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**
**      Altair OptiStruct(TM) 2018.0.1      **
**
**      Advanced Engineering Analysis, Design and      **
**      Optimization Software from Altair Engineering, Inc.      **
**
**
**      Windows 10 (Build 9200) DESKTOP-TOM2U6M      **
**      8 CPU: Intel(R) Core(TM) i7-8550U CPU @ 1.80GHz      **
**      11832 MB RAM, 18469 MB swap      **
**
**
```

** Build tag: 0934289red33180_Ce64RBW8UH14M:149678-0 4000000004000 **

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*** OptiStruct defaults set from:
install config file: C:\Program Files\Altair\2018\hwsolvers/optistruct.cfg.

NOTE # 9199

MSGLMT=STRICT is active, all messages will be printed.

You can suppress some less important warning messages by use of

MSGLMT=BRIEF or UNREF (in config file or in the input data).

1 PARAM(s) were set:

CHECKEL,YES

NOTE # 1852

AUTOMATIC SCREENING is activated.

Use DSCREEN,AUTO,OFF to disable automatic screening.

NOTE # 2715

Solver with 64 bit integer is activated.

The amount of memory allocated for the run is 4933 MB.

This run will use out of core processing in the solver.

OPTIMIZATION FILE AND PARAMETER INFORMATION :

FEM model file :

E:/Free Size Optimization/carro con momenti-CASOB.fem

Output files prefix :

E:/Free Size Optimization/carro con momenti-CASOB

FINITE ELEMENT MODEL DATA INFORMATION :

Total # of Grids (Structural) : 590721

Total # of Elements : 197419

Total # of Rigid Elements : 9

Total # of Rigid Element Constraints : 1779

Total # of Degrees of Freedom : 3544225

(Structural)

Total # of Non-zero Stiffness Terms : 168208917

Element Type Information

CQUAD8 Elements : 196119

CTRIA6 Elements : 1300

Load and Boundary Information

FORCE Sets : 2

SPC Sets : 1

Material and Property Information

PSHELL Cards : 10

MAT1 Cards : 1

OPTIMIZATION PROBLEM PARAMETERS :

Objective Function : Minimize Weighted Compliance

Response Summary :

Number of volume fraction responses : 1

Number of compliance responses : 2

Number of equation responses : 1

Static Subcase Summary :

Subcase ID SPC ID LOAD ID Weight = w(i)

1	1	2	1.000
---	---	---	-------

2	1	3	1.000
---	---	---	-------

Design Parameters Summary :

Total # of free-sizing design elements : 23330

Total # of free-sizing cards : 1

Total Volume of Design Material : 4.6648E+08

Total Mass of Design Material : 3.6619E+00

Volume of Non-Design Material : 4.4800E+08

Mass of Non-Design Material : 3.5168E+00

Shell Design Elements : PSHELL TO T

10 0.00 50.

Optimization Parameters Summary :

Initial Material Fraction [0,1] : 0.3000

Maximum Number of Iterations : 30

Convergence Tolerance : 5.0000E-03

Step Size (Free Sizing) : 0.5000

Checkerboard Control : Off

Run Type : Free-Sizing Optimization

Free-Sizing Optimization Summary :

DSIZE ID	Minimum Member Size	Maximum Member Size	Pattern Repet.	Pattern Symm.	Pattern Group.
----------	---------------------	---------------------	----------------	---------------	----------------

1	NONE	NONE	NONE		
---	------	------	------	--	--

Restart from previous solution : No

Run at location : E:/Free Size Optimization/

Scratch file directory : E:/Free Size Optimization/

Free space: 495.498 GB

Number of CPU processors : 1

MEMORY ESTIMATION INFORMATION :

Solver Type is: Sparse-Matrix Solver

Direct Method

Current Memory (RAM) : 4933 MB

Estimated Minimum Memory (RAM) for Out of Core Solution : 4375 MB

Recommended Memory (RAM) for Out of Core Solution : 4933 MB

Recommended Memory (RAM) for In-Core Solution : 22626 MB

DISK SPACE ESTIMATION INFORMATION :

Estimated Disk Space for Output Data Files : 561 MB

Estimated Scratch Disk Space for In-Core Solution : 5271 MB

Estimated Scratch Disk Space for Out of Core Solution : 29636 MB

BEGINNING OPTIMIZATION SOLUTION

OPTIMIZATION HISTORY INFORMATION :

ITERATION 0

Element # 314647, element type QUAD8.

