Aalto University

MAXSURF MODELER

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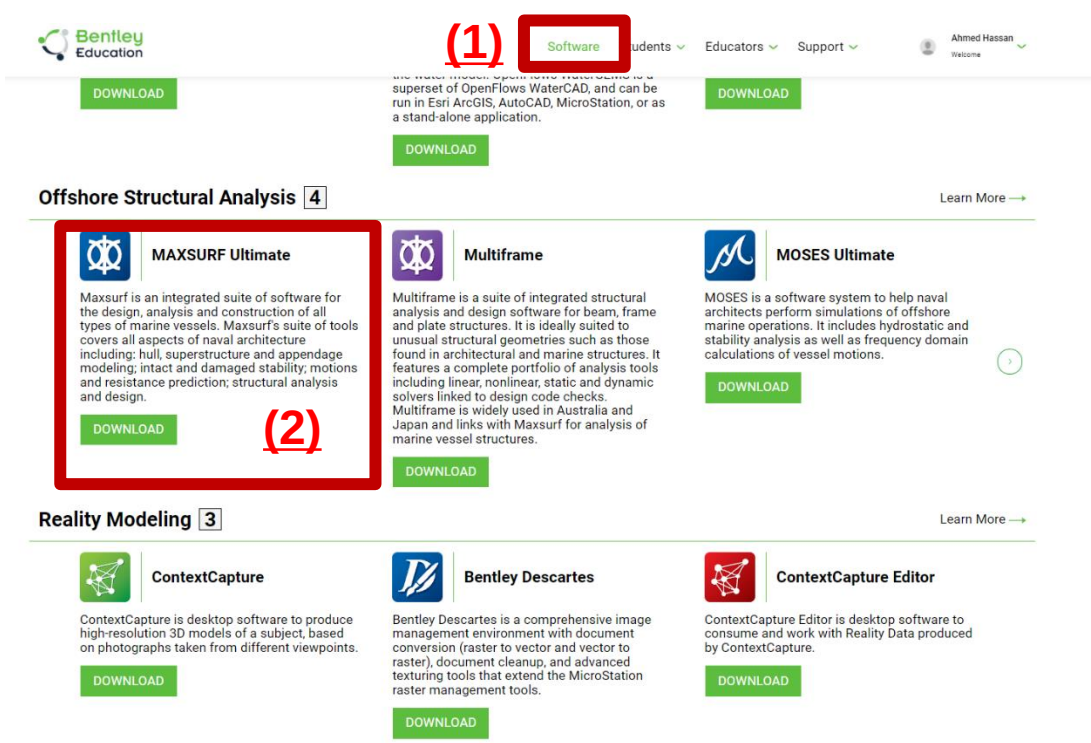
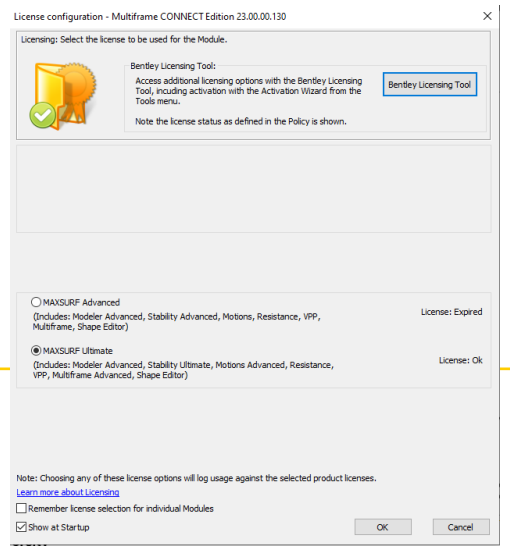
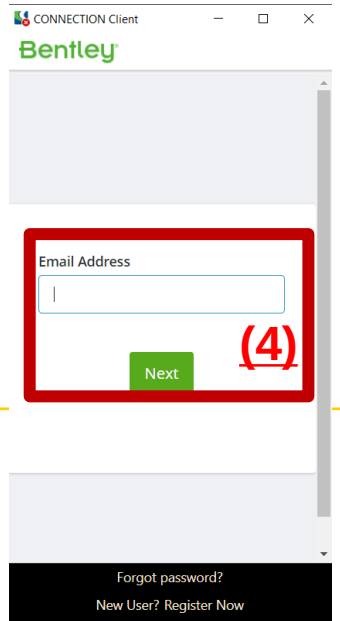
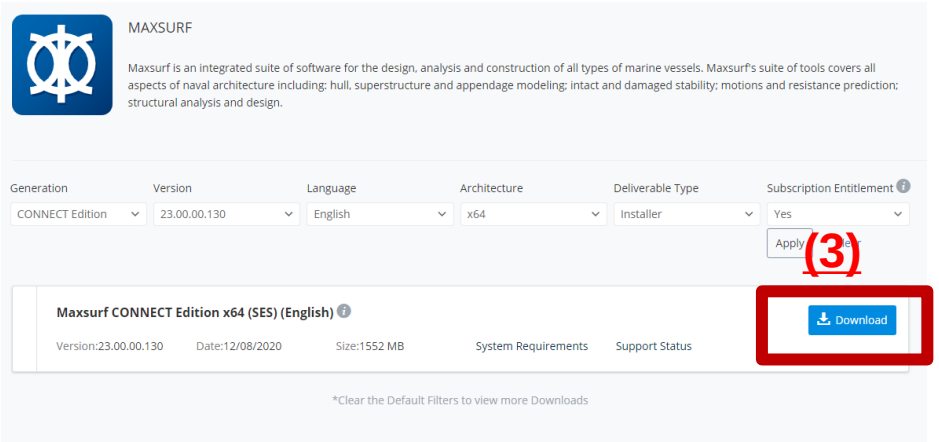
Maxsurf Download and Setup

