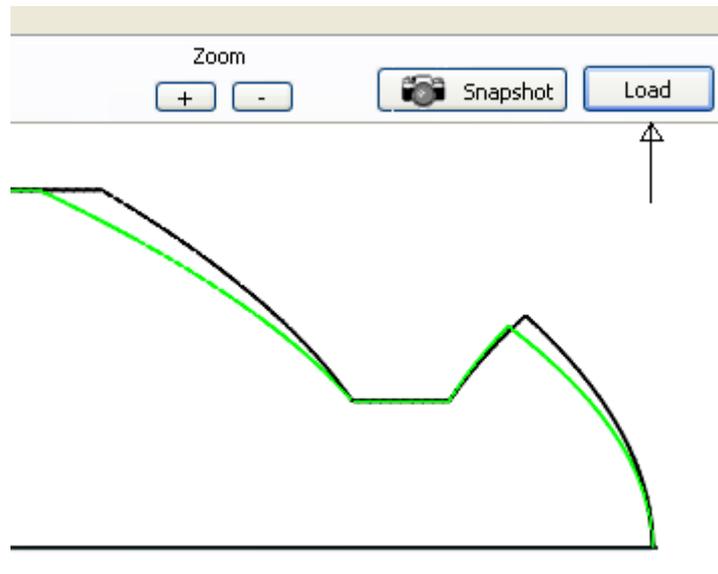
T10	38,92	1,1	-0,8	-1	6,38888...	-1
T11	63,0658...	1,1	-0,8	-1	15,5555...	5,45294...
T12	18,5841...	1,1	-0,8	5,45294...	15,5555...	0

Now T11(81,65m) is splitted 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.