WARNING - Outside of recommended range: Hoe Normal Offset = 0.30502

upper limit = 0.30000

Element # 314648, element type QUAD8.

WARNING - Outside of recommended range: Hoe Normal Offset = 0.34317

upper limit = 0.30000

Element # 314649, element type QUAD8.

WARNING - Outside of recommended range: Hoe Normal Offset = 0.38141

upper limit = 0.30000

NOTE : other similar error/warning messages were suppressed,
use PARAM,CHECKEL,FULL to obtain full report

Element # 314655, element type QUAD8.

WARNING - Outside of recommended range: Hoe Tangent Offset = 0.23197
upper limit = 0.20000

Element # 316768, element type QUAD8.

WARNING - Outside of recommended range: Hoe Tangent Offset = 0.23197
upper limit = 0.20000

Element # 316785, element type QUAD8.

WARNING - Outside of recommended range: Hoe Tangent Offset = 0.22135
upper limit = 0.20000

Element # 332578, element type QUAD8.

WARNING - Outside of recommended range: Skew Angle = 65.195
upper limit = 60.000

Element # 332583, element type QUAD8.

WARNING - Outside of recommended range: Skew Angle = 65.230
upper limit = 60.000

Element # 423836, element type QUAD8.

WARNING - Outside of recommended range: Skew Angle = 61.236

upper limit = 60.000

Element # 331029, element type TRIA6.

WARNING - Outside of recommended range: Vertex Angle = 14.511

lower limit = 15.000

Element # 416685, element type TRIA6.

WARNING - Outside of recommended range: Vertex Angle = 14.080

lower limit = 15.000

Element # 429304, element type TRIA6.

WARNING - Outside of recommended range: Skew Angle = 81.623

upper limit = 75.000

WARNING - Outside of recommended range: Vertex Angle = 4.2202

lower limit = 15.000

Element Quality Check Summary

Total # of elements that exceeded recommended range (warning) = 56

Note: Only element with the highest violation of each check is listed below.

Recommended range violations:

Element	Property	# of	Recommended Range	Max. Viol.	Elem.
		Viol.	Lower	Upper	Value type No.

TRIA6	Skew Angle	1	--	75.00	81.62 U	429304
-------	------------	---	----	-------	---------	--------

QUAD8	Skew Angle	32	--	60.00	68.42	U	552903
QUAD8	Hoe Normal Offset	9	--	0.30	0.57	U	314654
QUAD8	Hoe Tangent Offset	13	--	0.20	0.23	U	314655
TRIA6	Vertex Angle	3		15.00	165.00	L	429304

*** INFORMATION # 3454

MPC constraints for subcase 1 will be enforced
with elimination of dependent dofs.

List of Auto-SPC d.o.f.s for loadcase 1

Total number of Auto-SPC d.o.f.s = 431931

```

-----
Grid No.   Component
-----
22712      5
22713      5
22714      5
22715      5
22716      5
22717      5
22718      5
22719      5
22720      5

```

22721	5
22722	5
22723	5
22724	5
22725	5
22726	5
22727	5
22728	5
22729	5
22730	5
22731	5
22732	5
22733	5
22734	5
22735	5
22736	5
22737	5
22738	5
22739	5
22740	5
23032	5
23033	5
23034	5
23035	5
23036	5

23037	5
23038	5
23039	5
23040	5
23041	5
23042	5
23043	5
23044	5
23045	5
23046	5
23047	5
23048	5
23049	5
23050	5
23051	5
23052	5
23053	5
23054	5
23055	5
23056	5
23057	5
23058	5
23059	5
23060	5
23062	4

23063	4
23064	4
23065	4
23066	4
23067	4
23068	4
23069	4
23070	4
23071	4
23072	4
23101	4
23102	4
23103	4
23104	4
23105	4
23106	4
23255	4
23256	4
23257	4
23258	4
23259	4
23260	4
23261	4
23262	4
23263	4

23264	4
23265	4
23416	6
23417	6
23418	6
23419	6
23420	6
23421	6
23422	6
23423	6
23424	6
23425	6
23426	6
23427	6
23428	6
23429	6

Because of PARAM, PRGPST, 100, Auto-SPC printing is limited to 100 dofs.