- **Go to https://education.bentley.com/**
  - Sign up using your **Aalto Account**
  - Go to Software ➞ Offshore structural analysis menu ➞Maxsurf Ultimate ➞ Download
  - Download the last version V23
  - Install connection client and Maxsurf products
- **Activate Maxsurf products.**
  - Sign in “Connection client” (integrated software with Maxsurf) using your Aalto account
  - Select Maxsurf Ultimate license when asked.



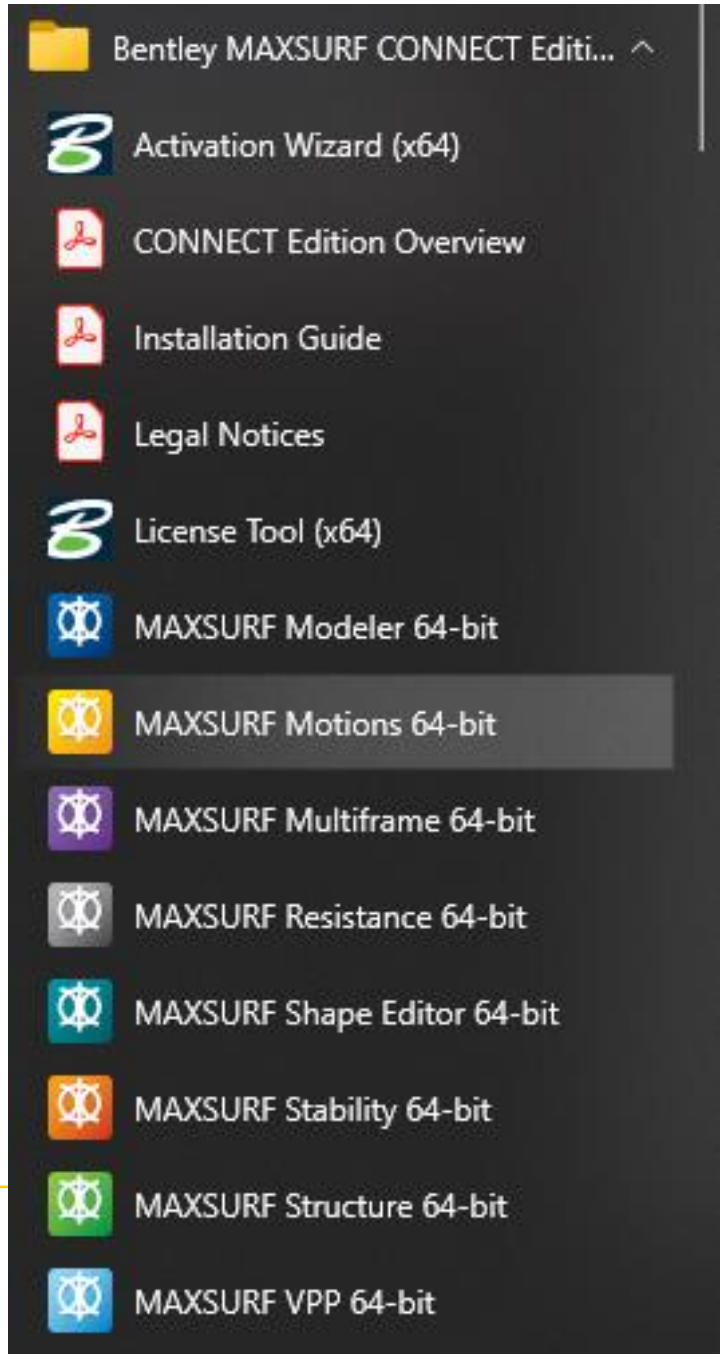






Maxsurf Tools

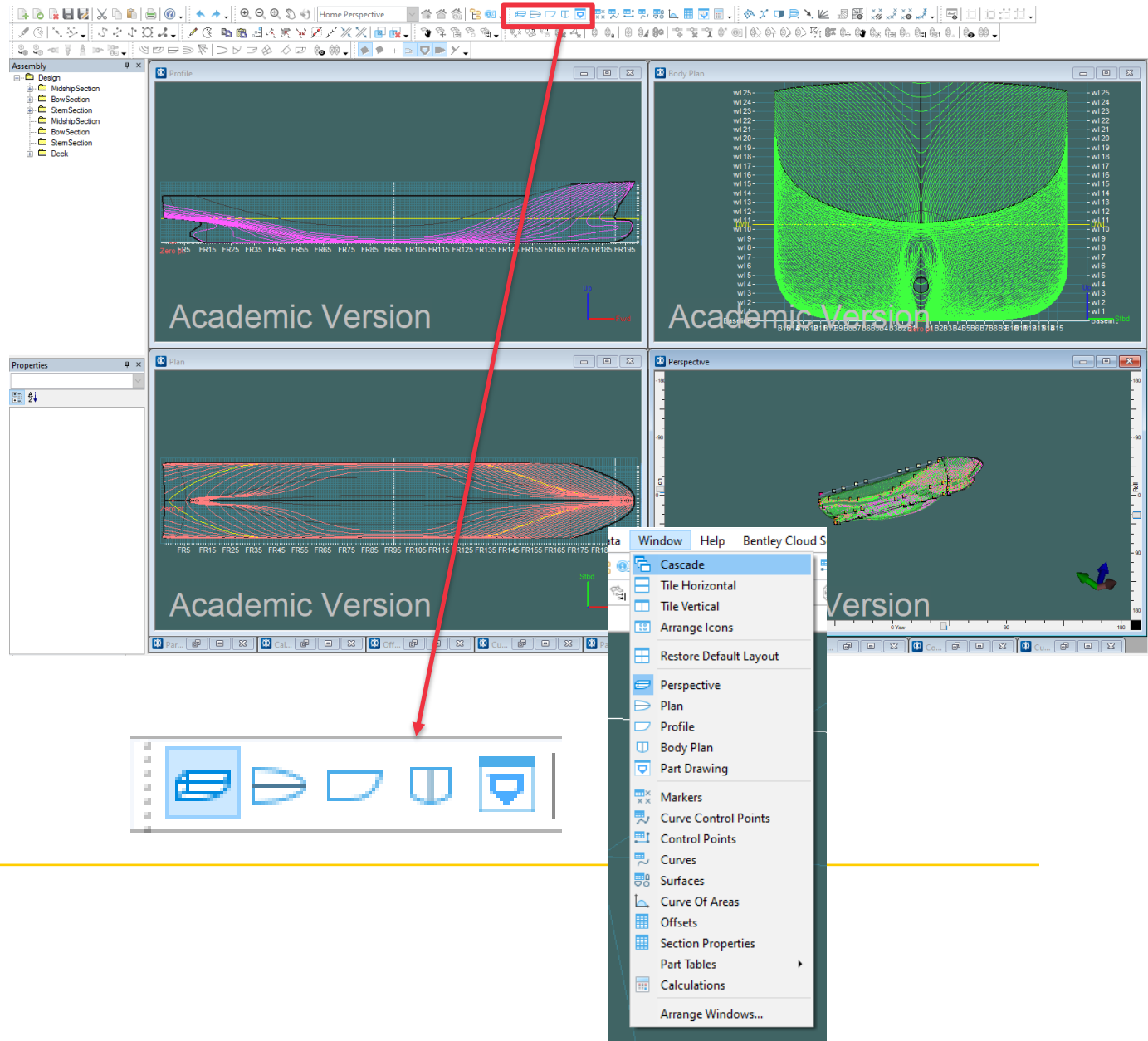
- **Maxsurf includes tools for**
  - Hull modelling (**Maxsurf Modeler**)
  - Seakeeping (Maxsurf Motions)
  - Stability calculations (Maxsurf stability)
  - Resistance estimation (Maxsurf Resistance)
  - Structural modelling and analysis (Maxusrf Structure and Multiframe).



