

Speaker design program in Excel. There are more comments on the Documentation sheet.

Note that there are 2 columns for 2 designs, so you can do comparisons.

User inputs are in yellow. Edit other cells only with extreme caution

This pukey color highlights things that you should look at. Everything else, shown in normal background color, is stuff that the program is calculating for itself

Step 1. Enter the Thiele-Small parameters for the drivers that you are considering. Make sure

Thiele-Small Parameters	Design 1	Design 2	Units	SI Units 1	SI Units 2	Units
	Delta 15A	1505-8DT		Delta 15A	1505-8DT	
Name of design						
Fs	40	46.5	Hz	40	46.5	Hz
Re	6.3	5.67	Ohms	6.3	5.67	Ohms
Qes	0.57	0.414		0.57	0.414	
Qms	8.05	6.5		8.05	6.5	
Vas	270.7	164.3	liters	0.2707	0.1643	m^3
Sd	864.6	850	cm^2	0.08646	0.085	m^2
Xmax	2.7	5.1	mm	0.0027	0.0051	m
Le	0.64	0.32	mH	0.00064	0.00032	H
Nominal driver impedance	8	8	Ohms	8	8	Ohms
Driver "RMS" rated power	400	400	W			

Step 2. Enter the major parameters of your box design. Note that the port tuning frequency is

Number of drivers	2	2		2	2
Box volume	180	180	liters	0.18	0.18 m^3
Port tuning frequency	50	50	Hz	50	50 Hz
Input power for sensitivity graph	1	1	W	1	1 W
Input power for excursion graph	250	600	W	250	600 W
Additional series resistance	0.1	0.1	Ohms	0.1	0.1 Ohms

Some computed analysis of the system

Computed approx. sensitivity	100.6	102.2	dB	at 10 kHz w/o inductance	
Max sensitivity	105.6	103.2	dB		
Max sens. W/o inductance	105.5	103.1	dB		
Height of hump	4.9	0.9	dB		
Peak frequency	96.0	103.0	Hz		
3 dB frequency	72.0	56.0	Hz		
10 dB frequency	51.0	39.0	Hz		