(Scratch disk space usage for starting iteration = 2758 MB)

*** WARNING # 5628

The compliance is negative or large 1.20324e+08.

The rotational displacement has large magnitude, -231.532 degrees (larger than 180).

The rotational degree of freedom may not be constrained properly in the model.

subcase id = 1

grid id = 1403361

component = 5

Subcase: 1

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. -1.738E-02 -2.597E-02 -1.198E+06 5.256E+08 -3.681E+06 -1.850E+06

Sum-SPCF 1.898E-02 2.404E-02 1.198E+06 -5.256E+08 3.681E+06 1.850E+06

Subcase: 2

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. 0.000E+00 0.000E+00 1.568E+05 -3.709E+07 1.037E+06 0.000E+00

Sum-SPCF 0.000E+00 0.000E+00 -1.568E+05 3.709E+07 -1.037E+06 0.000E+00

Notes: 1. All applied and SPC forces are transferred to

the origin of the basic coordinate system,

so that the applied and SPC loads can match.

2. If spring elements and/or MPCs exist in the model,

total applied loads may not match total SPC loads.

3. If axisymmetric elements are present in the model,

the total x-force and y-force and all the total moments are set to zero, according to principles of axisymmetric analysis.

4. If periodic boundary conditions exist in the model, total applied loads may not match total SPC loads.

(Running in-core solution)

Objective Function (Minimize WCOMP) = 1.20324E+08

Maximum Constraint Violation % = 0.00000E+00

Design Volume Fraction = 3.00000E-01 Mass = 4.61534E+00

Subcase	Weight	Compliance	Epsilon	Weight*Comp.
1	1.000E+00	1.203243E+08	-3.088533E-09	1.203243E+08
2	1.000E+00	0.000000E+00	0.000000E+00	0.000000E+00

Sum of Weight*Compliance 1.203243E+08

Note : Epsilon = Residual Strain Energy Ratio.

RETAINED RESPONSES TABLE

Response	Type	Response	Subcase	Grid/	DOF/	Response	Objective	Viol.
User-ID	Label	/RANDPS	Element/	Comp	Value	Reference/	%	
	/Model	MID/PID/	/Reg		Constraint			
	+Frqncy	Mode No.			Bound			
	/Times							
2	WCOMP	wcomp	--	--	--	1.203E+08	MIN	
1	VOLFR	Volfrac	--	--	TOTL	3.000E-01	< 3.000E-01	0.0 A

ITERATION 1

*** WARNING # 1662

Constraint reduced AUTOSPC DOF(s) listed below usually are related to a modeling error. Please review the model.

GRID 1548434 DOF 4

GRID 1548495 DOF 4

GRID 1548502 DOF 4

GRID 1548973 DOF 4

GRID 1549974 DOF 4

GRID 1550044 DOF 4

GRID 1550414 DOF 4

GRID 1552259 DOF 4

GRID 1552762 DOF 4

GRID 1552981 DOF 4

GRID 1553895 DOF 4

GRID 1554101 DOF 4

Number of constraint reduced AUTOSPC DOFs = 12

*** WARNING # 5628

The compliance is negative or large 1.18814e+08.

The rotational displacement has large magnitude, -229.485 degrees (larger than 180).

The rotational degree of freedom may not be constrained properly in the model.