Maxsurf Modeler (Interface)

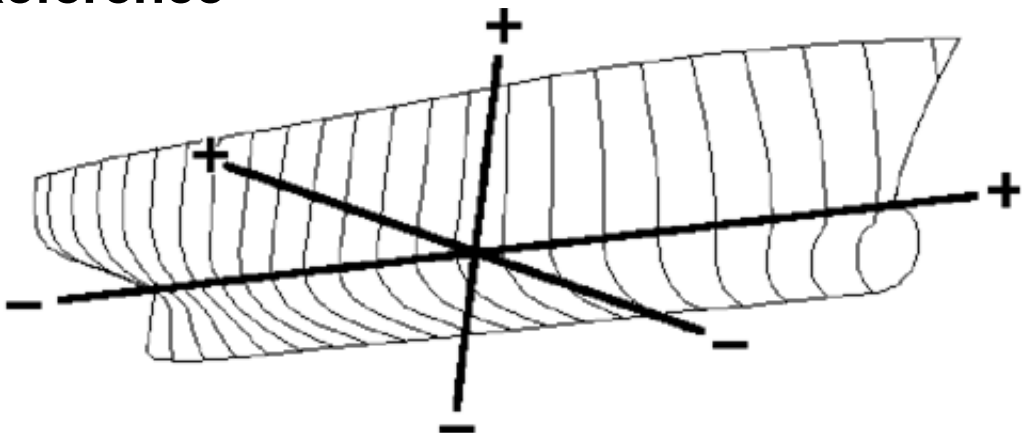
- **Open Maxsurf Modeler**
- **You can open sample from Open ➛ quick start ➛ then choose a sample**
- **There are three windows**
  - **Plan Window**: the plan window displays the model as seen from below, with Starboard above the centerline (+ve) and Portside below (-ve).
  - **Profile Window:** displays the hull as seen from the Starboard side, with the bow to the right of the screen.
  - **Body Plan**: The body plan window displays the transverse sections as seen from aft (view from behind) of the model. Starboard is on the right of the centerline and Portside on the left.
  - **Perspective Window**: The Perspective window is bordered by three rulers containing pointers that control the rotation of the displayed design.
- **Change window view:**