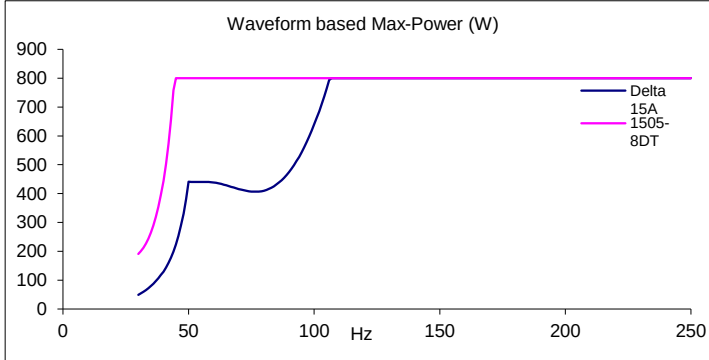
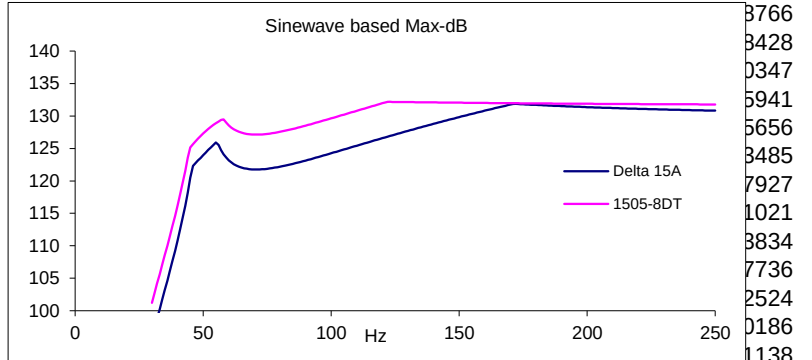
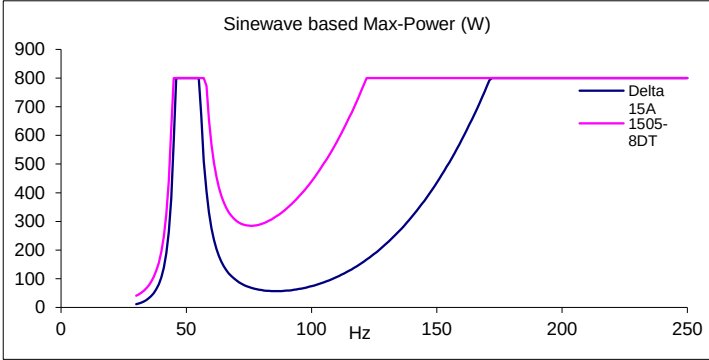
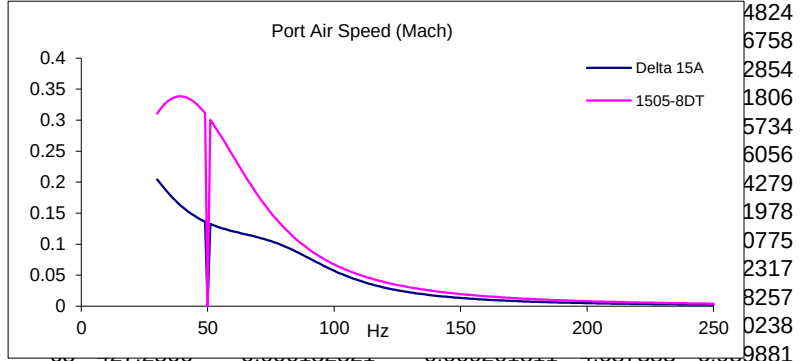
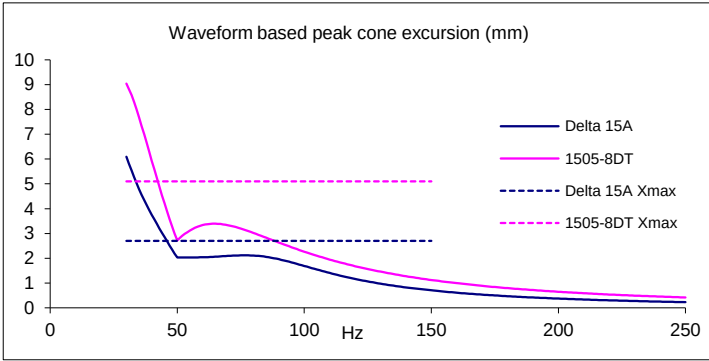
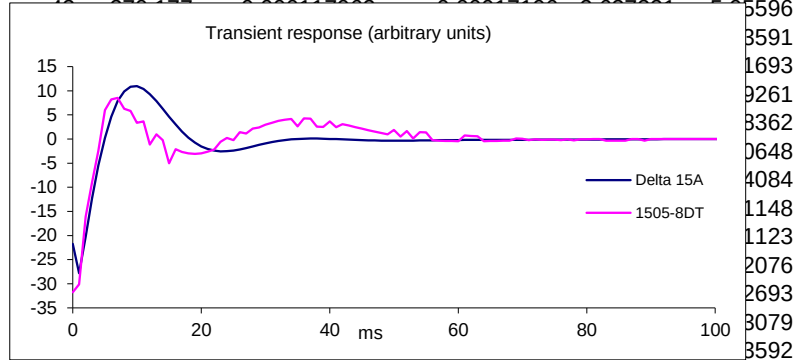
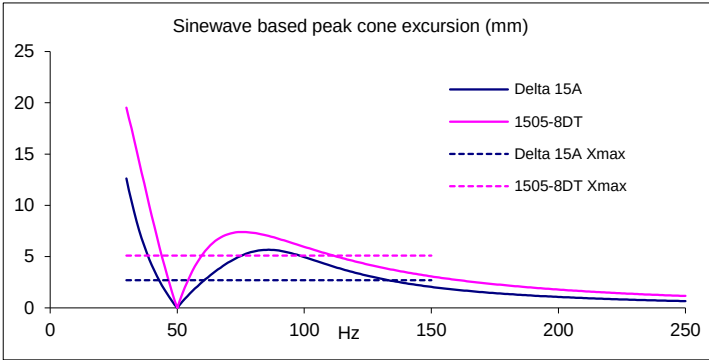
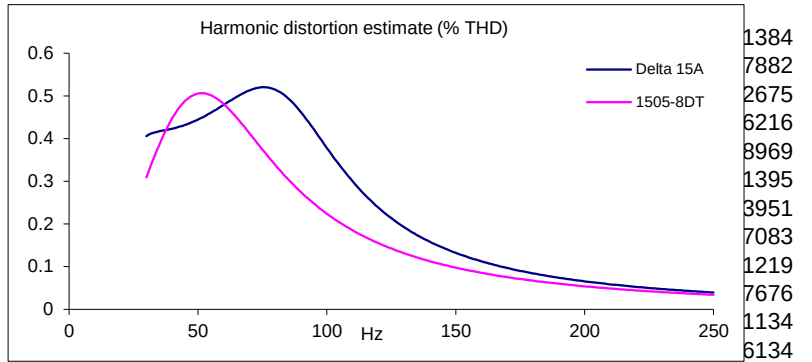
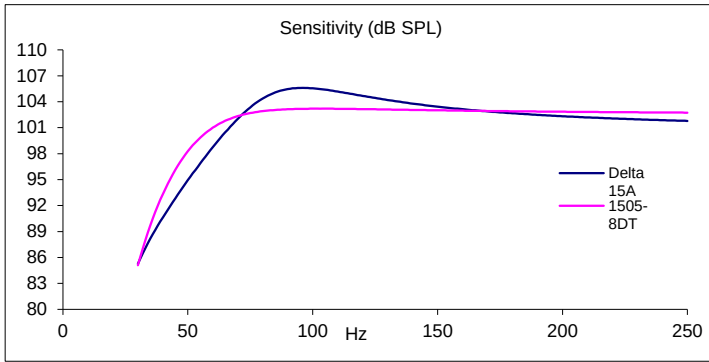
Step 3. Design your port.