subcase id = 1

grid id = 1403361

component = 5

Subcase: 1

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. -1.738E-02 -2.597E-02 -1.198E+06 5.256E+08 -3.681E+06 -1.850E+06

Sum-SPCF 1.902E-02 2.428E-02 1.198E+06 -5.256E+08 3.681E+06 1.850E+06

Subcase: 2

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. 0.000E+00 0.000E+00 1.568E+05 -3.709E+07 1.037E+06 0.000E+00

Sum-SPCF 0.000E+00 0.000E+00 -1.568E+05 3.709E+07 -1.037E+06 0.000E+00

Objective Function (Minimize WCOMP) = 1.18814E+08 % change = -1.26

Maximum Constraint Violation % = 0.76278E-05

Design Volume Fraction = 3.00000E-01 Mass = 4.61534E+00

Subcase Weight Compliance Epsilon Weight*Comp.

1 1.000E+00 1.188140E+08 -5.147996E-09 1.188140E+08

2 1.000E+00 0.000000E+00 0.000000E+00 0.000000E+00

Sum of Weight*Compliance 1.188140E+08

Note : Epsilon = Residual Strain Energy Ratio.

RETAINED RESPONSES TABLE

Response Type	Response	Subcase	Grid/	DOF/	Response	Objective	Viol.
User-ID	Label	/RANDPS	Element/	Comp	Value	Reference/	%
	/Model	MID/PID/	/Reg		Constraint		
	+Frqncy	Mode No.			Bound		
	/Times						

2	WCOMP	wcomp	--	--	--	1.188E+08	MIN
1	VOLFR	Volfrac	--	--	TOTL	3.000E-01	< 3.000E-01 0.0 A

ITERATION 2

*** WARNING # 1662

Constraint reduced AUTOSPC DOF(s) listed below usually are related to a modeling error. Please review the model.

GRID 1548434 DOF 4

GRID 1548495 DOF 4

GRID 1548502 DOF 4

GRID 1548611 DOF 4

GRID 1548973 DOF 4

GRID 1549218 DOF 4

GRID 1549676 DOF 4

GRID 1549974 DOF 4
GRID 1550044 DOF 4
GRID 1550414 DOF 4
GRID 1552034 DOF 4
GRID 1552259 DOF 4
GRID 1552762 DOF 4
GRID 1552981 DOF 4
GRID 1553303 DOF 4
GRID 1553895 DOF 4
GRID 1554101 DOF 4
GRID 1554245 DOF 4

Number of constraint reduced AUTOSPC DOFs = 18

*** WARNING # 5628

The compliance is negative or large 1.18094e+08.

The rotational displacement has large magnitude, -228.432 degrees (larger than 180).

The rotational degree of freedom may not be constrained properly in the model.

subcase id = 1

grid id = 1403361

component = 5

Subcase: 1

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. -1.738E-02 -2.597E-02 -1.198E+06 5.256E+08 -3.681E+06 -1.850E+06

Sum-SPCF 1.893E-02 2.455E-02 1.198E+06 -5.256E+08 3.681E+06 1.850E+06

Subcase: 2

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. 0.000E+00 0.000E+00 1.568E+05 -3.709E+07 1.037E+06 0.000E+00

Sum-SPCF 0.000E+00 0.000E+00 -1.568E+05 3.709E+07 -1.037E+06 0.000E+00

Objective Function (Minimize WCOMP) = 1.18094E+08 % change = -0.61

Maximum Constraint Violation % = 0.92696E-03

Design Volume Fraction = 3.00003E-01 Mass = 4.61535E+00

Subcase	Weight	Compliance	Epsilon	Weight*Comp.
1	1.000E+00	1.180937E+08	-3.100179E-09	1.180937E+08
2	1.000E+00	0.000000E+00	0.000000E+00	0.000000E+00

Sum of Weight*Compliance 1.180937E+08

Note : Epsilon = Residual Strain Energy Ratio.

RETAINED RESPONSES TABLE

Response Type	Response	Subcase	Grid/	DOF/	Response	Objective	Viol.
