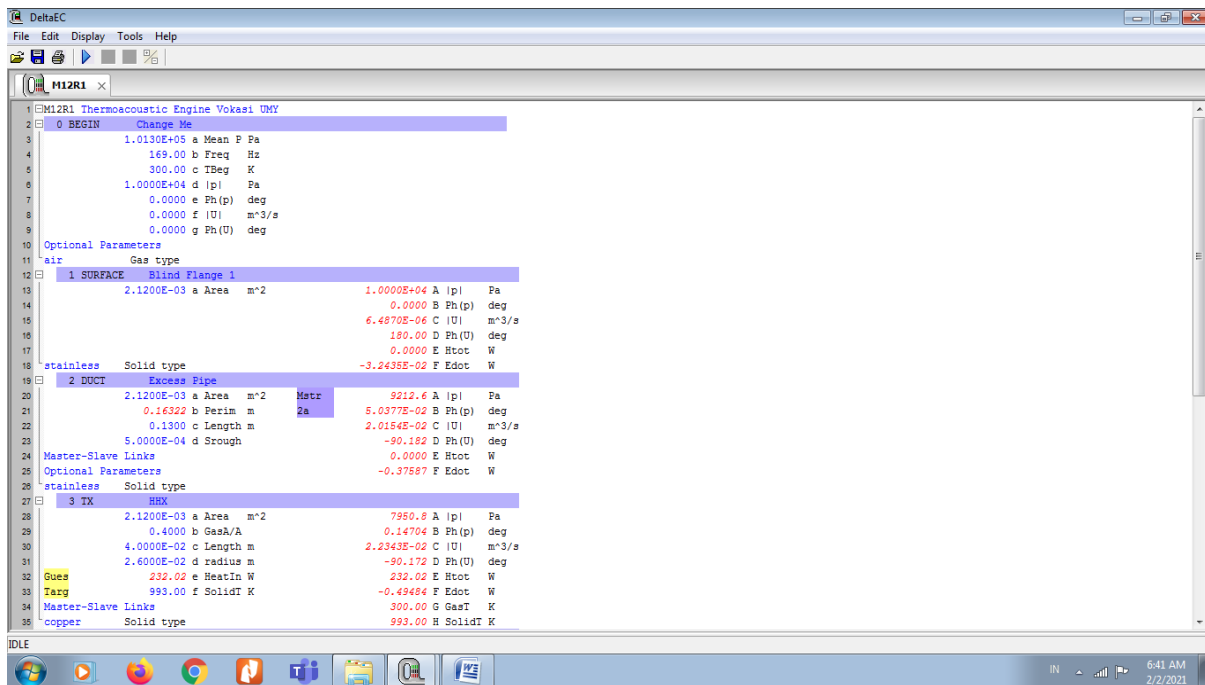
