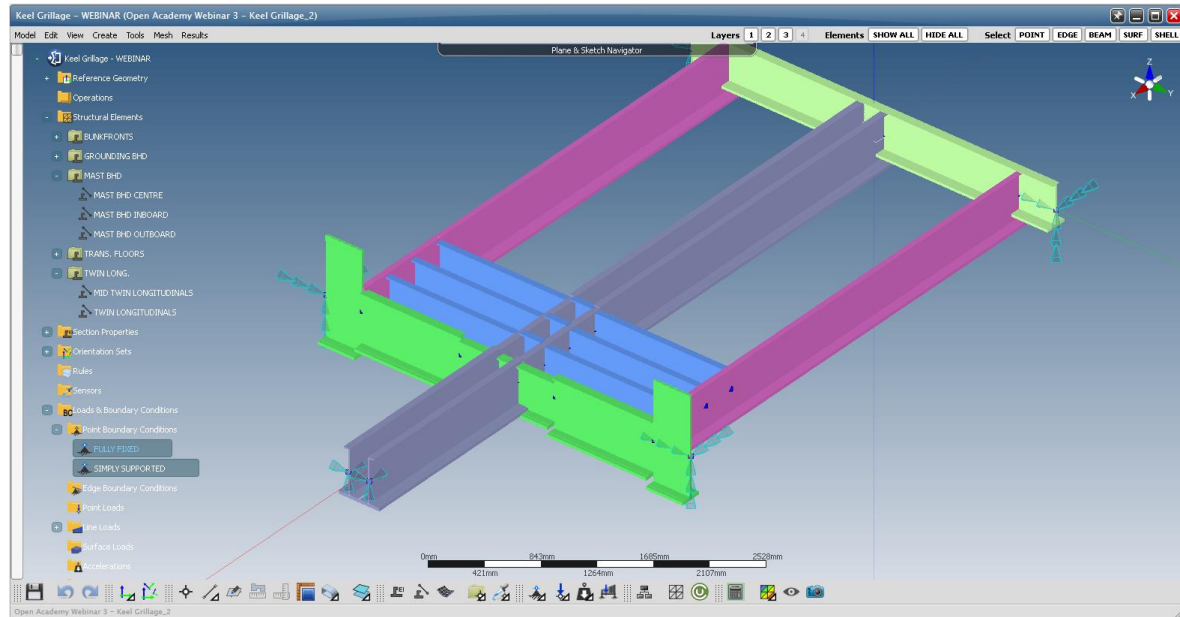


## Technical Report

### Bill of Material Report

Report generated in BoMGen powered by CompoSIDE

<b>Document:</b>	webinar report
<b>Product Name:</b>	Keel Grillage - WEBINAR
<b>Author:</b>	Aleksandra Dziekonska
<b>Circulation:</b>	



#### Issues and Amendments:

Issue	Issue Log	Issued by	Approved by	Issue Date
P1	Full carbon design	Aleksandra Dziekonska	Radek Michalik	12/05/2015 15:19

#### Disclaimer:

1. This document is intended for estimation purposes only and is not to be used for materials order.
2. This document should be used as a guide to tendering only. It remains the responsibility of the builder to satisfy himself as to the final selection of materials and the quantities required.
3. Some of the laminates are based on limited information and previous experience.
4. The laminates will be subject to change as the design evolves.
5. The "Weight Estimate" is exclusive of "wastage factors" (i.e. weights as designed) but includes "usage factor" (i.e. core resin consumption etc.).
6. The "Bill of Materials (BoM)" estimate includes "wastage and usage factors"
7. Product BoM factors are specified in the Appendix to this document or if specific for component in the document section outlining component BoM.
8. It is the builder responsibility to verify the appropriateness of the "wastage factors" and "usage factors" applied.

## 1. Introduction

<b>Product:</b>	Keel Grillage - WEBINAR
<b>Product Type:</b>	
<b>Keywords:</b>	Bill of Materials

## 2. Product Summary

### 2.1 BoM - Summary

		Summary		
Type	Material / Component	Total Areal Quantity <sup>1</sup> [m <sup>2</sup> ]	Total Weight Quantity <sup>1</sup> [kg]	Total Material Cost <sup>1</sup> [€]
	Total		113.06	4,196.65 €
Cores	15 mm PVC_60	12.59	10.79	156.48 €
Plies	UC-HEC300-E-PP	93.28	43.23	1,383.28 €
	UC-HEC300-E-VIN	23.32	13.83	484.15 €
	XC-400-E-PP	62.97	41.94	2,046.49 €
	XC-400-E-VIN	3.25	2.67	120.34 €
Formulated Products	EpoxyAdhesive		0.59	5.92 €

