



UTM
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Open Source CAE for Ship Design and Analysis

Introduction to FreeShip Plus

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Outline

1. What is FreeShip Plus?
2. A Simple Design Session
3. A Simple Analysis Session
4. Other Functions
5. Hands On Session

What is FreeShip Plus?

□ FreeShip Plus :

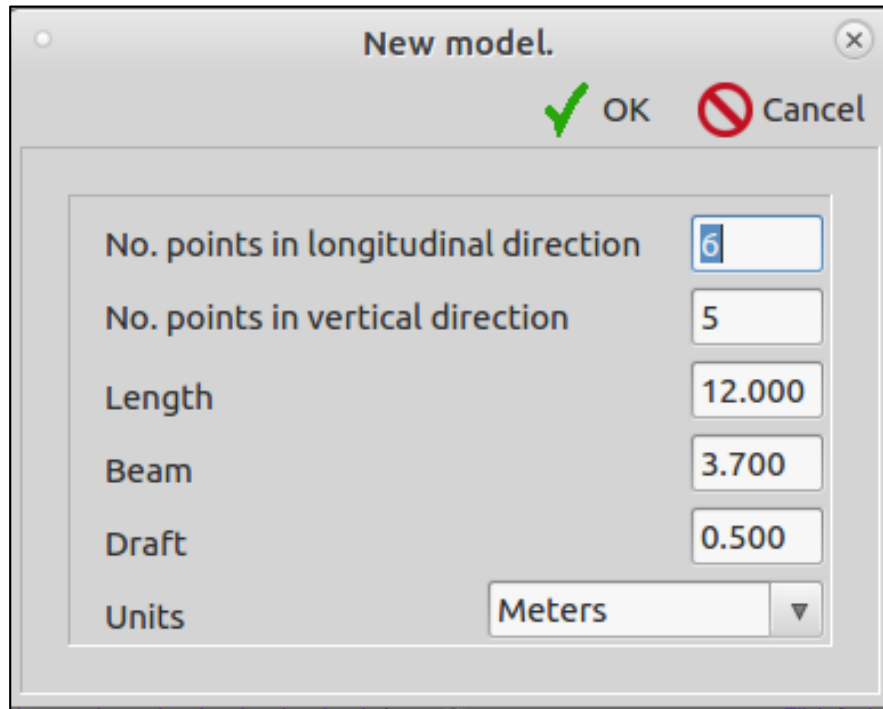
➤ an open source surface-modelling program based on subdivision surfaces and intended for the design of ships.

➤ The program is free-software:

You can redistribute it or modify it under the terms of the GNU General Public License as published by the Free Software Foundation.

A Simple Design Session

1) How to start new model:

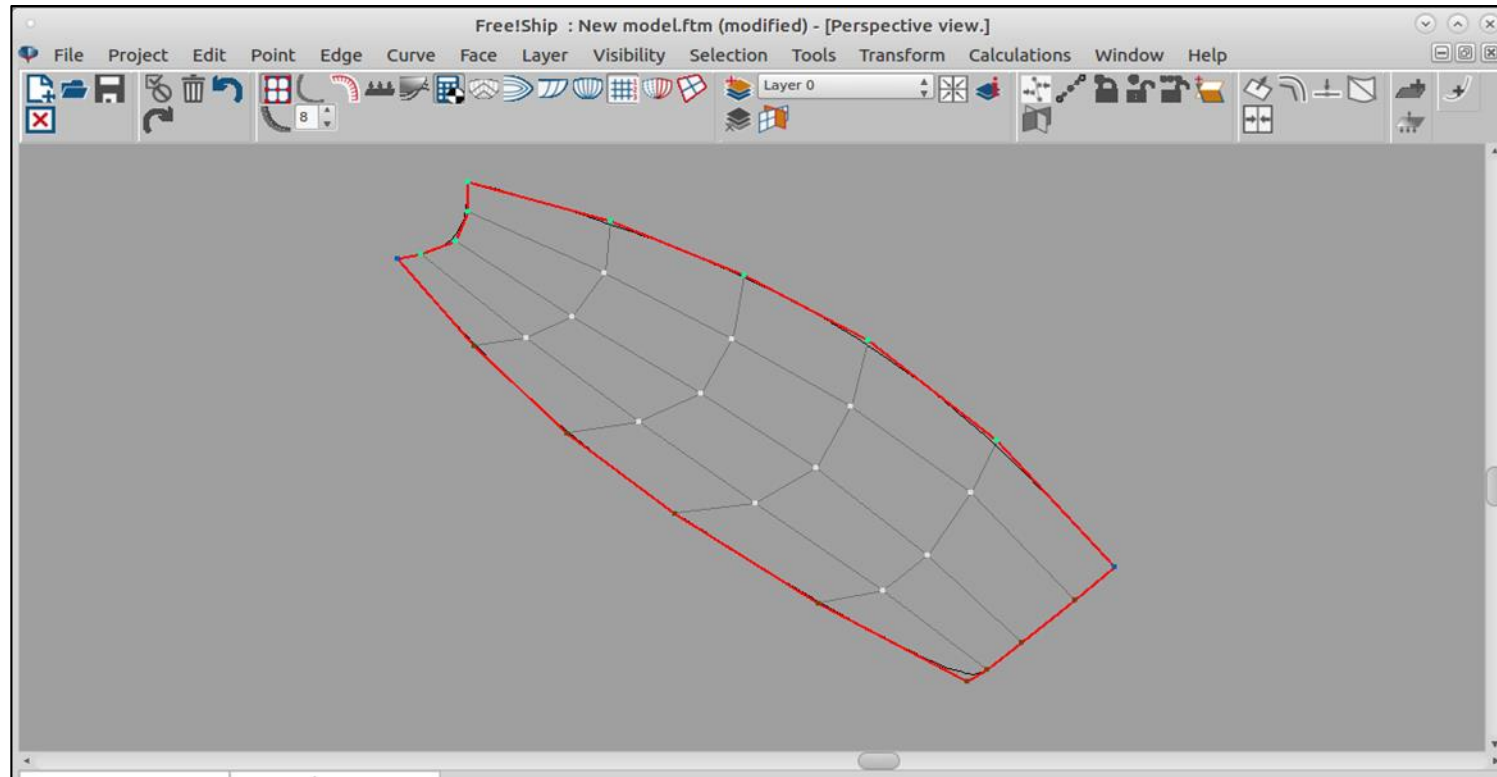


The following dialog is shown :

- No. points in longitudinal direction represents no of stations which start with the transom and the last one the stem.
- No. points in vertical direction represent waterlines which start from keel line, the last one for the sheer line.