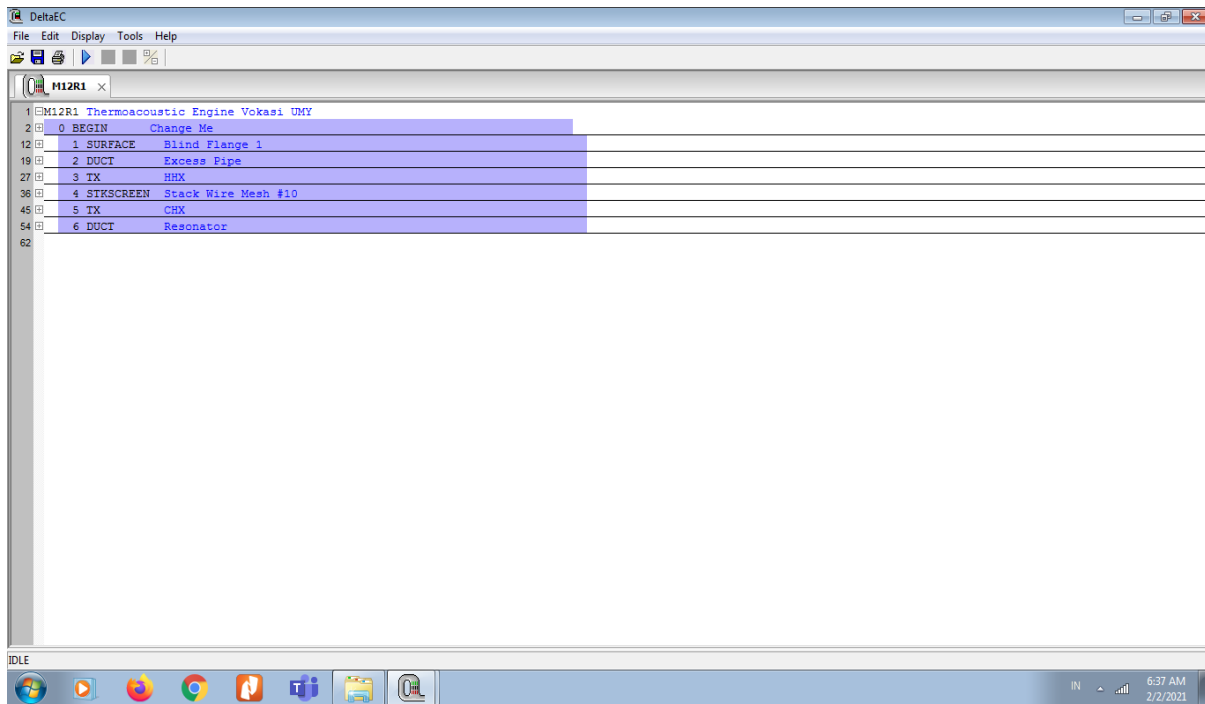
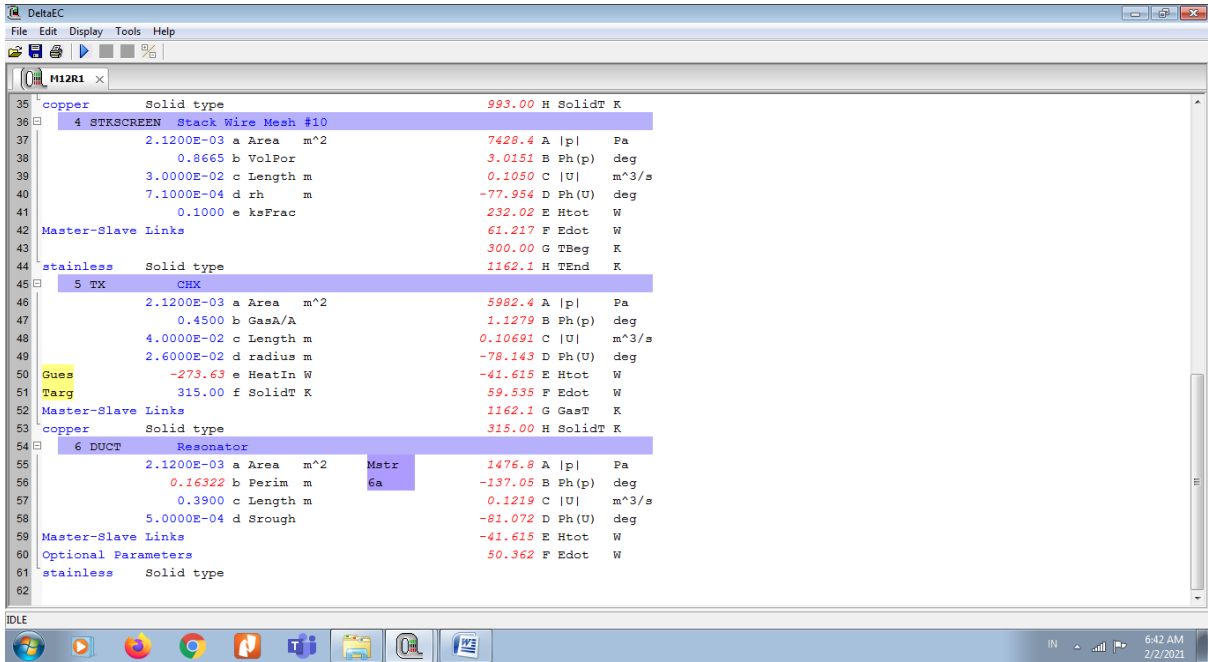