Core Weights include Resin Weight due to core resin consumption.  
 Areal and weight quantities include wastage and usage factors.  
 For core sheet size please refer to section 4. "Material Details"

#### Formulated Products

Material	As Designed Weight <sup>2</sup> [kg]	Total Weight <sup>1</sup> [kg]
EpoxyAdhesive	0.54	0.59

#### Resin Weight Summary (included in ply weight)

Material	Resin Type	Total Resin Weight <sup>1</sup> [kg]
Epoxy W	Epoxy	8.11

Included in plies and cores listed in table above.

## 2.2 BoM - Cost

Type	Material / Component	Component (Material Cost) [€]			
		Keel Grillage - WEBINAR	BUNKFRONTS	TRANS. FLOORS	TWIN LONG.
	Total	4,196.65 €	766.29 €	1,332.35 €	1,971.75 €
Cores	15 mm PVC_60	156.48 €	49.74 €	36.61 €	70.13 €
Plies	UC-HEC300-E-PP	1,383.28 €	165.72 €	687.54 €	530.02 €
	UC-HEC300-E-VIN	484.15 €	41.83 €	-	442.32 €
	XC-400-E-PP	2,046.49 €	509.01 €	608.20 €	929.28 €
	XC-400-E-VIN	120.34 €	-	-	-
Formulated Products	EpoxyAdhesive	5.92 €	-	-	-

Core Weights include Resin Weight due to core resin consumption.  
 Areal and weight quantities include wastage and usage factors.  
 For core sheet size please refer to section 4. "Material Details"

## 2.3 Weight Estimate

#	Component	As Designed Weight <sup>2</sup> [kg]
1	Keel Grillage - WEBINAR	100.18
2	Keel Grillage - WEBINAR/BUNKFRONTS	18.1
3	Keel Grillage - WEBINAR/TRANS. FLOORS	32.78
4	Keel Grillage - WEBINAR/TWIN LONG.	46.6

### 3. Components Summary

#### 3.1 Keel Grillage - WEBINAR (incl. Sub-components details)

Quantity: 1 (Including parent component quantity)

##### 3.1.1 Keel Grillage - WEBINAR Unique Material List (Total quantities)

#	Material Name	Type	As Designed Area <sup>2</sup> [m <sup>2</sup> ]	Total Area <sup>1</sup> [m <sup>2</sup> ]	As Designed Weight <sup>2</sup> [kg]	Total Weight <sup>1</sup> [kg]	Total Resin Weight <sup>1</sup> [kg]	Total Fibre Weight <sup>1</sup> [kg]	Total Price [€]	Price per Kg [€]
1	UC-HEC300-E-PP	Ply	84.6	93.28	38.82	43.23	0	0	1,383.28 €	32.00 €
2	UC-HEC300-E-VIN	Ply	20.76	23.32	11.19	13.83	6.75	7	484.15 €	35.00 €
3	XC-400-E-PP	Ply	57.11	62.97	37.66	41.94	0	0	2,046.49 €	48.80 €
4	XC-400-E-VIN	Ply	2.89	3.25	2.16	2.67	1.36	1.3	120.34 €	45.00 €
5	15 mm PVC_60	Core	10.9	12.59	9.81	10.79	0	0	156.48 €	14.50 €
6	EpoxyAdhesive	Homogen	0	0	0.54	0.59	0	0	5.92 €	10.00 €

Core Weights include Resin Weight due to core resin consumption.

Keel Grillage - WEBINAR Subcomponents:

#	Name	Type	Unit Area / Unit Length [m <sup>2</sup> ] / [mm]	Unit Subcomponent Weight (Factored) <sup>2</sup> [kg]	Unit Quantity	Quantity (including component quantity)
1	Bonding	Bonding	- / 4500	1.35	2	2

##### 3.1.2 Keel Grillage - WEBINAR Stacking

###### 3.1.2.1 Bonding StackUp (Bonding)

Subcomponent Quantity: 2, Length: 4500 [mm]

Material	α	Width / Leng. / Cov.	Comment	Bonding
	[°]	[mm] / [mm] / [%]		Bonding
1 - 3	3 x XC-400-E-VIN	45	100 / 4500 / 100	<input checked="" type="checkbox"/>
4	R15 EpoxyAdhesive	0	4500 / 100	<input checked="" type="checkbox"/>
Element Quantity			[-]	1
Single Element Thickness			[mm]	1.5