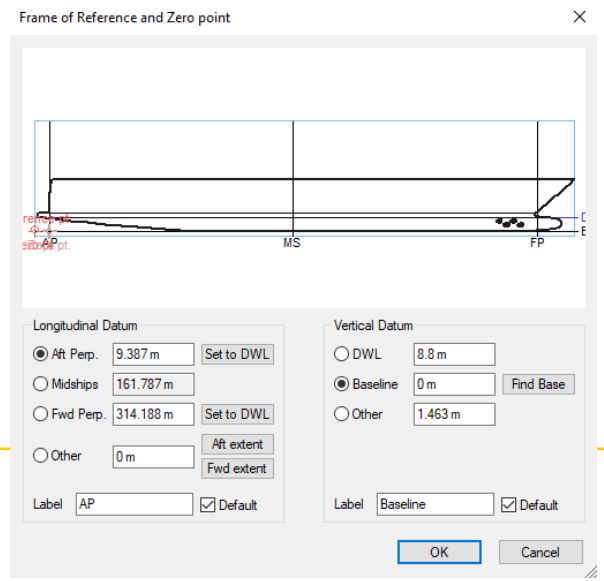
  Go to Window ➛ select (Perspective, Plan, Profile or Body Plan) (Or from “windows” tap)

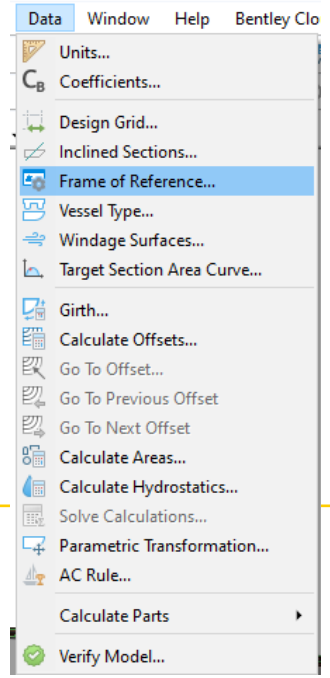


Maxsurf Modeler (Coordinate System)

- Longitudinal datum can be located at aft perpendicular, forward perpendicular, amidships or any other locations.
- Longitudinal datum: +ve forward of the datum -ve aft of the datum.
- Vertical datum can be located at the base line, design water line (DWL) or any other locations.
- Vertical datum: +ve up and -ve down the datum.
- Datum, aft perpendicular and forward perpendicular can be defined from Data ➛Frame of Reference