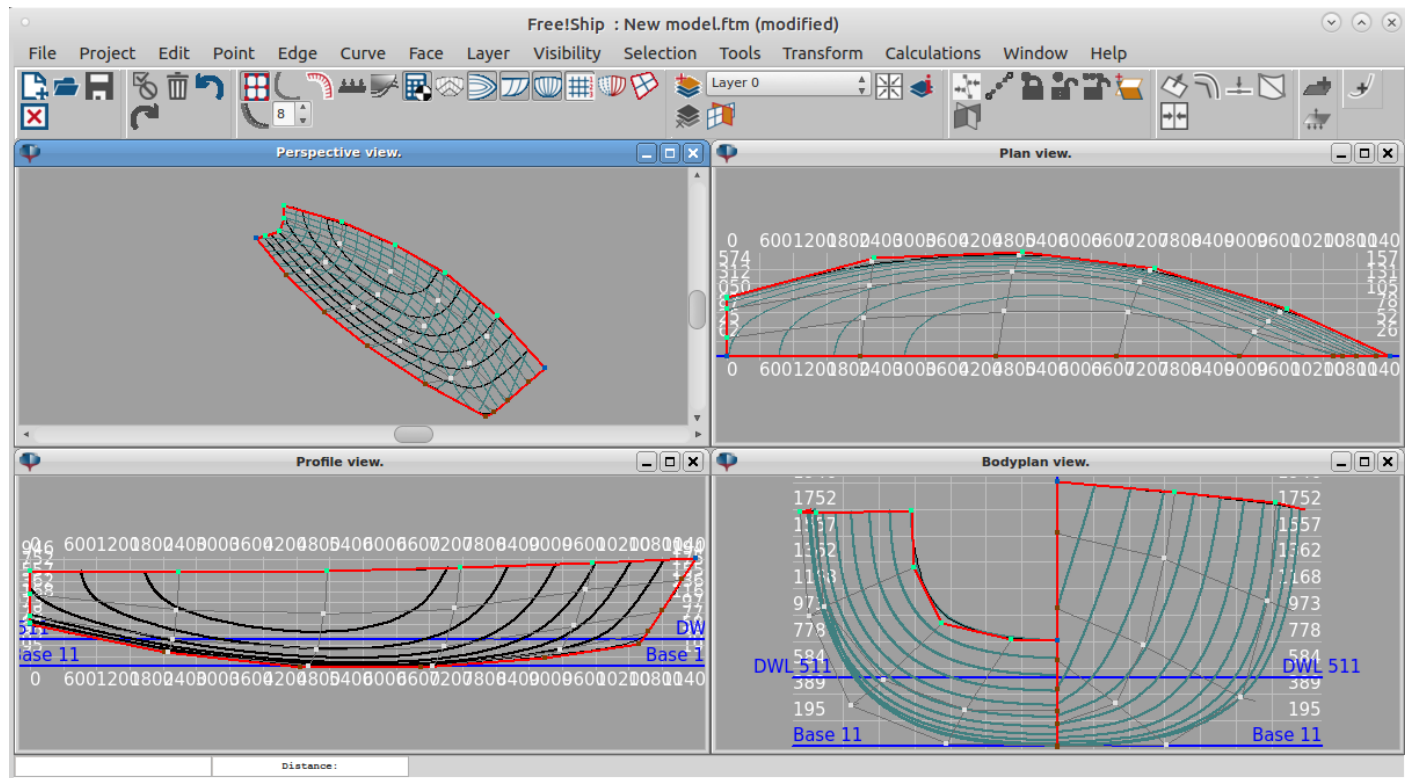
A Simple Design Session

□ The Perspective view should look now something like that:



A Simple Design Session

- 2) Open the existing model:
 - click the open command in the main menu.
- 3) View window in FreeShip Plus.