## 3.2 BUNKFRONTS (incl. Sub-components details)

Quantity: 1 (Including parent component quantity)

### 3.2.1 BUNKFRONTS Unique Material List (Total quantities)

#	Material Name	Type	As Designed Area <sup>2</sup> [m <sup>2</sup> ]	Total Area <sup>1</sup> [m <sup>2</sup> ]	As Designed Weight <sup>2</sup> [kg]	Total Weight <sup>1</sup> [kg]	Total Resin Weight <sup>1</sup> [kg]	Total Fibre Weight <sup>1</sup> [kg]	Total Price [€]	Price per Kg [€]
1	UC-HEC300-E-PP	Ply	10.14	11.17	4.65	5.18	0	0	165.72 €	32.00 €
2	UC-HEC300-E-VIN	Ply	1.79	2.01	0.97	1.2	0.58	0.6	41.83 €	35.00 €
3	XC-400-E-PP	Ply	14.21	15.66	9.37	10.43	0	0	509.01 €	48.80 €
4	15 mm PVC_60	Core	3.46	4	3.12	3.43	0	0	49.74 €	14.50 €

Core Weights include Resin Weight due to core resin consumption.

#### BUNKFRONTS Subcomponents:

#	Name	Type	Unit Area / Unit Length [m <sup>2</sup> ] / [mm]	Unit Subcomponent Weight (Factored) <sup>2</sup> [kg]	Unit Quantity	Quantity (including component quantity)
1	BUNK FRONT	Beam	- / 8662	18.1	1	1

### 3.2.2 BUNKFRONTS Stacking

#### 3.2.2.1 BUNK FRONT StackUp (Beam)

Subcomponent Quantity: 1, Length: 8662 [mm]

Material		α	Width / Leng. / Cov.	Comment	CAPPING	SHEAR WEB	Botom Tape
		[°]	[mm] / [mm] / [%]		Reinforcement	ShearWeb	Reinforcement
1 - 2	2 x UC-HEC300-E-VIN	0	100 / 8662 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 - 25	23 x UC-HEC300-E-PP	0	50 / 8662 / 100		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26 - 28	3 x XC-400-E-PP	45	400 / 8662 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	15 mm PVC_60	0	400 / 8662 / 100		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30 - 32	3 x XC-400-E-PP	45	400 / 8662 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Element Quantity			[-]		1	1	1
Single Element Thickness			[mm]		6.9	16.8	0.7
Average Lap Distance			[mm]		0	0	0
Bonding Tape Radius (Radius used for bonding plies width calculation)			[mm]		0	0	0

### 3.3 TRANS. FLOORS (incl. Sub-components details)

Quantity: 1 (Including parent component quantity)

#### 3.3.1 TRANS. FLOORS Unique Material List (Total quantities)

#	Material Name	Type	As Designed Area <sup>2</sup> [m <sup>2</sup> ]	Total Area <sup>1</sup> [m <sup>2</sup> ]	As Designed Weight <sup>2</sup> [kg]	Total Weight <sup>1</sup> [kg]	Total Resin Weight <sup>1</sup> [kg]	Total Fibre Weight <sup>1</sup> [kg]	Total Price [€]	Price per Kg [€]
1	UC-HEC300-E-PP	Ply	42.05	46.36	19.3	21.49	0	0	687.54 €	32.00 €
2	XC-400-E-PP	Ply	16.97	18.71	11.19	12.46	0	0	608.20 €	48.80 €
3	15 mm PVC_60	Core	2.55	2.95	2.3	2.52	0	0	36.61 €	14.50 €

Core Weights include Resin Weight due to core resin consumption.

TRANS. FLOORS Subcomponents:

#	Name	Type	Unit Area / Unit Length [m <sup>2</sup> ] / [mm]	Unit Subcomponent Weight (Factored) <sup>2</sup> [kg]	Unit Quantity	Quantity (including component quantity)
1	MID TRANSVERSE FLOORS	Beam	- / 600	3.27	1	1
2	TRANSVERSE FLOORS	Beam	- / 7800	29.51	1	1

#### 3.3.2 TRANS. FLOORS Stacking

##### 3.3.2.1 MID TRANSVERSE FLOORS StackUp (Beam)

Subcomponent Quantity: 1, Length: 600 [mm]