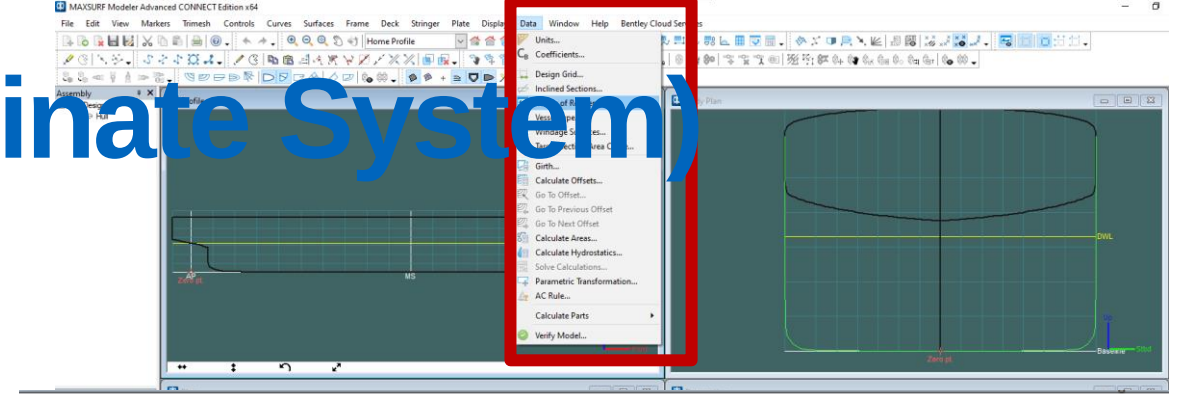


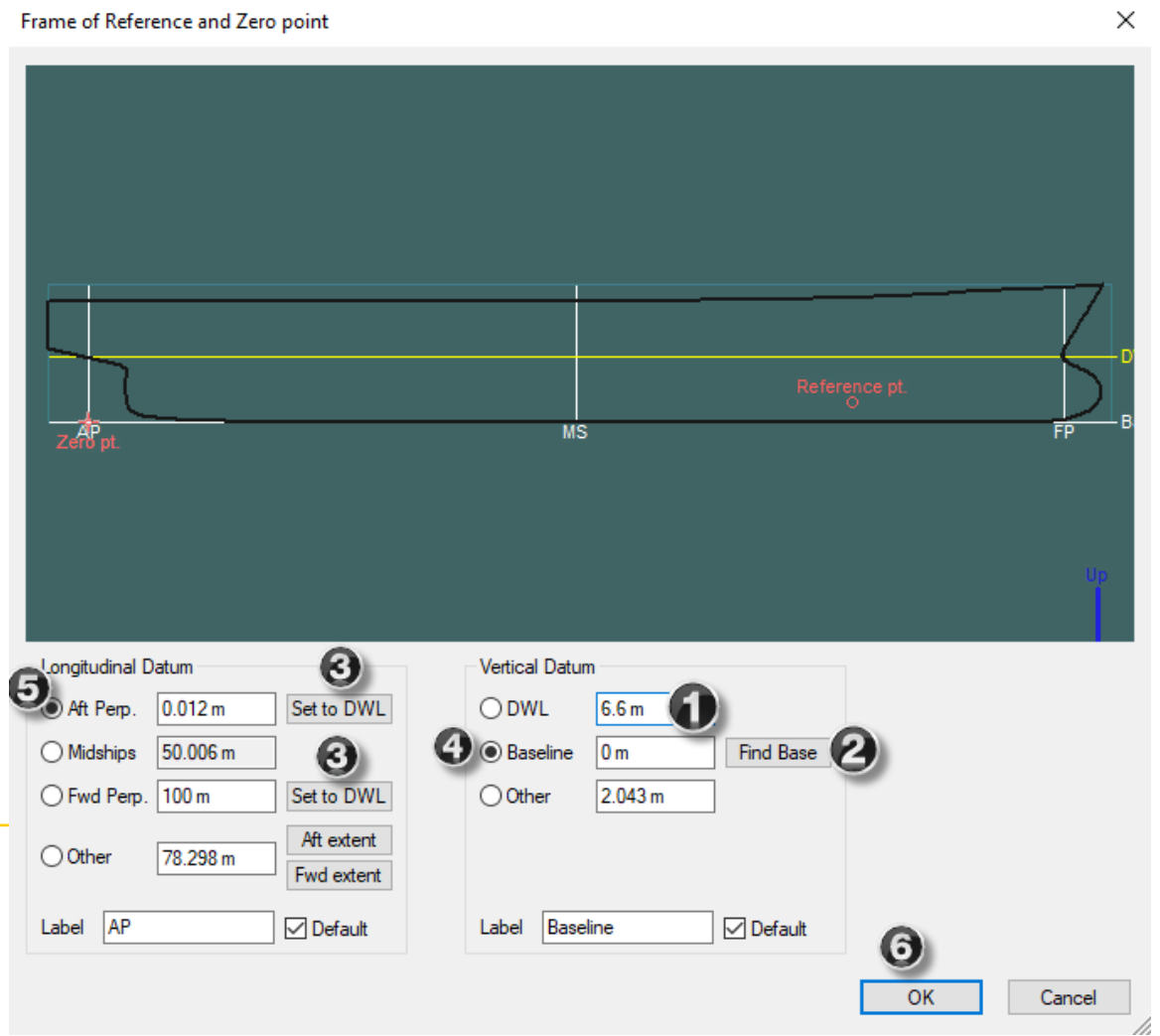


Maxsurf Modeler (Coordinate System)

- **To define Zero reference point (Coordinate system) and hull lines.**
  - Go to **Data ➛ Frame of Reference**

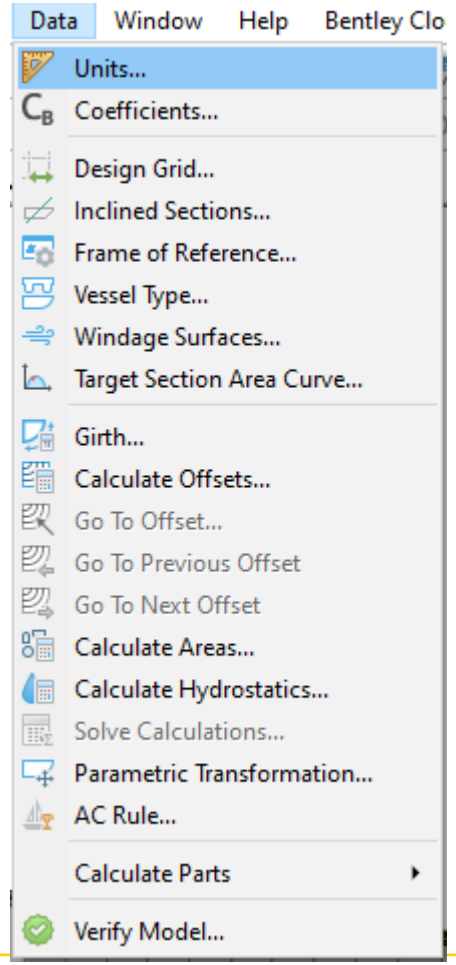
1. Define design water line (DWL)
2. Press find base
3. Press (Set to DWL for Aft and Fwd perpendiculars)
4. Set vertical Datum to Baseline
5. Set Longitudinal Datum to Aft Perp.
6. Press Ok

