

Technical Report

Section Properties Report

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Document:	MidShip Section Check
Section Name:	60' Motor Yacht Midship
Section Type:	Thin walled
Author:	Jon Evans

Issues & Amendments:

Issue	Issue Log	Issued by	Approved by	Issue Date
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1. Section Properties

1.1 Basic Section Properties

Section Name: 60' Motor Yacht Midship		
Property	Value	Unit
Price per meter with plating	0	€/m
Price per meter without plating	0	€/m
Weight per meter with plating	73.117	kg/m
Weight per meter without plating	73.117	kg/m

1.2 Coordinate Dependent Section Properties

1.2.1 Global

Coordinate System: Global		
Property	Value	Unit
Area	301658.3	mm ²
Width	5650.59	mm
Height	3012.41	mm
[Min Y, Min Y]	[9858.2, 15508.8]	mm
[Min Z, Max Z]	[-1.5, 3010.9]	mm
Elastic Center [y, z]	[12683.5, 1920.5]	mm
Shear Center [y, z]	[12683.5, -1148.5]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm
I _{yy}	7.431e+11	mm ⁴
I _{zz}	4.971e+13	mm ⁴
J	5.045e+13	mm ⁴
EA	7.251e+08	N
EI _{yy}	3.391e+15	Nmm ²

Elzz	1.205e+17	Nmm2
Elyz	1.766e+16	Nmm2
GAyy	2.587e+08	Nmm2
GAzz	2.038e+08	Nmm2
GJyz	2.319e+11	Nmm2

Principal Coord. Orientation	0	°
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Mlyy	1.801e+05	kg mm2
Mlzz	1.205e+07	kg mm2
Mlyz	1.161e+06	kg mm2

Principal Mass Coord. Orientation	0	°
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1.2.2 Global Elastic Center

Coordinate System: Global Elastic Center		
Property	Value	Unit
Area	301658.3	mm2
Width	5650.59	mm
Height	3012.41	mm

[Min Y, Min Z]	[-2825.3, 2825.3]	mm
[Min Z, Max Z]	[-1922, 1090.5]	mm

Elastic Center [y, z]	[0, 0]	mm
Shear Center [y, z]	[0, -3069]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm

Iyy	4.057e+11	mm4
Izz	1.180e+12	mm4
J	1.586e+12	mm4

EA	7.251e+08	N
Elyy	7.161e+14	Nmm2
Elzz	3.854e+15	Nmm2
Elyz	-2.327e+08	Nmm2
GAyy	2.587e+08	Nmm2
GAzz	2.038e+08	Nmm2
GJyz	2.319e+11	Nmm2

Principal Coord. Orientation	0	°
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Mlyy	9.835e+04	kg mm2
Mlzz	2.860e+05	kg mm2
Mlyz	-1.882e-02	kg mm2

Principal Mass Coord. Orientation	8.5	°
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1.2.3 Global Shear Center

Coordinate System: Global Shear Center		
Property	Value	Unit
Area	301658.3	mm ²
Width	5650.59	mm
Height	3012.41	mm
[Min Y, Min Y]	[-2825.3, 2825.3]	mm
[Min Z, Max Z]	[1147.1, 4159.5]	mm
Elastic Center [y, z]	[0, 3069]	mm
Shear Center [y, z]	[0, 0]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm
I _{yy}	2.008e+12	mm ⁴
I _{zz}	1.180e+12	mm ⁴
J	3.188e+12	mm ⁴
EA	7.251e+08	N
E _{lyy}	7.546e+15	Nmm ²
E _{lzz}	3.854e+15	Nmm ²
E _{lyz}	8.744e+08	Nmm ²
G _{Ayy}	2.587e+08	Nmm ²
G _{Azz}	2.038e+08	Nmm ²
G _{Jyz}	2.319e+11	Nmm ²
Principal Coord. Orientation	0	°
M _{Iyy}	4.868e+05	kg mm ²
M _{Izz}	2.860e+05	kg mm ²
M _{Iyz}	1.174e-01	kg mm ²
Principal Mass Coord. Orientation	-5.1	°

1.2.4 Global Mass Center

Coordinate System: Global Mass Center		
Property	Value	Unit
Area	301658.3	mm ²
Width	5650.59	mm
Height	3012.41	mm
[Min Y, Min Y]	[-2825.3, 2825.3]	mm
[Min Z, Max Z]	[-1252.9, 1759.5]	mm
Elastic Center [y, z]	[0, 669.1]	mm
Shear Center [y, z]	[0, -2400]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm
I _{yy}	2.707e+11	mm ⁴
I _{zz}	1.180e+12	mm ⁴
J	1.450e+12	mm ⁴

EA	7.251e+08	N
Elyy	1.041e+15	Nmm2
Elzz	3.854e+15	Nmm2
Elyz	-3.384e+08	Nmm2
GAyy	2.587e+08	Nmm2
GAzz	2.038e+08	Nmm2
GJyz	2.319e+11	Nmm2

Principal Coord. Orientation	0	°
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Mlyy	6.562e+04	kg mm2
MIzz	2.860e+05	kg mm2
Mlyz	-8.164e-03	kg mm2

Principal Mass Coord. Orientation	5.5	°
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1.2.5 Principal Mass Center