Port type (0=Round 1=Rect.)	0	0		Round	Round
Number of ports	4	4			
Port end correction (see below)	0.85	0.85		0.85	0.85
Circular port calculations					
Port diameter	7.62	7.62	cm	0.0762	0.0762 m
Diameter in inches	3	3	in		
Port area				0.00456	0.00456 m^2
Rectangular port calculations					
Port width	9.5	7.125	cm	0.095	0.07125 m
Port height	4	2	cm	0.04	0.02 m
Port width in inches	3.740157	2.805118	in		
Port height in inches	1.574803	0.787402	in		
Port area				0.0038	0.001425 m^2
Dimension for end correction				0.0762	0.0762 m^2
Total port area				0.018241	0.018241 m^2
Table of port end corrections					
Two flanged ends	0.85				
One flanged, one free (typical)	0.732				
Both ends free	0.614				

Results up to this point: The computed length of the port.

Length of port	5.863792	5.863792	cm	0.058638	0.058638	m
Length of port in inches	2.30858	2.30858	in			

freq ang freq x rms 1 x rms 2 x mm 1 x mm 2
30 188.4956 0.00056457 0.000563793 12.62225 19.52742



82	515.2212	0.000250321	0.00020892	5.596501	7.236116
83	521.5044	0.000251818	0.000207467	5.629972	7.185793
84	527.7876	0.000252843	0.000205879	5.652288	7.130789
85	534.0708	0.000253405	0.000204173	5.665454	7.071675
86	540.3539	0.00025352	0.000202362	5.668014	7.00897
87	546.6371	0.000253204	0.000200462	5.660962	6.943149
88	552.9203	0.00025248	0.000198484	5.644774	6.874647
89	559.2035	0.000251372	0.00019644	5.619989	6.803857
90	565.4867	0.000249905	0.000194341	5.587195	6.731138
91	571.7699	0.000248108	0.000192195	5.547018	6.656815
92	578.053	0.000246009	0.000190011	5.500105	6.581183
93	584.3362	0.000243639	0.000187797	5.447117	6.504508
94	590.6194	0.000241027	0.00018556	5.38871	6.427031
95	596.9026	0.000238201	0.000183307	5.325534	6.348967