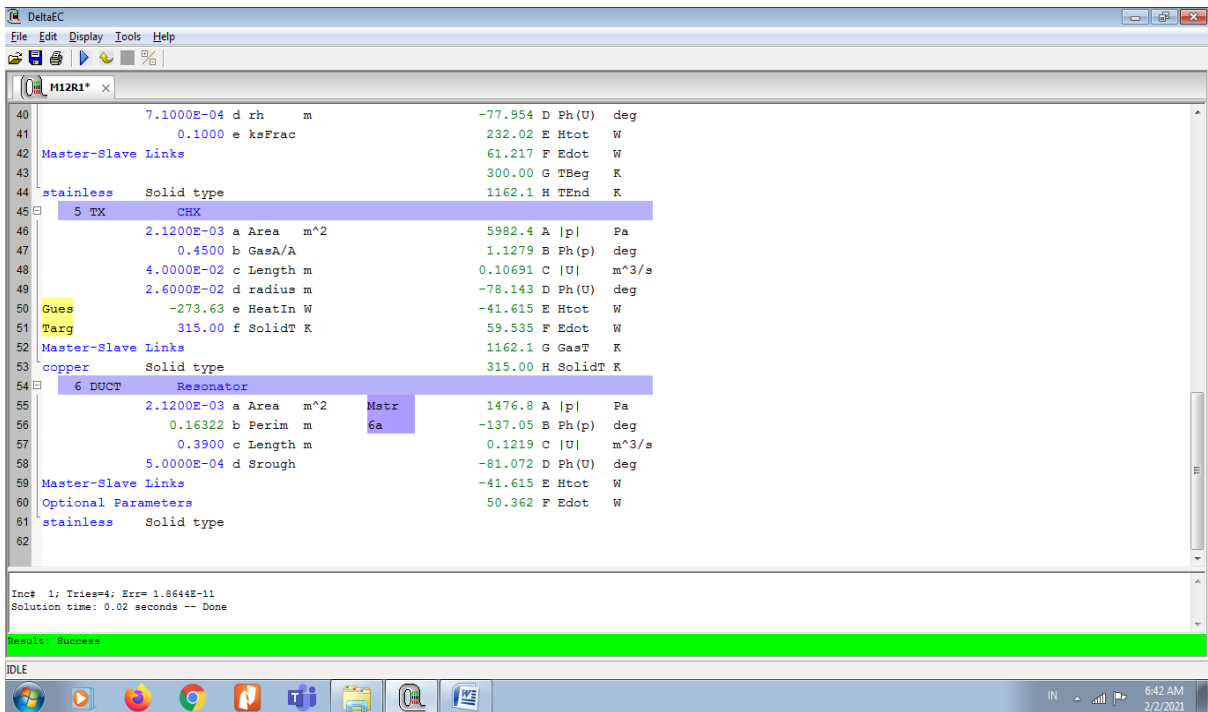