A Simple Design Session

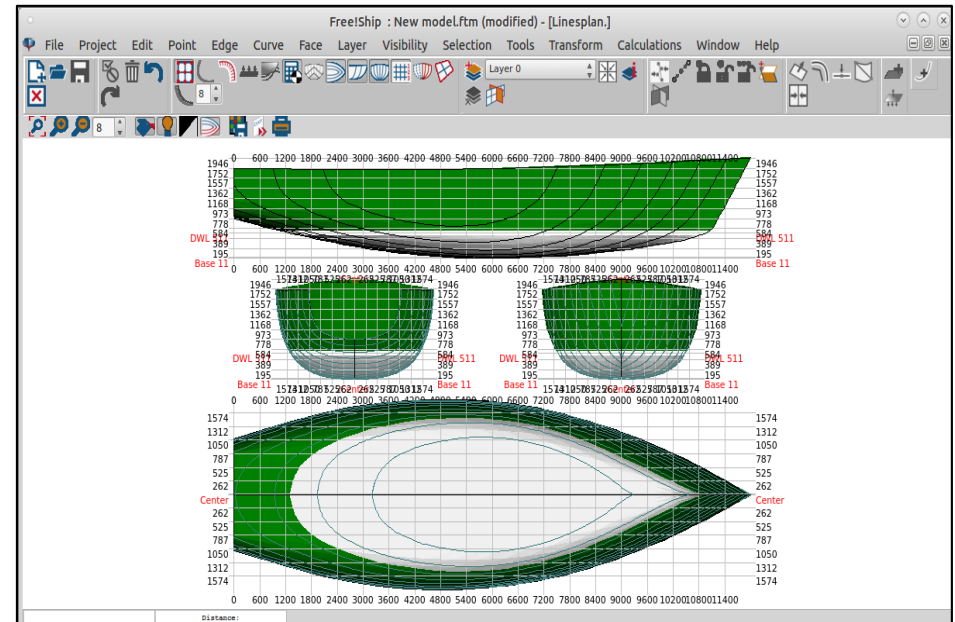
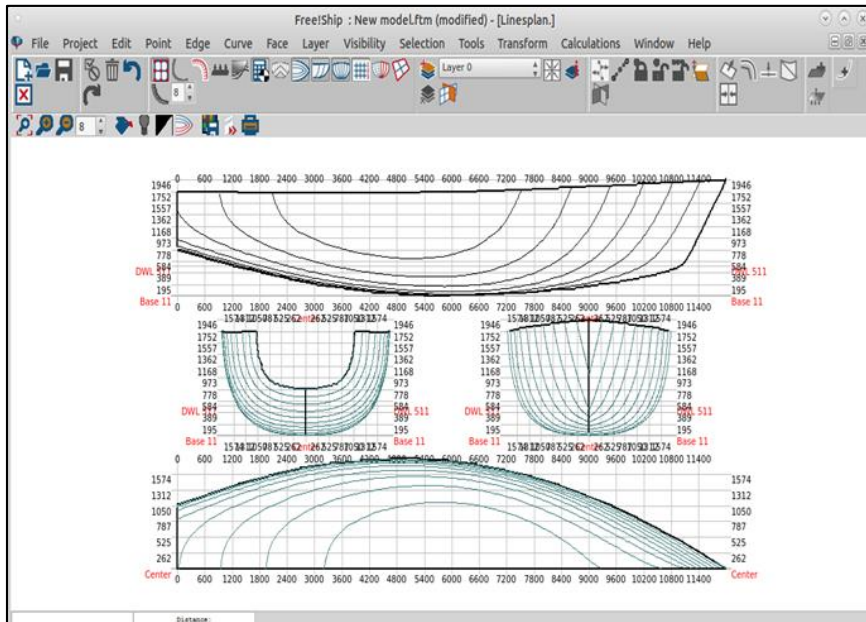
4) Import and export file in FreeShip Plus.

File types	Import	Export
Part	√	√
Carlson .hul file	√	
Import/Export .fef file	√	√
Surface	√	
Importing chines	√	
VRML	√	
PolyCad files	√	
Michlet waves	√	√
IGES		√
DXF 3D mesh		√
DXF 2D polylines		√
DXF 3D polylines		√
STL file		√

A Simple Design Session

5) LinesPlan.

- FreeShip Plus also enables the user to view the complete formatted linesplan of the ship.



A Simple Design Session

6) Tools

- Check model :
 - can check the model for any inconsistencies, and corrects most of them automatically.
- Remove negative:
 - Sometimes, when a hull is imported, the geometry of both sides of the ship is present. FreeShip Plus only needs the port side. This option removes all faces from the model that are completely on the starboard side.

A Simple Design Session

- Remove unused points:
 - This can be used to remove all unused points from the model.
- Import markers:
 - Markers are curves that can be added to the model as a reference.
For example the offsets of another design can be imported as markers.
- Delete markers:
 - This deletes all markers from the model. It speaks for itself that this option is disabled if there are no markers added to the model.

