

## Modeling Hull form using offset table

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**Offset table definition** 

#### Surface from offset

Surface from curves

Fairing



#### Modelling a Ferry using offset table

- In this tutorial we are going to use the offset table in the "T4\_hull lines" excel file to model the vessel in Maxsurf.
  - Instead, you can also create the model using lines plan in the same excel file, as explained in the presentation "02 Ice Breaker from lines plan"

#### Steps involved in this tutorial

- ✓ Importing offset table data as markers from a text file.
- ✓ Creating surface using markers.
- ✓ Fairing
- ✓ Trimming and final preparation for further stability and resistance analysis.
- ✓ Hydrostatics.



#### **Offset Table**

- First we need to define the main particulars of the vessel in excel. In this example we have the following particulars
  - $\succ$  L<sub>pp</sub> = 362 m
  - $\succ$  B = 65 m
  - ≻ T = 9.3 m
  - ➢ D = 22.6 m
  - $\succ$  C<sub>b</sub> = 0.752
- Amend the offset table, lines plan, sectional area curve etc. to obtain the desired hull form, refer to "T4\_Hull Lines xlsx tutorial" presentation.
- The lines should be fair enough before exporting the corresponding offset table to Maxsurf.

#### **Offset Table**

• To import the offset table into Maxsurf we need to convert it into a text file contains 4 columns:

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	19.25	-13.750	30.55		32.0775	32.5	32.5	32.5	32.5	32.0	32.5	32.5	32.175	20.05	11.375	369.964	3.9
	12.62	-12.07	29.373		27.3	31 525	32.5	32.5	32.5	32.0	32.5	32.5	29.25	24.03	2.6	364 172	0.65
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WL 4	7.44	11.584	0	14.48	-13	21.125	30.225	32.4025	32.5	32.5	32.5	30.875	24.7	13.325	0.325	362	0
WL 3	5.58	13.756	0	32.58	-32.5	6.5	26	31.85	32.5	32.5	32.175	29.25	21.775	10.725	1.95	364.896	1.3
WL 2	3.72	14.48	0	43.44	-65	-6.5	18.85	30.225	32.3375	32.3375	31.2	26.65	18.2	7.8	2.275	367.43	1.625
WL 1	1.86	14.48	0	54.3	-65	-16.25	10.725	26	31.525	31.525	28.6	22.425	13	4.55	1.95	367.43	1.3
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- The text file can also contain the stem and stern profile and/or buttock markers.
- Markers with negative values or with missing coordinate should be deleted.

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#### **Importing Markers**

- Open Maxsurf Modeler and then open Markers window
  - Window → Markers
- Import Markers
  - Go to File → Open Markers... → then open the Markers text file

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#### **Importing Markers**

- Go to perspective view and check the imported Markers
- The markers should represent the hull surface.
- You can delete markers (for instance wrong and duplicated markers) by selecting them and press delete.

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- The first trial to create a surface from markers should be as simple as possible, unless you may spend much time to get fair hull.
- Markers represent skeg and pulpous bow are not important at this stage, as they complicate the NURBS surface generation and may induce errors.



#### **Connect Markers**

- Check Markers orders are defined correctly.
  - Go to Display → Markers → Connect Marker Stations





- Generate design Grid from Markers
  - Go to Markers → Generate design grid from markers → Ok

#### Check markers of each station

- Switch to body plan and then go to Display → Markers → Markers for current station.
- Select the station you want to view from the window at the upper left side







- Define the missing markers as the ones at the center line for each station
  - Press Ctrl +A to add markers
  - Change the Marker coordinates (offset, height and longitudinal position from properties window



- All markers withing each station should be connected by virtual lines have the same shape of the station, if not or if there are disturbances in the connection (like the one in the figure) :
  - Select the Marker that are not defined correctly, preferably you should select them one by one in each station from the highest marker to the lowest one, and then order them by going to Markers → Re-order selected markers





 Repeat the previous procedures until getting satisfied from the Markers definition of each frame





#### Surface from markers (Fitting curves)

- Select all Markers within frames/stations and bow stem markers ( Only markers forward the last frame) and then fit curves to Marker Stations
  - Curves → Fit curves to Marker stations... → use exact fit and define curve stiffens or define number of control points and fitting tolerance

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Curves Surfaces Frame Deck

Add Curve

🖑 Add Data Point

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 Flip Curve...

35 Rotate Curve...

5) Reverse Curve

5. Break Curve

Project Curve onto Surface...

Delete Curve...

🖑 Add Control Point

#### Surface from markers (Fitting curves)

- The symmetry of the bow stem curve should be deactivated
  - Double click on the stem profile curve and uncheck symmetry.