# Steps of Simulation Using DeltaEc





## Running The Delta EC



# Finished Result of Delta EC

M12R1 - Notepad

File Edit Format View Help

[->D:\Delta EC\M12R1.sp  
Created:06:42:35 02-Feb-2021 with DeltaEC Fortran Vers. 6.3b11.11 for the IBM  
= Thermoacoustic Engine Yokasi UMY

Leg:Seg	X(m)	gasA(m^2)	Tm(K)	Re[p](Pa)	Im[p](Pa)	Re[U](m3/s)	Im[U](m3/s)	Edot(W)	Htot(W)	xdot(W)	H2k(W)	TSolid(K)	p20HL(Pa)	NL	
0:	1	0.0000	1.0000E-06	300.00	1.0000E+04	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	300.00	0.00000	0	
0:	1	0.0000	1.0000E-06	300.00	1.0000E+04	0.00000	0.00000	-6.4870E-06	0.00000	-3.2435E-02	0.00000	300.00	0.00000	0	
0:	2	0.0000	2.1200E-03	300.00	0.00000	0.00000	0.00000	-6.4870E-06	0.00000	-3.2435E-02	0.00000	300.00	0.00000	0	
0:	2	0.13000E-01	2.1200E-03	300.00	9992.0	0.13818	-1.2967E-05	-2.0695E-03	-6.4918E-02	0.00000	-6.4918E-02	0.00000	300.00	0.00000	0
0:	2	0.26000E-01	2.1200E-03	300.00	9968.1	0.41237	-1.9395E-05	-4.1356E-03	-9.7517E-02	0.00000	-9.7517E-02	0.00000	300.00	0.00000	0
0:	2	0.39000E-01	2.1200E-03	300.00	9928.3	0.85176	-2.5726E-05	-6.1952E-03	-1.13035	0.00000	-1.13035	0.00000	300.00	0.00000	0
0:	2	0.52000E-01	2.1200E-03	300.00	9872.6	1.4450	-3.1920E-05	-8.2449E-03	-1.6333	0.00000	-1.6333	0.00000	300.00	0.00000	0
0:	2	0.65000E-01	2.1200E-03	300.00	9801.2	2.1903	-3.7934E-05	-1.0281E-02	-1.9716	0.00000	-1.9716	0.00000	300.00	0.00000	0
0:	2	0.78000E-01	2.1200E-03	300.00	9714.1	3.0854	-4.3727E-05	-1.2301E-02	-2.3136	0.00000	-2.3136	0.00000	300.00	0.00000	0
0:	2	0.91000E-01	2.1200E-03	300.00	9611.5	4.1274	-4.9258E-05	-1.4302E-02	-2.6624	0.00000	-2.6624	0.00000	300.00	0.00000	0
0:	2	0.10400	2.1200E-03	300.00	9493.6	5.3131	-5.4486E-05	-1.6280E-02	-3.0188	0.00000	-3.0188	0.00000	300.00	0.00000	0
0:	2	0.11700	2.1200E-03	300.00	9360.6	6.6387	-5.9373E-05	-1.8231E-02	-3.3840	0.00000	-3.3840	0.00000	300.00	0.00000	0
0:	2	0.13000	2.1200E-03	300.00	9212.6	8.1001	-6.3880E-05	-2.0154E-02	-3.7587	0.00000	-3.7587	0.00000	300.00	0.00000	0
0:	3	0.13000	8.4800E-04	300.00	9212.6	8.1001	-6.3880E-05	-2.0154E-02	-3.7587	0.00000	-3.7587	0.00000	993.00	0.00000	0
0:	3	0.17000	8.4800E-04	300.00	7950.8	20.405	-6.7136E-05	-2.2343E-02	-4.9484	232.02	-4.9484	232.02	993.00	0.00000	0
0:	4	0.17000	1.8370E-03	300.00	7950.8	20.405	-6.7136E-05	-2.2343E-02	-4.9484	232.02	-4.9484	232.02	300.00	0.00000	0
0:	4	0.17300	1.8370E-03	283.51	7903.3	35.798	2.7145E-04	-2.2360E-02	0.67245	232.02	-12.788	232.02	283.51	0.00000	0