A Simple Design Session

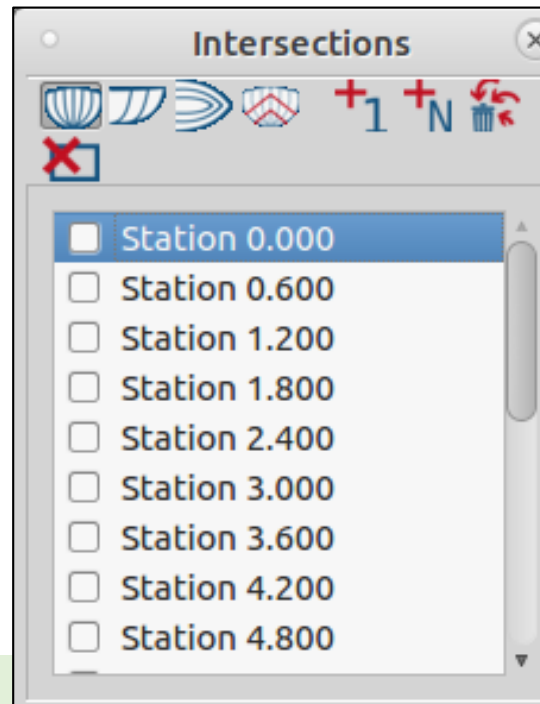
- Add cylinder:
 - This option lets you add a cylinder. You can specify the start point, endpoint, radius and number of points in the dialog that appears. You can use the cylinder for example to add a bow thruster to your model.

A Simple Analysis Session

❑ Calculations in FreeShip Plus.

a) intersection curves :

- Intersection curves such as stations, buttocks, waterlines and diagonals are calculated from the model.



A Simple Analysis Session

b) Design hydrostatics:

- This option is used to perform hydrostatic calculations at a range of drafts. A trim may also be specified. The results can be saved to a text file. These properties are calculated for both sides of the ship and may be used for example to estimate the weight of the hull.

The screenshot shows a software window with the following metadata:

- Project: Parent 60 - Container feeder
- Designer: Unknown
- Created by: M. van Engeland
- Filename: C:\Maritime\FreeShip\Ships\Parent 60.fhm
- Design length: 85.000 [m]
- Length over all: 90.040 [m]
- Design beam: 13.750 [m]
- Beam over all: 13.851 [m]
- Design draft: 4.200 [m]
- Midship location: 42.500 [m]

The main data table shows hydrostatic properties for various drafts:

Draft [m]	Trim [m]	Lwl [m]	Bwl [m]	Volume [m ³]	Displ. [tonnes]	LCB [m]	VCB [m]
0.000	0.000	2.087	0.147	0.000	0.000	5.703	0.000
0.250	0.000	80.743	12.481	146.94	150.62	43.864	0.133
0.500	0.000	82.261	13.257	325.23	333.36	43.534	0.267
0.750	0.000	83.388	13.582	519.74	532.73	43.426	0.401
1.000	0.000	84.098	13.709	724.71	742.83	43.337	0.536
1.250	0.000	84.520	13.737	936.27	959.68	43.262	0.669
1.500	0.000	84.728	13.745	1152.5	1181.3	43.199	0.801
1.750	0.000	84.815	13.752	1372.6	1406.9	43.144	0.934
2.000	0.000	84.820	13.773	1595.9	1635.8	43.094	1.065
2.250	0.000	84.803	13.797	1822.2	1867.7	43.044	1.197
2.500	0.000	84.810	13.816	2051.2	2102.5	42.991	1.329
2.750	0.000	84.908	13.828	2283.0	2340.0	42.933	1.460
3.000	0.000	85.141	13.837	2517.4	2580.3	42.865	1.592
3.250	0.000	85.576	13.844	2754.5	2823.4	42.788	1.724
3.500	0.000	86.145	13.848	2994.5	3069.4	42.695	1.856
3.750	0.000	86.659	13.850	3237.6	3318.6	42.583	1.989
4.000	0.000	86.960	13.851	3484.4	3571.5	42.445	2.123
4.250	0.000	87.384	13.851	3735.7	3829.1	42.281	2.257
4.500	0.000	87.169	13.849	3992.2	4092.0	42.101	2.393

A detailed view of the row for Draft = 0.094 m is shown below:

Design length	: 1.925 m
Length over all	: 1.925 m
Design beam	: 0.350 m
Beam over all	: 0.350 m
Design draft	: 0.086 m
Midship location	: 0.962 m
Water density	: 1.025 t/m ³
Appendage coefficient	: 1.0000