Curve Properties		>
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		Symmetry
		OK Cancel



#### Surface from markers (Skin curves)

#### Create surface from the curves

- Select all curves
- Go to surface → skin curves → select the appropriate stiffness (start with lower surface stiffness) → enter the appropriate number of columns and rows ( columns should be more than number of frames) → order may be according to longitudinal position if not selected with order → Ok.





#### **Importing Markers (Surface Fairing)**

 After creating the hull now we don't need the curves any more so hide or delete them from the Assembly tree

• Select curves → right click on them → hide



- Active surface net to start fairing the hull
  - Display → Net → Active Rows and Columns
- Refer to presentation "02 Ice Breaker from lines plan" for more information about the fairing process



Toggle display of the control point net for all visible and unlocked surfaces



- You can employ different options in Maxsurf to assist you in fairing process:
  - Lines plan and control points (refer to previous presentations)







- You can employ different options in Maxsurf to assist in fairing process:
  - Lines plan and control points (refer to previous presentations)
  - **Compress**: the vertical and transverse axes are increased by a factor of four relative to the longitudinal axis. This is useful for fairing longitudinal curvature.





- You can employ different options in Maxsurf to assist in fairing process:
  - Curvature: Displays curvature porcupines for any edge, section, waterline, buttock, diagonal or feature line by clicking on the curve and selecting Show Curvature. ( Like deck edge in the figure below)





 Active/deactivate the Half Icon to show both sides/hide one side

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#### **Modeling Skeg**

• After getting satisfied from the fairness of the Hull model, you can lock it by double click on and then check locked.





## **Modeling Skeg**

- Define the skeg
  - ✓ Go to surface → Add surface → Buttock plane and Add enough columns and rows to define the skeg surface.
  - ✓ Make sure to change the stiffness of the skeg surface to suitable value.
  - ✓ Manipulate the control points to get the desired shape of the skeg.

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## **Modeling Skeg**

- Trim the extension of the skeg inside the hull form and/or trim the freeboard and forecastle.
  - ✓ Go to Display → trimming → trim grey.
  - ✓ Go to Surface → start trimming → select the surface you want to trim → then select the part of the surface to be trimmed → then press Ctrl + T

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#### **Parametric transformation**

- The parametric variation tool is ideal for making small adjustments to your model.
- You can first check the hydrostatics at the design draft before performing parametric transformation:
  - Go to Data → Calculate Hydrostatics...
- In case huge deviations are observed comparing with the hydrostatics and section area curves in the excel "T4\_Hull Lines", you can simply rectify the errors using parametric transformation.