0:	4	0.17600	1.8370E-03	267.34	7852.7	49.569	5.8970E-04	-2.2341E-02	1.7617	232.02	-26.366	232.02	267.34	0.00000	0
0:	4	0.17900	1.8370E-03	251.26	7798.9	61.632	8.8098E-04	-2.2259E-02	2.7494	232.02	-41.728	232.02	251.26	0.00000	0
0:	4	0.18200	1.8370E-03	234.84	7741.8	71.882	1.1360E-03	-2.2071E-02	3.6040	232.02	-59.769	232.02	234.84	0.00000	0
0:	4	0.18500	1.8370E-03	217.33	7681.2	80.175	1.3399E-03	-2.1689E-02	4.2767	232.02	-82.352	232.02	217.33	0.00000	0
0:	4	0.18800	1.8370E-03	196.70	7616.7	86.277	1.4625E-03	-2.0885E-02	4.6687	232.02	-114.73	232.02	196.70	0.00000	0
0:	4	0.19100	1.8370E-03	154.16	7548.1	89.561	1.3095E-03	-1.7514E-02	4.1580	232.02	-211.41	232.02	154.16	0.00000	0
0:	4	0.19400	1.8370E-03	201.60	7588.0	100.32	3.0040E-03	-1.4297E-02	10.680	232.02	-97.362	232.02	201.60	0.00000	0
0:	4	0.19700	1.8370E-03	1168.9	7513.6	210.72	2.1951E-02	-1.10286	71.626	232.02	190.86	232.02	1168.9	0.00000	0
0:	4	0.20000	1.8370E-03	1162.1	7418.1	390.72	2.1914E-02	-1.0269	61.217	232.02	187.93	232.02	1162.1	0.00000	0
0:	5	0.20000	9.5400E-04	1162.1	7418.1	390.72	2.1914E-02	-1.0269	61.217	232.02	187.93	232.02	315.00	0.00000	0
0:	6	0.24000	9.5400E-04	1162.1	5981.3	117.76	2.1967E-02	-1.0463	59.535	-41.615	-15.503	-41.615	315.00	0.00000	0
0:	6	0.24000	2.1200E-03	1162.1	5981.3	117.76	2.1967E-02	-1.0463	59.535	-41.615	-15.503	-41.615	1162.1	0.00000	0
0:	6	0.27900	2.1200E-03	1162.1	5334.3	-1.8099	2.1967E-02	-1.0817	58.686	-41.615	-15.722	-41.615	1162.1	0.00000	0
0:	6	0.31800	2.1200E-03	1162.1	4667.1	-120.74	2.1896E-02	-1.1130	57.814	-41.615	-15.947	-41.615	1162.1	0.00000	0
0:	6	0.35700	2.1200E-03	1162.1	3982.3	-238.66	2.1756E-02	-1.1400	56.922	-41.615	-16.178	-41.615	1162.1	0.00000	0
0:	6	0.39600	2.1200E-03	1162.1	3282.4	-355.21	2.1546E-02	-1.1627	56.012	-41.615	-16.412	-41.615	1162.1	0.00000	0
0:	6	0.43500	2.1200E-03	1162.1	2570.2	-470.03	2.1269E-02	-1.1810	55.088	-41.615	-16.651	-41.615	1162.1	0.00000	0
0:	6	0.47400	2.1200E-03	1162.1	1848.2	-582.77	2.0925E-02	-1.1948	54.152	-41.615	-16.893	-41.615	1162.1	0.00000	0
0:	6	0.51300	2.1200E-03	1162.1	1119.4	-693.08	2.0517E-02	-1.2040	53.207	-41.615	-17.136	-41.615	1162.1	0.00000	0
0:	6	0.55200	2.1200E-03	1162.1	386.40	-800.63	2.0044E-02	-1.2087	52.259	-41.615	-17.381	-41.615	1162.1	0.00000	0
0:	6	0.59100	2.1200E-03	1162.1	-347.96	-905.12	1.9511E-02	-1.2088	51.309	-41.615	-17.627	-41.615	1162.1	0.00000	0
0:	6	0.63000	2.1200E-03	1162.1	-1080.9	-1006.2	1.8917E-02	-1.2042	50.362	-41.615	-17.871	-41.615	1162.1	0.00000	0