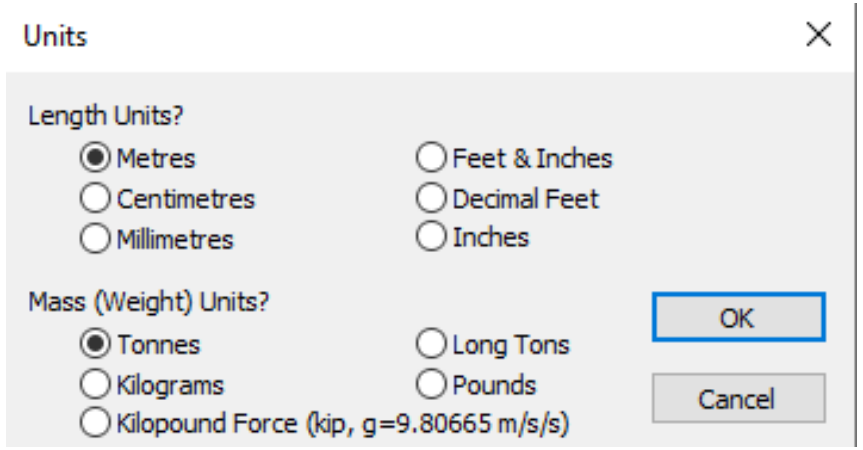




Maxsurf Modeler (Units)

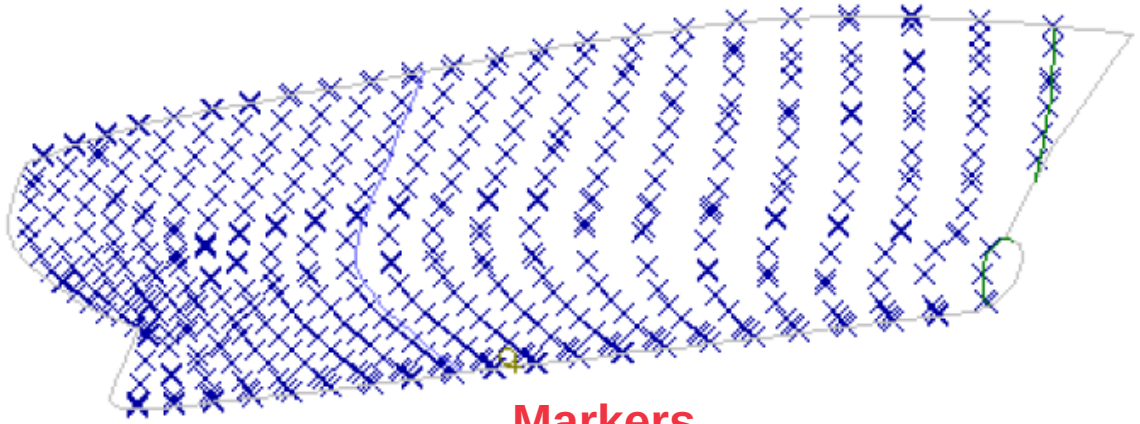
- **A variety of metric and imperial units may be specified.**
- **Go to Data ➛Units ➛ select the required units for length and mass**