Material		α	Width / Leng. / Cov.	Comment	BOTTOM TAPES	CAPPING	Web
		[°]	[mm] / [mm] / [%]		Reinforcement	Reinforcement	ShearWeb
1 - 16	16 x UC-HEC300-E-PP	0	150 / 600 / 100		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 - 58	42 x UC-HEC300-E-PP	0	60 / 600 / 100		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
59 - 64	6 x XC-400-E-PP	45	350 / 600 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
65	15 mm PVC_60	0	350 / 600 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
66 - 71	6 x XC-400-E-PP	45	350 / 600 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Element Quantity			[-]		1	1	1
Single Element Thickness			[mm]		4.8	12.6	20.4
Average Lap Distance			[mm]		0	0	0
Bonding Tape Radius (Radius used for bonding plies width calculation)			[mm]		0	0	0

##### 3.3.2.2 TRANSVERSE FLOORS StackUp (Beam)

Subcomponent Quantity: 1, Length: 7800 [mm]

Material		α	Width / Leng. / Cov.	Comment	BOTTOM TAPES	CAPPING	SHEAR WEB
		[°]	[mm] / [mm] / [%]		Reinforcement	Reinforcement	ShearWeb
1 - 16	16 x UC-HEC300-E-PP	0	150 / 7800 / 100		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 - 58	42 x UC-HEC300-E-PP	0	60 / 7800 / 100		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
59 - 64	6 x XC-400-E-PP	45	300 / 7800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65	15 mm PVC_60	0	300 / 7800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
66 - 71	6 x XC-400-E-PP	45	300 / 7800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Element Quantity			[-]		1	1	1
Single Element Thickness			[mm]		4.8	12.6	17.7
Average Lap Distance			[mm]		0	0	0
Bonding Tape Radius (Radius used for bonding plies width calculation)			[mm]		0	0	0

### 3.4 TWIN LONG. (incl. Sub-components details)

Quantity: 1 (Including parent component quantity)

#### 3.4.1 TWIN LONG. Unique Material List (Total quantities)

#	Material Name	Type	As Designed Area <sup>2</sup> [m <sup>2</sup> ]	Total Area <sup>1</sup> [m <sup>2</sup> ]	As Designed Weight <sup>2</sup> [kg]	Total Weight <sup>1</sup> [kg]	Total Resin Weight <sup>1</sup> [kg]	Total Fibre Weight <sup>1</sup> [kg]	Total Price [€]	Price per Kg [€]
1	UC-HEC300-E-PP	Ply	32.42	35.74	14.87	16.57	0	0	530.02 €	32.00 €
2	UC-HEC300-E-VIN	Ply	18.96	21.3	10.23	12.64	6.16	6.39	442.32 €	35.00 €
3	XC-400-E-PP	Ply	25.93	28.59	17.1	19.04	0	0	929.28 €	48.80 €
4	15 mm PVC_60	Core	4.89	5.64	4.4	4.84	0	0	70.13 €	14.50 €

Core Weights include Resin Weight due to core resin consumption.

TWIN LONG. Subcomponents:

#	Name	Type	Unit Area / Unit Length [m <sup>2</sup> ] / [mm]	Unit Subcomponent Weight (Factored) <sup>2</sup> [kg]	Unit Quantity	Quantity (including component quantity)
1	MID TWIN LONGITUDINALS	Beam	- / 1800	10.62	1	1
2	TWIN LONGITUDINALS	Beam	- / 10414	35.98	1	1

#### 3.4.2 TWIN LONG. Stacking

##### 3.4.2.1 MID TWIN LONGITUDINALS StackUp (Beam)

Subcomponent Quantity: 1, Length: 1800 [mm]

Material		α	Width / Leng. / Cov.	Comment	CAPPING	BOTTOM TAPE	SHEAR WEB
		[°]	[mm] / [mm] / [%]		Reinforcement	Reinforcement	ShearWeb
1 - 10	10 x UC-HEC300-E-VIN	0	150 / 1800 / 100		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11 - 65	55 x UC-HEC300-E-PP	0	60 / 1800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66 - 71	6 x XC-400-E-PP	45	400 / 1800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
72	15 mm PVC_60	0	400 / 1800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
73 - 78	6 x XC-400-E-PP	45	400 / 1800 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Element Quantity			[-]		1	1	1
Single Element Thickness			[mm]		15.6	3.5	20.4
Average Lap Distance			[mm]		0	0	0
Bonding Tape Radius (Radius used for bonding plies width calculation)			[mm]		0	0	0