# Resonator 780 mm

DeltaEC

File Edit Display Tools Help

M12R2\*

1 M12R2 Thermoacoustic Generator FT UGM

2 0 BEGIN Change Me

12 1 SURFACE Blind Flange 1

19 2 DUCT Excess Pipe

27 3 TX HHX

36 4 STKSCREEN Stack Wire Mesh #10

45 5 TX CHX

54 6 DUCT Resonator

	2.1200E-03	a Area	m^2	Matr	7936.1	A	[p]	Pa
55	0.16322	b Perim	m	6a	-167.09	B <td>Ph(p)</td> <td>deg</td>	Ph(p)	deg
57	0.7800	c Length	m		9.2414E-02	C <td>[U]</td> <td>m^3/s</td>	[U]	m^3/s
58	5.0000E-04	d Strough			-83.624	D <td>Ph(U)</td> <td>deg</td>	Ph(U)	deg
59		Master-Slave Links			-41.615	E <td>Htot</td> <td>W</td>	Htot	W
60		Optional Parameters			41.727	F <td>Edot</td> <td>W</td>	Edot	W
61		stainless	Solid type					
62								

Incl 1; Tries=4; Err= 1.8644E-11  
Solution time: 0.01 seconds -- Done

Result: Success

IDLE

M12R2 - Notepad

File Edit Format View Help

|->D:\Delta EC\M12R2.sp  
 Created 15:49:35 18-Jul-2019 with DeltaEC Fortran vers. 6.3b11.11 for the IBM  
 == Thermoacoustic generator FT UGM ==