1       Displacement       144829       t         2       Volume (displaced)       138369.533       m*3         3       Draft Amidships       9.300       m         4       Immersed depth       9.300       m         5       WL Length       365.310       m         6       Beam max extents on       64.945       m         7       Wetted Area       19259:287       m*2         8       Max sect. area       578.348       m*2         9       Waterpl. Area       19736.234       m*2         10       Prismatic coeff. (Cp)       0.655       11         11       Block coeff. (Cb)       0.627       0.627         12       Max Sect. area coeff.       0.832       1         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       45.032       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         20       BML       1190.053       m         23       GML       1065.940       m         24 <th></th> <th>Measurement</th> <th>Value</th> <th>Units</th> <th></th> <th></th>		Measurement	Value	Units		
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3       Draft Amidships       9:300       m         4       immersed depth       9:300       m         5       WL Length       365:310       m         6       Beam max extents on       64:945       m         7       Wetted Area       00259:267       m*2         8       Max sect. area       578:348       m*2         9       Waterpi. Area       19736:234       m*2         9       Waterpi. Area       19736:234       m*2         10       Prismatic coeff. (Cb)       0.627       0.655         11       Block coeff. (Cb)       0.627       0.058         13       Waterpi. area coeff.       0.058       1         14       LCB length       178:526       from ze         15       LCF length       164:508       from ze         16       LCB %       48:870       from ze         17       LCF %       45:032       from ze         18       KB       5:287       m         19       KG fluid       0:000       m         20       BML       1190:53       m         23       GML       1095:040       m         24	2	Volume (displaced)	138369.535	m^3		
4       Immersed depth       9.300       m         5       WL Length       385.310       m         6       Beam max extents on       64.945       m         7       Wetted Area       3255.287       m*2         8       Max sect. area       578.348       m*2         9       Waterpl. Area       19736.234       m*2         9       Waterpl. Area       19736.234       m*2         10       Prismatic coeff. (Cp)       0.655       11         11       Block coeff. (Cb)       0.627       12         12       Max Sect. area coeff.       0.832       14         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         20       BML       1190.053       m         21       BML       1190.53       m         22       GML       1195.340       m         23       GML       1195.340       m         26       immersion (	3	Draft Amidships	9.300	m		
5       WL Length       365.310       m         6       Beam max extents on       64.945       m         7       Wetted Area       2059.267       m*2         8       Max sect. area       578.348       m*2         9       Waterpl. Area       19736.234       m*2         9       Waterpl. Area       19736.234       m*2         10       Prismatic coeff. (Cp)       0.655       11         11       Block coeff. (Cb)       0.627       12         12       Max Sect. area coeff.       0.066       13         13       Waterpl. area coeff.       0.832       14         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1195.340       m         23       GML       1195.340       m         25       KML<	4	Immersed depth	9.300	m		
6       Beam max extents on       64.945       m         7       Wetted Area       9259-987       m*2         8       Max sect. area       578.348       m*2         9       Waterpl. Area       19736.234       m*2         9       Waterpl. Area       19736.234       m*2         10       Prismatic coeff. (Cb)       0.655       0.627         11       Block coeff. (Cb)       0.627       0.627         12       Max Sect. area coeff.       0.832       1         13       Waterpl. area coeff.       0.832       1         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       45.032       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         20       BML       1190.053       m         21       BML       1190.053       m         22       GML       106-340       m         23       GML       1195.340       m         24       KMt       48.591       m         25       KML </td <td>5</td> <td>WL Length</td> <td>365.310</td> <td>m</td> <td></td> <td></td>	5	WL Length	365.310	m		
7       Wetted Area       20209-262       m^22         8       Max sect. area       578.348       m^22         9       Waterpl. Area       19736.234       m^22         10       Prismatic coeff. (Cp)       0.655       1         11       Block coeff. (Cb)       0.627       1         12       Max Sect. area coeff       0.058       1         13       Waterpl. area coeff.       0.832       1         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1106-340       m         23       GML       1106-340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc	6	Beam max extents on	64.945	m		
8       Max sect. area       578.349       m^2         9       Waterpl. Area       19736.234       m^2         10       Prismatic coeff. (Cp)       0.655         11       Block coeff. (Cb)       0.627         12       Max Sect. area coeff.       0.966         13       Waterpl. area coeff.       0.832         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1.05.910       m         23       GML       1.95.340       m         24       KMt       48.591       m         25       KML       1.195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28	7	Wetted Area	20259.287	m^2		
9       Waterpl. Area       19736.234       m*2         10       Prismatic coeff. (Cp)       0.655         11       Block coeff. (Cb)       0.627         12       Max Sect. area coeff.       0.966         13       Waterpl. area coeff.       0.832         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML corrected       48.591       m         23       GML       105.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m	8	Max sect. area	578.348	m^2		
10       Prismatic coeff. (Cp)       0.655         11       Block coeff. (Cb)       0.627         12       Max Sect. area coeff.       0.968         13       Waterpl. area coeff.       0.832         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML corrected       48.591       m         23       GML       105.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         Vensity (water)       1.025 tonne/m <sup>3</sup> 1	9	Waterpl. Area	19736.234	m^2		
11       Block coeff. (Cb)       0.627         12       Max Sect. area coeff.       0.968         13       Waterpl. area coeff.       0.832         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1195.340       m         23       GML       1195.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         Vensity (water)       1.025 tonne/m <sup>3</sup> 1	10	Prismatic coeff. (Cp)	0.655	0		
12       Max Sect. area coeff.       0.000         13       Waterpl. area coeff. (       0.832         14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1195.340       m         23       GML       1195.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         vensity (water)       1.025 tonne/m <sup>3</sup> 1	11	Block coeff. (Cb)	0.627	5		
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14       LCB length       178.526       from ze         15       LCF length       164.508       from ze         16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BMt       43.304       m         21       BML       1190.053       m         22       GML       1196.940       m         23       GML       1195.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         vensity (water)       1.025 tonne/m <sup>3</sup> 1025 tonne/m <sup>2</sup>	13	Waterpl. area coeff. (	0.832	·		
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16       LCB %       48.870       from ze         17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BML       43.304       m         21       BML       1190.053       m         22       GML corrected       48.591       m         23       GML       1196-940       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         ensity (water)       1.025 tonne/m^3       1025 tonne/m^2	15	LCF length	164.508	from ze		
17       LCF %       45.032       from ze         18       KB       5.287       m         19       KG fluid       0.000       m         20       BML       43.304       m         21       BML       1190.053       m         22       GMt corrected       48.591       m         23       GML       1196-949       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4840.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         vensity (water)       1.025 tonne/m^3       1025 tonne/m^2	16	LCB %	48.870	from ze		
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20       BMt       43.304       m         21       BML       1190.053       m         22       GMt corrected       48.591       m         23       GML       1195.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         vensity (water)       1.025 tonne/m^3       1025 tonne/m^2	19	KG fluid	0.000	m		
21       BML       1190.053       m         22       GMt corrected       48.591       m         23       GML       196.340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         ensity (water)       1.025 tonne/m^3       1005 tonne/c       1005 tonne/c	20	BMt	43.304	m		
22       GMt corrected       48.591       m         23       GML       106.949       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         ensity (water)       1.025 tonne/m^3       1025 tonne/m^3	21	BML	1190.053	m		
23       GML       1195-340       m         24       KMt       48.591       m         25       KML       1195.340       m         26       Immersion (TPc)       202.296       tonne/c         27       MTc       4640.808       tonne.m         28       RM at 1deg = GMt.Dis       120274.292       tonne.m         ensity (water)       1.025 tonne/m^3       1025 tonne/m^2	22	GMt corrected	48.591	m		
24         KMt         48.591         m           25         KML         1195.340         m           26         Immersion (TPc)         202.296         tonne/c           27         MTc         4640.808         tonne.m           28         RM at 1deg = GMt.Dis         120274.292         tonne.m           ensity (water)         1.025 tonne/m^3         1025 tonne/m^2	23	GML	1105.340	m		
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26         Immersion (TPc)         202.296         tonne/c           27         MTc         4640.808         tonne.m           28         RM at 1deg = GMt.Dis         120274.292         tonne.m           Iensity (water)         1.025 tonne/m^3         1025 tonne/m^2	25	KML	1195.340	m		
27         MTc         4640.808         tonne.m           28         RM at 1deg = GMt.Dis         120274.292         tonne.m           lensity (water)         1.025 tonne/m^3         1025 tonne/m^2	26	Immersion (TPc)	202.296	tonne/c		
28       RM at 1deg = GMt.Dis       120274.292       tonne.m         lensity (water)       1.025 tonne/m <sup>3</sup> td descrites       1.025 tonne /m <sup>3</sup>	27	MTc	4640.808	tonne.m		
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Design Grid...
Inclined Sections.