##### 3.4.2.2 TWIN LONGITUDINALS StackUp (Beam)

Subcomponent Quantity: 1, Length: 10414 [mm]

Material		α	Width / Leng. / Cov.	Comment	CAPPING	BOTTOM TAPE	Web
		[°]	[mm] / [mm] / [%]		Reinforcement	Reinforcement	ShearWeb
1 - 10	10 x UC-HEC300-E-VIN	0	150 / 10414 / 100		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11 - 55	45 x UC-HEC300-E-PP	0	60 / 10414 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56 - 61	6 x XC-400-E-PP	45	400 / 10414 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62	15 mm PVC_60	0	400 / 10414 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
63 - 68	6 x XC-400-E-PP	45	400 / 10414 / 100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Element Quantity			[-]		1	1	1
Single Element Thickness			[mm]		12.6	3.5	16.8
Average Lap Distance			[mm]		0	0	0
Bonding Tape Radius (Radius used for bonding plies width calculation)			[mm]		0	0	0



## 4. BoM Material Details

### Cores

Name	$t_{pp}$ [mm]	$\rho$ [kg/m <sup>3</sup> ]	$A_m$ [g/m <sup>2</sup> ]	Sheet Width Sheet Length [mm]	Core Preprocessing Type	Paper/Film Type	Cell Shape / Grade	Price per m <sup>2</sup> €
15 mm PVC_60	15	60	900		Plain (PL)	-	- / -	

### Plies

Name	$t_{pp}$ [mm]	$A_m$ [g/m <sup>2</sup> ]	FVF	RWF	Material Type	Reinforcement Type	Matrix Type	Processing Type	Price per m <sup>2</sup> €
UC-HEC300-E-PP	0.3	463.5	0.56	0.353	UD	HEC	Epoxy	Prepreg	
UC-HEC300-E-VIN	0.35	504	0.48	0.405	UD	HEC	Epoxy	Infusion	
XC-400-E-PP	0.45	666	0.52	0.399	Biaxials	HSC	Epoxy	Prepreg	
XC-400-E-VIN	0.5	700	0.46	0.429	Biaxials	HSC	Epoxy	Infusion	

### Formulated Products

Name	$\rho$ [kg/m <sup>3</sup> ]	Price per Kg €
Epoxy W	1180	
EpoxyAdhesive	1200	10

### Material Description

Type	Name	Description
Cores	15 mm PVC_60	
Plies	UC-HEC300-E-PP	F: HEC (Mod235GPa, Strength >4.8GPa) M: Generic epoxy
	UC-HEC300-E-VIN	F: HEC (Mod235GPa, Strength >4.8GPa) M: Generic epoxy
	XC-400-E-PP	F: Generic 12K fibre Mod 230GPa, Strength >3.4 M: Generic Epoxy
	XC-400-E-VIN	F: Generic 12K fibre Mod 230GPa, Strength >3.4 M: Generic Epoxy
Formulated Products	Epoxy W	Epoxy Wet
	EpoxyAdhesive	This is generic Structural Epoxy adhesive

## 5. Appendix

### 5.1 BoM Settings

#### Wastage factors

Property	Value	Unit
Wastage Scale Factor	1	
Finished Part Offcut	5	%
Cores Offcut	10	%
Secondary Bonding Adhesive Wastage	5	%

	Infusion	Prepreg
Fabric Offcut [%]	7	5
Resin Application Wastage [%]	10	0

Included in Usage and Wastage Quantities accordingly.

#### Usage factors

Property	Value	Unit
Usage Scale Factor	1	
Secondary Bonding Adhesive Usage	3	%

	Infusion	Prepreg
General Resin Usage [%]	7	0
Resin Bleed-Out [%]	0	1

Included in Usage and Wastage Quantities accordingly.

#### Overlap Factors (Wastage & Usage)

Overlap Factors (Percentage of ply total area)

	Infusion	Prepreg
Multiaxial Overlap [%]	7	2.5
UD Overlap [%]	3.5	1.75

Included in Usage and Wastage Quantities accordingly.

#### Core Resin Consumption Factors

Core Resin Consumption varies and depends on Core Preprocessing (i.e. Core Cut Type) and Laminate Processing Type (i.e. Infusion).

Defined according to STRUCTeam Internal Knowledge.

### 5.2 Tables Header Notes

<sup>1</sup> Including Wastage & Usage Factors

<sup>2</sup> Including Usage Factors

<sup>3</sup> Laminates are compliant with the ISO 12215 Category A and ABS guidelines