User-ID	Label	/RANDPS	Element/	Comp	Value	Reference/	%
	/Model	MID/PID/	/Reg		Constraint		
	+Frqncy	Mode No.			Bound		
	/Times						

2 WCOMP wcomp -- -- -- 1.181E+08 MIN
1 VOLFR Volfrac -- -- TOTL 3.000E-01 < 3.000E-01 0.0 A

ITERATION 3

*** WARNING # 1662

Constraint reduced AUTOSPC DOF(s) listed below usually are related
to a modeling error. Please review the model.

GRID 1548434 DOF 4

GRID 1548495 DOF 4

GRID 1548502 DOF 4

GRID 1548611 DOF 4

GRID 1548973 DOF 4

GRID 1549218 DOF 4

GRID 1549676 DOF 4

GRID 1549974 DOF 4

GRID 1550044 DOF 4

GRID 1550414 DOF 4

GRID 1552034 DOF 4

GRID 1552259 DOF 4

GRID 1552762 DOF 4

GRID 1552981 DOF 4

GRID 1553303 DOF 4

GRID 1553895 DOF 4

GRID 1554101 DOF 4

GRID 1554245 DOF 4

Number of constraint reduced AUTOSPC DOFs = 18

*** WARNING # 5628

The compliance is negative or large 1.17818e+08.

The rotational displacement has large magnitude, -227.68 degrees (larger than 180).

The rotational degree of freedom may not be constrained properly in the model.

subcase id = 1

grid id = 1403361

component = 5

Subcase: 1

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. -1.738E-02 -2.597E-02 -1.198E+06 5.256E+08 -3.681E+06 -1.850E+06

Sum-SPCF 1.897E-02 2.468E-02 1.198E+06 -5.256E+08 3.681E+06 1.850E+06

Subcase: 2

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. 0.000E+00 0.000E+00 1.568E+05 -3.709E+07 1.037E+06 0.000E+00

Sum-SPCF 0.000E+00 0.000E+00 -1.568E+05 3.709E+07 -1.037E+06 0.000E+00

the 1st satisfied convergence ratio = 2.3427E-03

Objective Function (Minimize WCOMP) = 1.17818E+08 % change = -0.23

Maximum Constraint Violation % = 0.00000E+00

Design Volume Fraction = 3.00000E-01 Mass = 4.61534E+00

Subcase	Weight	Compliance	Epsilon	Weight*Comp.
1	1.000E+00	1.178177E+08	-5.134881E-09	1.178177E+08
2	1.000E+00	0.000000E+00	0.000000E+00	0.000000E+00

Sum of Weight*Compliance 1.178177E+08

Note : Epsilon = Residual Strain Energy Ratio.

RETAINED RESPONSES TABLE

Response Type	Response	Subcase	Grid/	DOF/	Response	Objective	Viol.
User-ID	Label	/RANDPS	Element/	Comp	Value	Reference/	%
	/Model	MID/PID/	/Reg	Constraint			
	+Frqncy	Mode No.		Bound			
	/Times						

2	WCOMP	wcomp	--	--	--	1.178E+08	MIN
1	VOLFR	Volfrac	--	--	TOTL	3.000E-01	< 3.000E-01 0.0 A

ITERATION 4

*** WARNING # 1662

Constraint reduced AUTOSPC DOF(s) listed below usually are related to a modeling error. Please review the model.

GRID 1548434 DOF 4

GRID 1548470 DOF 4

GRID 1548495 DOF 4

GRID 1548502 DOF 4

GRID 1548611 DOF 4

GRID 1548973 DOF 4

GRID 1549218 DOF 4

GRID 1549602 DOF 4

GRID 1549676 DOF 4

GRID 1549974 DOF 4

GRID 1550044 DOF 4

GRID 1550414 DOF 4

GRID 1552034 DOF 4

GRID 1552259 DOF 4

GRID 1552688 DOF 4

GRID 1552762 DOF 4

GRID 1552981 DOF 4

GRID 1553303 DOF 4

GRID 1553895 DOF 4

GRID 1554101 DOF 4

GRID 1554245 DOF 4

Number of constraint reduced AUTOSPC DOFs = 21

*** WARNING # 5628

The compliance is negative or large 1.17732e+08.