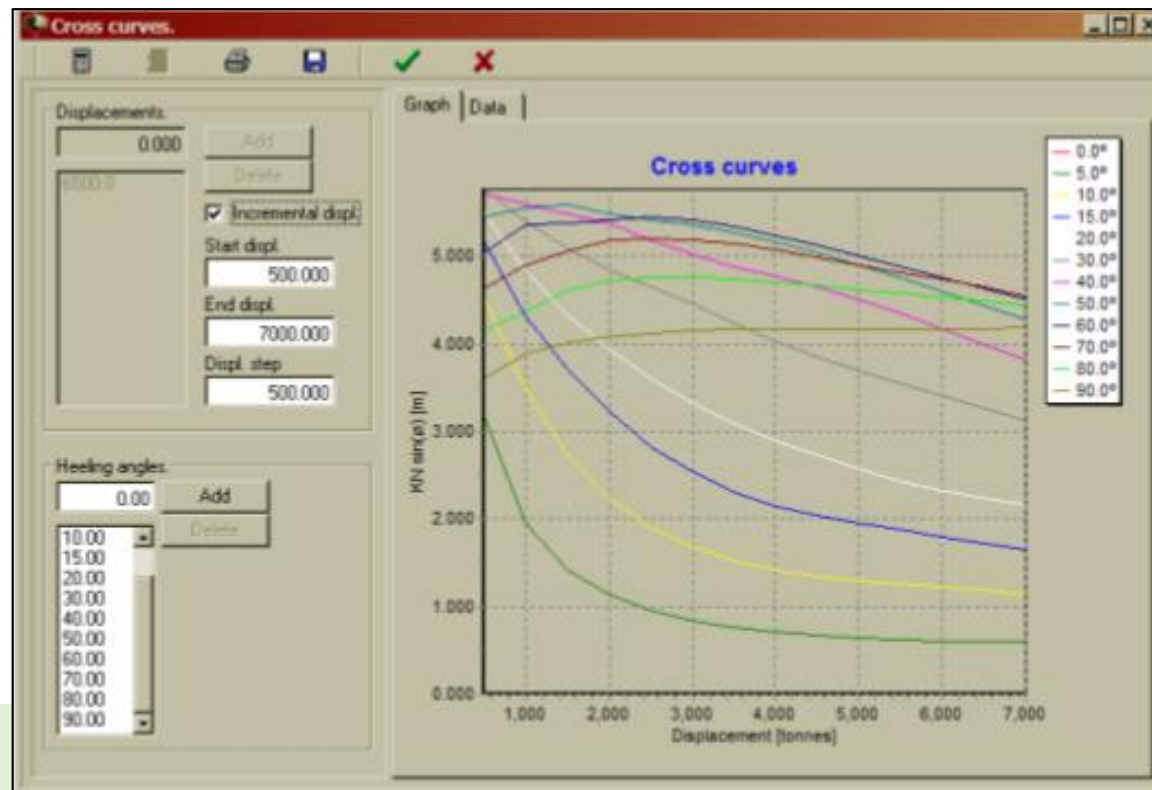
The detailed view also includes a summary table of hydrostatic properties:

Draft	Trim	Lwl	Bwl	Volume	Displ.	LCB	VCB	Cb	Am	Cm	Aw	Cw	LCF	Cp	S	KMt	KMI
m	m	m	m	m ³	tonnes	m	m	[-]	m ²	[-]	m ²	[-]	m	[-]	m ²	m	m
0.094	0.000	1.798	0.344	0.023	0.023	0.837	0.065	0.3868	0.018	0.5677	0.480	0.7757	0.757	0.6813	0.612	0.234	4.301

A Simple Analysis Session

c) Cross curves:

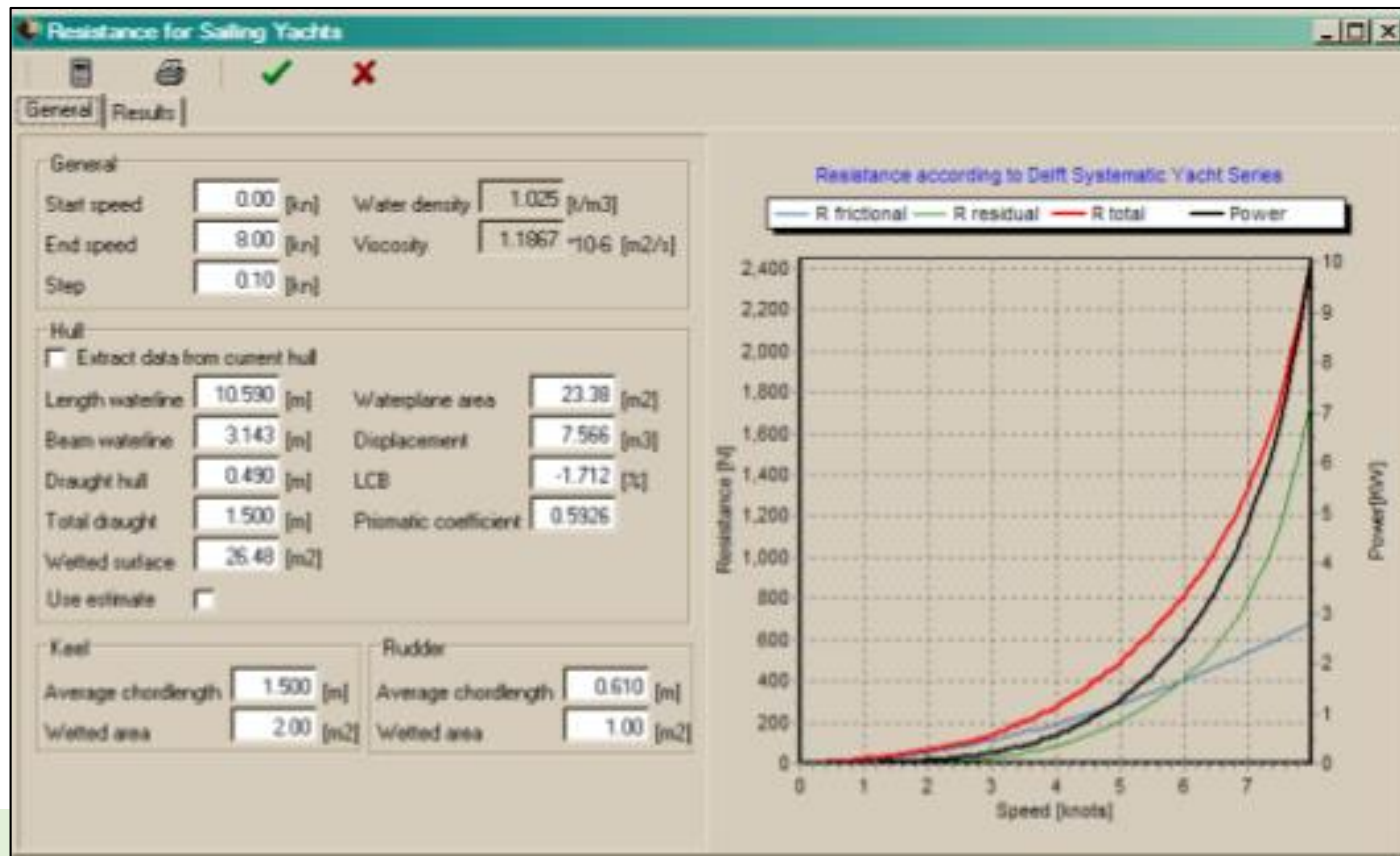
- Stability calculations are provided in the form of cross curves. For a number of heeling angles and displacements $KN \sin(\phi)$ is calculated and presented in a graph and table.