Coordinate System: Principal Mass Center		
Property	Value	Unit
Area	301658.3	mm2
Width	5650.59	mm
Height	3012.41	mm

[Min Y, Min Y]	[-2825.3, 2825.3]	mm
[Min Z, Max Z]	[-1252.9, 1759.5]	mm

Elastic Center [y, z]	[0, 669.1]	mm
Shear Center [y, z]	[0, -2400]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm

Iyy	2.707e+11	mm4
Izz	1.180e+12	mm4
J	1.450e+12	mm4

EA	7.251e+08	N
Elyy	1.041e+15	Nmm2
Elzz	3.854e+15	Nmm2
Elyz	-3.384e+08	Nmm2
GAyy	2.587e+08	Nmm2
GAzz	2.038e+08	Nmm2
GJyz	2.319e+11	Nmm2

Principal Coord. Orientation	0	°
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Mlyy	6.562e+04	kg mm2
MIzz	2.860e+05	kg mm2
Mlyz	-8.164e-03	kg mm2

Principal Mass Coord. Orientation	5.5	°
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1.2.6 Principal Elastic Center

Coordinate System: Principal Elastic Center		
Property	Value	Unit
Area	301658.3	mm ²
Width	5650.59	mm
Height	3012.41	mm
[Min Y, Min Y]	[-2825.3, 2825.3]	mm
[Min Z, Max Z]	[-1922, 1090.5]	mm
Elastic Center [y, z]	[0, 0]	mm
Shear Center [y, z]	[0, -3069]	mm
Mass Center [y, z]	[12683.5, 1251.4]	mm
I _{yy}	4.057e+11	mm ⁴
I _{zz}	1.180e+12	mm ⁴
J	1.586e+12	mm ⁴
EA	7.251e+08	N
E _{lyy}	7.161e+14	Nmm ²
E _{lzz}	3.854e+15	Nmm ²
E _{lyz}	-2.327e+08	Nmm ²
G _{Ayy}	2.587e+08	Nmm ²
G _{Azz}	2.038e+08	Nmm ²
G _{Jyz}	2.319e+11	Nmm ²
Principal Coord. Orientation	0	°
M _{lyy}	9.835e+04	kg mm ²
M _{lzz}	2.860e+05	kg mm ²
M _{lyz}	-1.882e-02	kg mm ²
Principal Mass Coord. Orientation	8.5	°

2. Section Elements Definition

2.1 Layered Section Elements

2.1.1 Element_001

Layered Section Element Basic Info		
Name	Element_001	
Element Type	ShearWeb	
Group	-	
Used Geometry	Hull Bottom, Hull Bottom_Cut_001, Line_010, Line_011, Hull Bottom_Cut_003_Cut_001	
Element Stack		
#	Material Name	Alpha [°]
TOP		
1	1 x XC-SM400-EP-PP	45

Element Stack		
#	Material Name	Alpha [°]
2-4	3 x XC-SM300-EP-PP	45
5	1 x 34mm C70.130	0
6-8	3 x XC-SM300-EP-PP	45
BOTTOM		

2.1.2 Element_002

Layered Section Element Basic Info	
Name	Element_002
Element Type	ShearWeb
Group	-
Used Geometry	Hull Topside Starboard, Hull Topside Portside

Element Stack		
#	Material Name	Alpha [°]
TOP		
1	1 x QC-SM600-EP-PP	0
2-4	3 x XC-SM300-EP-PP	45
5	1 x 20mm C70.100	0
6-7	2 x XC-SM300-EP-PP	45
8	1 x QC-SM600-EP-PP	0
BOTTOM		

2.1.3 Element_003

Layered Section Element Basic Info	
Name	Element_003
Element Type	ShearWeb
Group	-
Used Geometry	Polyline_003, Polyline_005

Element Stack		
#	Material Name	Alpha [°]
TOP		
1-3	3 x XC-SM300-EP-PP	0
4	1 x 7mm C70.75	0
5-6	2 x XC-SM400-EP-PP	0
BOTTOM		

* Orange layer marks core

* Green layer marks layered material

2.2 Uniform Section Elements

No uniform section elements for this section

3. Section Loads

3.1 Manual Loads

3.1.1 Bending Moment

Allowable Load Info	
Name	Bending Moment
Coordinate System	Global
Load Scale Factor	1
Deviatoric moment	Disabled
Input/Output Load Levels	Working/Working
Internal Forces (output) [Nx, Ny, Nz] [kN]	[0.00, 0.00, 0.00]
Internal Moments (output) [Mx, My, Mz] [kNm]	[0.00, -1668.31, 0.00]

3.2 Allowable Loads

No allowable loads for this section

4. RF Results

4.1 Bending Moment

Section Minimum RF	
Minimum Reserve Factor	2.136 (11TR)
Failure Criteria	MaxStrain3D
Failure Mode	Resin Micro-Cracking

Element Minimum RF		
Name	Ply	RF
Element_001	XC-SM300-EP-PP @45 #1	2.136 (MaxStrain3D/11TR)
Element_002	QC-SM600-EP-PP @0 #1	2.708 (MaxStrain3D/11TR)
Element_003	XC-SM400-EP-PP @0 #1	2.945 (MaxStrain3D/11CF)