Vessel Type..

Girth...

Frame of Reference.

Windage Surfaces.

Calculate Offsets...

図 Go To Next Offset

Calculate Areas.

AC Rule...

Verify Model..

四 Go To Previous Offset

Calculate Hydrostatics..

Parametric Transformation

Solve Calculations

Calculate Parts

👝 Target Section Area Curve..

#### **Parametric transformation**

- To change slightly any of the particulars you can use the parametric transformation feature in Maxsurf
- ✓ Go to Data → Parametric Transformation → Insert the new particular(s) ( $C_B$  or  $C_P$ , Midship area coefficient, LCB, displacement, LWL, Beam and/or immersed depth) → Press Search → Check the new model main parameter are defined adequately and the lines are smooth without considerable distortion → Press Ok or search again to define new model.

Data Window Help Bentley Clo

 $\checkmark~$  Check again the hydrostatics

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#### **Exporting Lines Plan**

- To show labels and grid lines
  - Display → Design grid → design grid labels







#### **Exporting Lines Plan**

- The Model still can be refined and optimized as required
- To generate lines plan from the 3D model Go to the profile and press
  - File → Export → Lines Plan

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- Maxsurf Stability can be employed, to plot hydrostatics curves.
- $\checkmark~$  Save the model in Maxsurf modeler
- ✓ Open Maxsurf stability
- ✓ Go to File → Open Design → and open the modified model.
- ✓ If it is the first time to open the model in Maxsurf Stability, the first option " read existing data" should not be active (Next time you can select this option to open the saved stability file)
- ✓ From stations, select the appropriate number of stations that will be used to calculate ship hydrostatics. It depends on the ship length and the ship geometry. Increasing the number of stations will increase the required analysis time.





- To show the stations that will be used in hydrostatics calculations
  - ✓ Go to Display → Visibility → Sections



- Now we need to define the range of draft for hydrostatics calculations:
- Go to window → Upright Hydrostatics (Or select it from Analysis tab)  $\checkmark$
- Go to Analysis → Draft..  $\checkmark$
- Define initial draft amidship, Final draft and draft increment or number of drafts
- Define VCG and LCG if available unless the calculations of GM will be not accurate.
- Press Ok

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Window Help

Cascade

Tile Horizontal Tile Vertical

Arrange lcons

View Direction

Restore Default Layout

G.