A Simple Analysis Session

d) Resistance calculations:

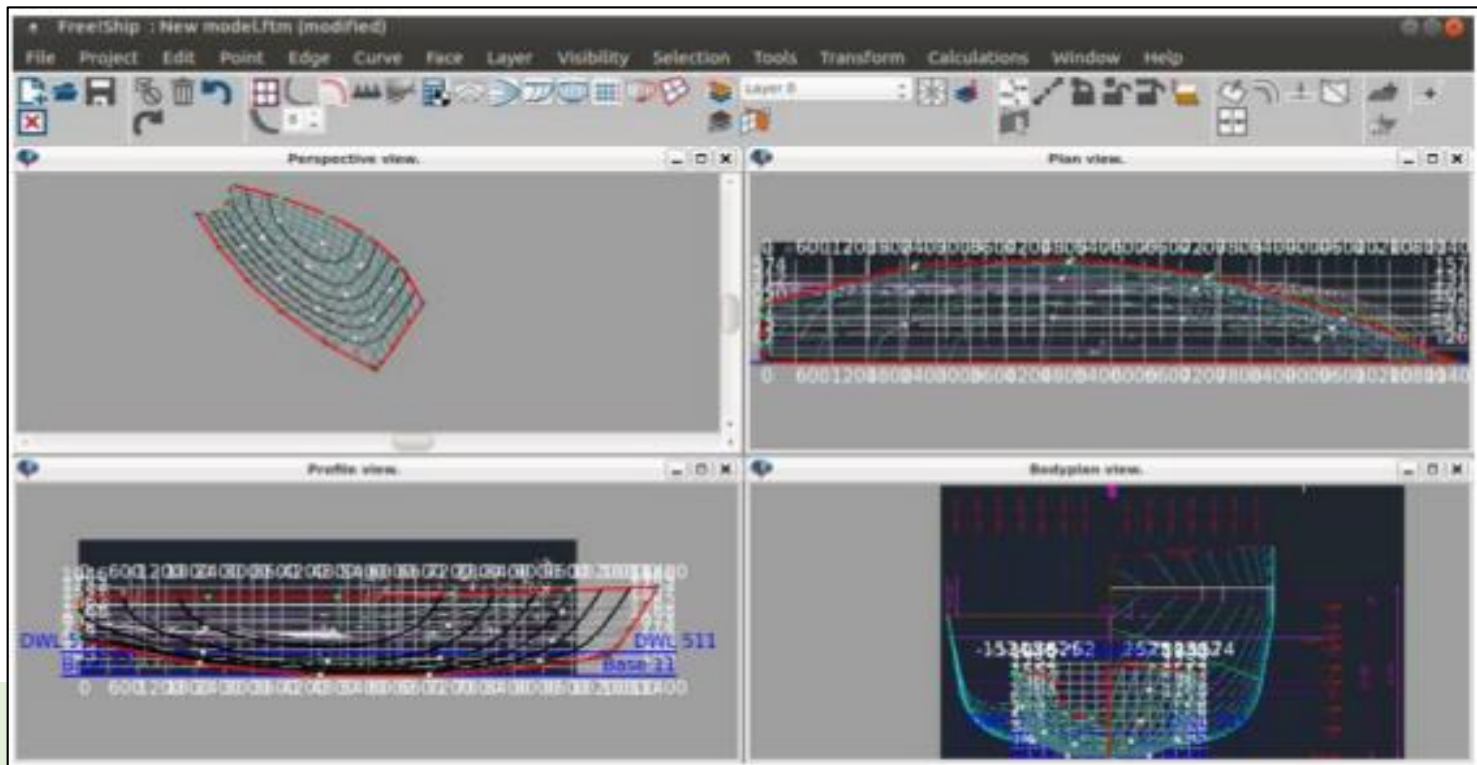
- The graph displays 4 resistance curves. The first three are for frictional resistance, residual resistance and the total resistance.



Other Functionalities

❑ Background images.

- FreeShip Plus has the ability to show images on the background of your model. This functionality is particularly convenient if you have an existing linesplan on paper and want to recreate the lines in FreeShip Plus.



Advantages of FreeShip Plus

- 1) High quality surfacing.
- 2) User friendly interface.
- 3) Comprehensive ship analysis.
- 4) Surface trimming in FreeShip Plus is a simple point and click process.
- 5) No license costs.

Short example on modelling a ship
model in FreeShip Plus.

THANK YOU