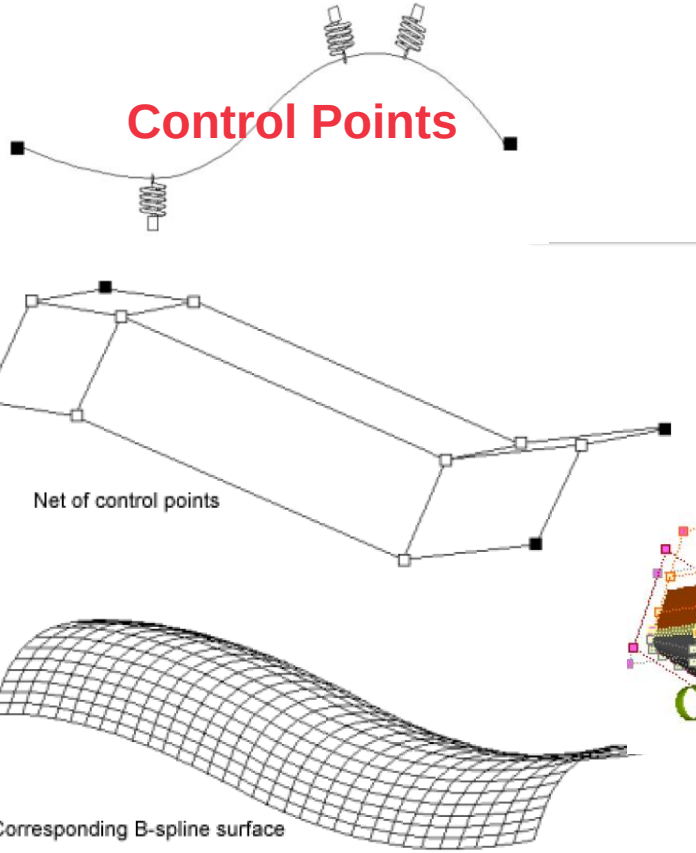


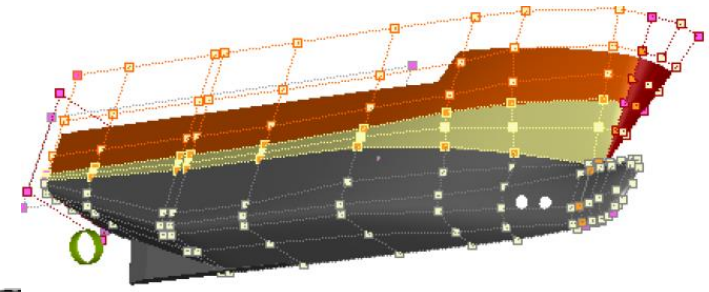
Maxsurf Modeler (Basics)

- **There are different tools that can be used to create 3D hull model**
  - **Markers** are reference marks displayed on the screen. They may be offset data that has originated from an existing hull or simply limiting dimensions that need to be visible while developing a design.
  - **Control points:** Used to define surfaces and curves. Movement of these control points and changing its weight allow you to manipulate a surface/curve into a desired shape.
  - **NURBS Surface.** The shape of the surface is defined by the:
    - *Control points*
    - *Surface stiffness*
  - **Trimesh**: linear surface made up of triangular facets



Markers





Surfaces and control points

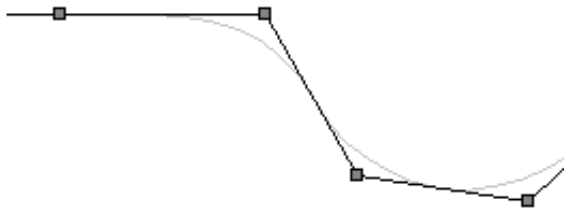
Maxsurf Modeler (Basics/Markers)

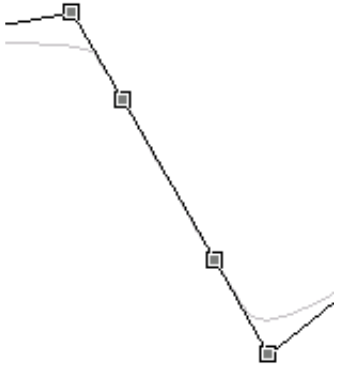
- **Markers are purely graphical and have no effect on the calculation of surfaces/curves.**
- **Markers have three coordinates**
  - "X" Longitudinal position
  - "Y" Offset
  - "Z" Height
- **Markers can be defined either by:**
  - **Fitting** lines to an existing design (represent offset table points)
  - A **text file**
  - DXF curves or points, will be converted into markers.
  - Coping and pasting into the markers table from another application such as a spreadsheet.
  - Markers can also be entered manually using the Add Marker function in the Edit menu.
- **Each marker can be associated with a station in your design.**

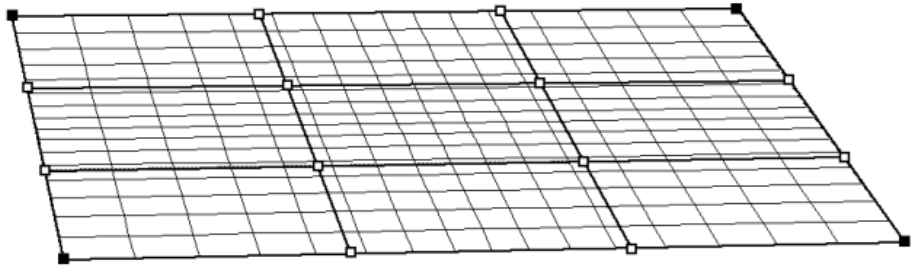
	Station Inde	Long. Pos. m	Offset m	Height m	Surface
1	1	0.000	0.000	0.000	None
2	1	0.000	0.000	1.106	None
3	1	0.000	0.000	2.211	None
4	1	0.000	0.000	4.423	None
5	1	0.000	0.000	6.634	None
6	1	0.000	0.000	8.846	None
7	1	0.000	0.980	11.057	None
8	1	0.000	1.694	13.269	None
9	1	0.000	2.754	15.480	None
10	2	7.740	0.000	0.000	None
11	2	7.740	0.000	1.106	None
12	2	7.740	1.144	2.211	None
13	2	7.740	1.806	4.423	None
14	2	7.740	2.292	6.634	None
15	2	7.740	2.799	8.846	None
16	2	7.740	3.384	11.057	None
17	2	7.740	4.257	13.269	None
18	2	7.740	5.547	15.480	None
19	3	15.480	0.280	0.000	None
20	3	15.480	3.298	1.106	None
21	3	15.480	4.192	2.211	None
22	3	15.480	4.988	4.423	None
23	3	15.480	5.513	6.634	None
24	3	15.480	6.009	8.846	None
25	3	15.480	6.605	11.057	None
26	3	15.480	7.607	13.269	None
27	3	15.480	8.976	15.480	None
28	4	30.960	2.743	0.000	None
29	4	30.960	7.970	1.106	None
30	4	30.960	9.047	2.211	None