Leg:Seg	X(m)	gasA(m <sup>2</sup> )	Tm(K)	Re[p](Pa)	Im[p](Pa)	Re[u](m/s)	Im[u](m/s)	Edot(w)	Htot(w)	xdot(w)	H2k(w)	TSolid(K)	p20H(Pa)	nL		
0:	1	0.0000E-01	1.0000E+06	300.00	0.0000E+04	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	300.00	0.0000	0		
0:	1	0.0000E-01	1.0000E+06	300.00	1.0000E+04	0.0000	-6.4870E-06	0.0000	-3.2435E-02	0.0000	-3.2435E-02	0.0000	300.00	0.0000	0	
0:	2	0.0000E-01	2.1200E-03	300.00	1.0000E+04	0.0000	-2.3726E-05	-6.1952E-03	-1.3035	0.0000	-1.3035	0.0000	300.00	0.0000	0	
0:	2	0.1300E-01	2.1200E-03	300.00	0.0000	0.12818	-1.2967E-05	-2.0695E-03	-6.4918E-02	0.0000	-6.4918E-02	0.0000	300.00	0.0000	0	
0:	2	0.2600E-01	2.1200E-03	300.00	0.0000	0.9968.1	0.41237	-1.9395E-05	-4.1356E-03	-9.7517E-02	0.0000	-9.7517E-02	0.0000	300.00	0.0000	0
0:	2	0.3900E-01	2.1200E-03	300.00	0.0000	9928.3	0.85176	-2.3726E-05	-6.1952E-03	-1.3035	0.0000	-1.3035	0.0000	300.00	0.0000	0
0:	2	0.5200E-01	2.1200E-03	300.00	0.0000	9872.6	1.4450	-3.1920E-05	-8.2449E-03	-1.6353	0.0000	-1.6353	0.0000	300.00	0.0000	0
0:	2	0.6500E-01	2.1200E-03	300.00	0.0000	9801.2	2.1903	-3.7934E-05	-1.0281E-02	-1.9716	0.0000	-1.9716	0.0000	300.00	0.0000	0
0:	2	0.7800E-01	2.1200E-03	300.00	0.0000	9714.1	3.0854	-4.3727E-05	-1.2301E-02	-2.3136	0.0000	-2.3136	0.0000	300.00	0.0000	0
0:	2	0.9100E-01	2.1200E-03	300.00	0.0000	9611.5	4.1274	-4.9258E-05	-1.4302E-02	-2.6624	0.0000	-2.6624	0.0000	300.00	0.0000	0
0:	2	0.1040E-01	2.1200E-03	300.00	0.0000	9493.6	5.3131	-5.4486E-05	-1.6280E-02	-3.0188	0.0000	-3.0188	0.0000	300.00	0.0000	0
0:	2	0.1170E-01	2.1200E-03	300.00	0.0000	9360.6	6.6387	-5.9373E-05	-1.8231E-02	-3.3840	0.0000	-3.3840	0.0000	300.00	0.0000	0
0:	2	0.1300E-01	2.1200E-03	300.00	0.0000	9212.6	8.1001	-6.3880E-05	-2.0154E-02	-3.7587	0.0000	-3.7587	0.0000	300.00	0.0000	0
0:	3	0.1300E-01	8.4800E-04	300.00	0.0000	9212.6	8.1001	-6.3880E-05	-2.0154E-02	-3.7587	0.0000	-3.7587	0.0000	993.00	0.0000	0
0:	3	0.1700E-01	8.4800E-04	300.00	0.0000	7950.8	20.405	-6.7136E-05	-2.2343E-02	-4.9484	232.02	-4.9484	232.02	993.00	0.0000	0
0:	4	0.1700E-01	1.8370E-03	300.00	0.0000	7950.8	20.405	-6.7136E-05	-2.2343E-02	-4.9484	232.02	-4.9484	232.02	300.00	0.0000	0
0:	4	0.1730E-01	1.8370E-03	283.31	0.0000	7903.3	35.798	2.7145E-04	-2.2360E-02	0.67245	232.02	-12.788	232.02	283.31	0.0000	0
0:	4	0.1760E-01	1.8370E-03	267.34	0.0000	7852.7	49.569	5.8970E-04	-2.2341E-02	1.7617	232.02	-26.366	232.02	267.34	0.0000	0
0:	4	0.1790E-01	1.8370E-03	251.26	0.0000	7798.9	61.632	8.8098E-04	-2.2259E-02	2.7494	232.02	-41.728	232.02	251.26	0.0000	0
0:	4	0.1820E-01	1.8370E-03	234.84	0.0000	7741.8	71.882	1.1360E-03	-2.2071E-02	3.6040	232.02	-59.769	232.02	234.84	0.0000	0
0:	4	0.1850E-01	1.8370E-03	217.33	0.0000	7681.2	80.175	1.3399E-03	-2.1689E-02	4.2767	232.02	-82.352	232.02	217.33	0.0000	0