The rotational displacement has large magnitude, -227.116 degrees (larger than 180).

The rotational degree of freedom may not be constrained properly in the model.

subcase id = 1

grid id = 1403361

component = 5

Subcase: 1

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. -1.738E-02 -2.597E-02 -1.198E+06 5.256E+08 -3.681E+06 -1.850E+06

Sum-SPCF 1.905E-02 2.470E-02 1.198E+06 -5.256E+08 3.681E+06 1.850E+06

Subcase: 2

Label x-force y-force z-force x-moment y-moment z-moment

Sum-App. 0.000E+00 0.000E+00 1.568E+05 -3.709E+07 1.037E+06 0.000E+00

Sum-SPCF 0.000E+00 0.000E+00 -1.568E+05 3.709E+07 -1.037E+06 0.000E+00

the 2nd satisfied convergence ratio = 7.2528E-04

Objective Function (Minimize WCOMP) = 1.17732E+08 % change = -0.07

Maximum Constraint Violation % = 0.12241E-03

Design Volume Fraction = 3.00000E-01 Mass = 4.61534E+00

Subcase	Weight	Compliance	Epsilon	Weight*Comp.
1	1.000E+00	1.177323E+08	-4.292207E-09	1.177323E+08
2	1.000E+00	0.000000E+00	0.000000E+00	0.000000E+00

Sum of Weight*Compliance 1.177323E+08

Note : Epsilon = Residual Strain Energy Ratio.

RETAINED RESPONSES TABLE

Response Type	Response	Subcase	Grid/	DOF/	Response	Objective	Viol.
User-ID	Label	/RANDPS	Element/	Comp	Value	Reference/	%
	/Model	MID/PID/	/Reg		Constraint		
	+Frqncy	Mode No.			Bound		
	/Times						

2	WCOMP	wcomp	--	--	--	1.177E+08	MIN
1	VOLFR	Volfrac	--	--	TOTL	3.000E-01	< 3.000E-01 0.0 A

OPTIMIZATION HAS CONVERGED.

FEASIBLE DESIGN (ALL CONSTRAINTS SATISFIED).

RESOURCE USAGE INFORMATION

MAXIMUM MEMORY USED 4933 MB

MAXIMUM DISK SPACE USED 4977 MB

COMPUTE TIME INFORMATION

EXECUTION STARTED Sun Nov 24 21:59:22 2019

EXECUTION COMPLETED Sun Nov 24 22:59:12 2019

ELAPSED TIME 00:59:49

CPU TIME 00:41:13

***** END OF REPORT *****

For Useful OptiStruct Tips and Tricks, go to the URL:

<http://www.altairhyperworks.com/tips.aspx>

==== End of solver screen output ====

==== OptiStruct Job completed ====

Iteration	Subcase	Variable	Grid/Elem ID	Value
0	1	MaxDisp	2183016_Z	-668.564
0	2	MaxDisp	2229834_Y	0
0	0	ObjFun:MinimizeWCOMP	0	1.20324e+08
0	0	MaxConstrViol(%)	0	0
1	1	MaxDisp	2183016_Z	-667.487
1	2	MaxDisp	2229834_Y	0
1	0	ObjFun:MinimizeWCOMP	0	1.18814e+08
1	0	MaxConstrViol(%)	0	7.62785e-06
2	1	MaxDisp	2183016_Z	-666.938
2	2	MaxDisp	2229834_Y	0
2	0	ObjFun:MinimizeWCOMP	0	1.18094e+08
2	0	MaxConstrViol(%)	0	0.000926961
3	1	MaxDisp	2183016_Z	-666.713
3	2	MaxDisp	2229834_Y	0
3	0	ObjFun:MinimizeWCOMP	0	1.17818e+08
3	0	MaxConstrViol(%)	0	0
4	1	MaxDisp	2183016_Z	-666.646
4	2	MaxDisp	2229834_Y	0
4	0	ObjFun:MinimizeWCOMP	0	1.17732e+08
4	0	MaxConstrViol(%)	0	0.000122412