Bentley Cloud Services

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Home Perspective

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- To Calculate the hydrostatics Go to Analysis → Start Hydrostatics.
- To show the tabulated results at different drafts:

1.053 USW2 1.157.

• Go to Window → Results..

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	Draft Amidships m	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000
1	Displacement t	0.0000	6996	18375	31601	46169	61833	78427	95893	114177	133314	153180	173532	194245
2	Heel deg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Draft at FP m	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000
4	Draft at AP m	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000
5	Draft at LCF m	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000
6	Trim (+ve by stern) m	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	WL Length m	0.000	357.455	359.998	361.567	362.669	363.532	363.986	363.298	359.993	365.608	365.402	365.516	365.824
8	Beam max extents on W	0.000	57.732	60.462	61.999	63.000	63.698	64.169	64.464	64.632	64.706	64.741	64.775	64.807
9	Wetted Area m <sup>2</sup>	0.000	9996.931	12453.91	14218.70	15711.94	17066.62	18321.75	19543.53	20814.29	22149.29	23237.38	24181.81	25074.96
10	Waterpl. Area m <sup>2</sup>	0.000	9881.690	12131.00	13621.21	14785.92	15769.65	16640.16	17426.48	18225.22	19078.62	19646.84	20039.15	20358.84
11	Prismatic coeff. (Cp)	0.000	0.427	0.480	0.517	0.546	0.571	0.593	0.614	0.640	0.649	0.667	0.683	0.698
12	Block coeff. (Cb)	0.000	0.331	0.412	0.458	0.493	0.521	0.546	0.571	0.598	0.611	0.632	0.650	0.666
13	Max Sect. area coeff. (	0.000	0.784	0.864	0.889	0.905	0.915	0.923	0.930	0.936	0.942	0.948	0.952	0.956
14	Waterpl. area coeff. (C	0.000	0.479	0.557	0.608	0.647	0.681	0.712	0.744	0.783	0.806	0.830	0.846	0.859
15	LCB from zero pt. (+ve f	0.000	188.466	187.797	187.254	186.557	185.713	184.772	183.647	182.335	180.768	179.153	177.739	176.566
16	LCF from zero pt. (+ve f	0.000	187.647	186.948	185.773	184.123	182.164	179.883	177.300	173.753	169.439	167.498	166.877	166.735
17	KB m	0.008	0.615	1.174	1.734	2.294	2.854	3.416	3.978	4.543	5.112	5.682	6.247	6.807
18	KG m	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508	9.508
19	BMt m	0.000	265.212	142.378	100.902	79.464	66.146	57.004	50.267	45.111	41.078	37.748	34.788	32.211
20	BML m	0.000	5665.913	3269.726	2403.612	1949.031	1670.487	1483.914	1349.232	1264.267	1220.612	1138.855	1049.701	969.820
21	GMt m	-9.500	256.319	134.044	93.128	72.249	59.492	50.912	44.737	40.146	36.682	33.922	31.527	29.510
22	GML m	-9.500	5657.020	3261.392	2395.837	1941.816	1663.833	1477.822	1343.703	1259.302	1216.216	1135.029	1046.440	967.120
23	KMt m	0.008	265.827	143.552	102.636	81.757	69.000	60.420	54.245	49.654	46.190	43.430	41.035	39.018
24	KML m	0.008	5666.528	3270.900	2405.345	1951.324	1673.341	1487.330	1353.211	1268.810	1225.724	1144.537	1055.948	976.628
25	Immersion (TPc) tonne/c	0.000	101.287	124.343	139.617	151.556	161.639	170.562	178.621	186.809	195.556	201.380	205.401	208.678
26	MTc tonne.m	0.000	1082.917	1639.856	2071.701	2453.192	2815.128	3171.459	3525.820	3934.397	4436.655	4757.511	4968.942	5140.447
27	RM at 1deg = GMt.Disp.	0.000	31294.89	42986.78	51361.06	58216.02	64199.44	69685.22	74870.67	79996.91	85345.20	90686.04	95480.61	100041.2
28	Max deck inclination deg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Trim and from her stand	0.0000			·····		••••••••••••••••••••••••••••••••••••••	÷		·····	÷		÷	÷

- The graphical representation of the results can be illustrated from:
  - Go to Window → Graph..



• The show curves of form, change the type of curves from the tab above the Graph window



• You can also show the curves of areas and Bonjean curves from the same tab.



Bonjean curves