0:	4	0.1880E-01	1.8370E-03	196.70	0.0000	7616.7	86.277	1.4625E-03	-2.0885E-02	4.6687	232.02	-114.73	232.02	196.70	0.0000	0
0:	4	0.1910E-01	1.8370E-03	154.16	0.0000	7548.1	89.561	1.3095E-03	-1.7514E-02	4.1580	232.02	-211.41	232.02	154.16	0.0000	0
0:	4	0.1940E-01	1.8370E-03	201.60	0.0000	7588.0	100.32	3.0040E-03	-1.4297E-02	10.680	232.02	-97.362	232.02	201.60	0.0000	0
0:	4	0.1970E-01	1.8370E-03	1168.9	0.0000	7513.6	210.72	2.1951E-02	-1.0286	71.626	232.02	190.86	232.02	1168.9	0.0000	0
0:	4	0.2000E-01	1.8370E-03	1162.1	0.0000	7418.1	390.72	2.1914E-02	-1.0269	61.217	232.02	187.93	232.02	1162.1	0.0000	0
0:	5	0.2000E-01	9.5400E-04	1162.1	0.0000	7418.1	390.72	2.1914E-02	-1.0269	61.217	232.02	187.93	232.02	315.00	0.0000	0
0:	5	0.2400E-01	9.5400E-04	1162.1	0.0000	5981.3	117.76	2.1967E-02	-1.0463	59.535	-41.615	-15.503	-41.615	315.00	0.0000	0
0:	6	0.2400E-01	2.1200E-03	1162.1	0.0000	5981.3	117.76	2.1967E-02	-1.0463	59.535	-41.615	-15.503	-41.615	1162.1	0.0000	0
0:	6	0.3180E-01	2.1200E-03	1162.1	0.0000	4667.1	-120.74	2.1896E-02	-1.1130	57.814	-41.615	-15.947	-41.615	1162.1	0.0000	0
0:	6	0.3960E-01	2.1200E-03	1162.1	0.0000	3282.4	-355.21	2.1546E-02	-1.1627	56.012	-41.615	-16.412	-41.615	1162.1	0.0000	0
0:	6	0.4740E-01	2.1200E-03	1162.1	0.0000	1848.2	-582.76	2.0925E-02	-1.1948	54.152	-41.615	-16.893	-41.615	1162.1	0.0000	0
0:	6	0.5520E-01	2.1200E-03	1162.1	0.0000	386.42	-800.63	2.0044E-02	-1.2087	52.239	-41.615	-17.381	-41.615	1162.1	0.0000	0
0:	6	0.6300E-01	2.1200E-03	1162.1	0.0000	-1080.9	-1006.2	1.8917E-02	-1.2042	50.363	-41.615	-17.871	-41.615	1162.1	0.0000	0
0:	6	0.7080E-01	2.1200E-03	1162.1	0.0000	-2331.4	-1197.1	1.7561E-02	-1.1815	48.489	-41.615	-18.355	-41.615	1162.1	0.0000	0
0:	6	0.7860E-01	2.1200E-03	1162.1	0.0000	-3943.0	-1371.0	1.5994E-02	-1.1407	46.668	-41.615	-18.825	-41.615	1162.1	0.0000	0
0:	6	0.8640E-01	2.1200E-03	1162.1	0.0000	-5294.4	-1526.1	1.4240E-02	-1.0827	44.921	-41.615	-19.276	-41.615	1162.1	0.0000	0
0:	6	0.9420E-01	2.1200E-03	1162.1	0.0000	-6564.9	-1660.6	1.2321E-02	-1.0082	43.270	-41.615	-19.702	-41.615	1162.1	0.0000	0
0:	6	1.0200E-01	2.1200E-03	1162.1	0.0000	-7735.4	-1773.1	1.0264E-02	-9.1843E-02	41.727	-41.615	-20.100	-41.615	1162.1	0.0000	0

## Resonator 1170 mm

DeltaEC

File Edit Display Tools Help

M12R3\*

1 M12R3 Thermoacoustic Generator FT UGM

2 0 BEGIN Change Me

12 1 SURFACE Blind Flange 1

19 2 DUCT Excess Pipe

27 3 IX HHX

36 4 SIKSCREEN Stack Wire Mesh #10

45 5 IX CHX

54 6 DUCT Resonator

55	2.1200E-03	a Area	m <sup>2</sup>	Mstr	1.1701E+04	A  p	Pa
56	0.16322	b Perim	m	6a	-170.28	B Ph(p)	deg
57	1.1700	c Length	m		2.9488E-02	C  U	m <sup>3</sup> /s
58	5.0000E-04	d Strough			-92.209	D Ph(U)	deg
59		Master-Slave Links			-41.615	E Htot	W
60		Optional Parameters			35.657	F Edot	W
61		stainless	Solid type				
62							

Inct 1; Tries=4; Err= 1.8644E-11  
 Solution time: 0.02 seconds -- Done

Result: Success