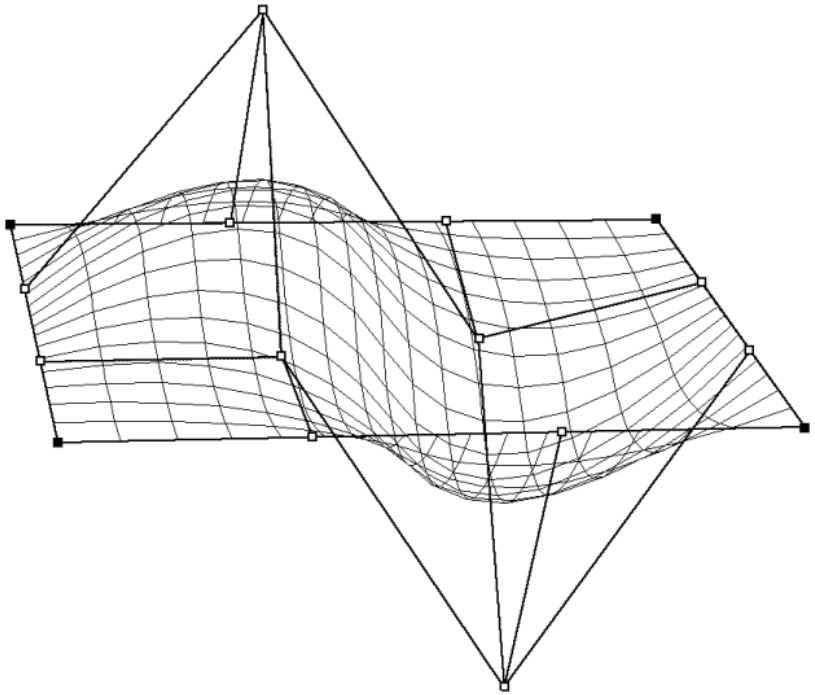
Maxsurf Modeler (Basics/Control points)

- Surfaces are defined in Modeler by the position of a set of control points (rows and columns of control points) that collectively form a control point net. Movement of these control points allows you to manipulate a surface into a desired shape.
- Central to the process of modelling designs using Modeler is an understanding of how control points may be used to attain the surface shapes that you wish to achieve.
- The shape of the surface will change by changing the coordinates of its control points.



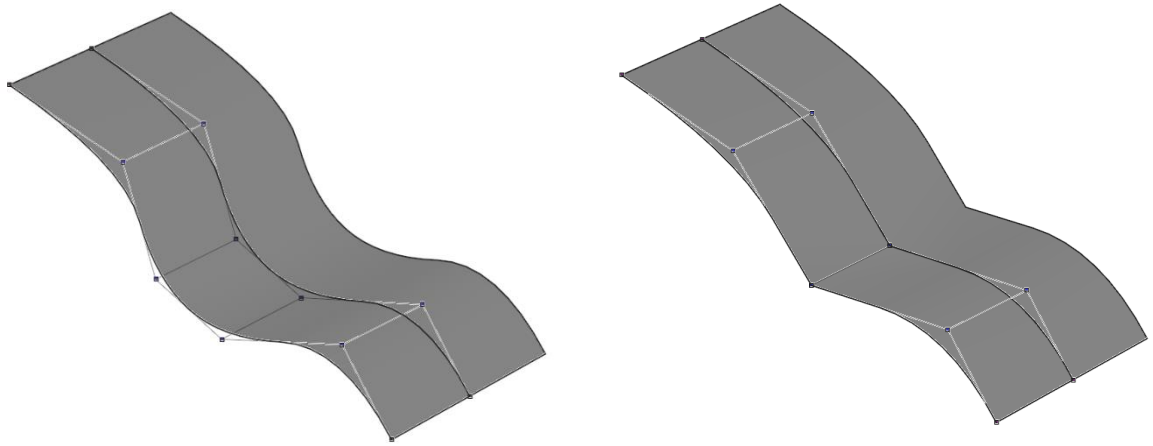




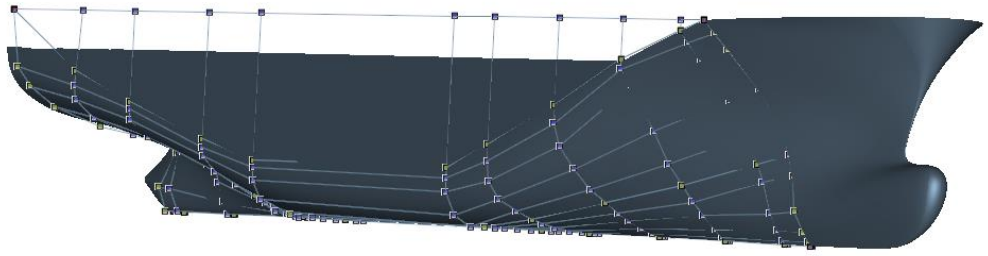


Maxsurf Modeler (Basics/Surfaces)

- **There are two types of surfaces in Maxsurf Modeler**
  - NURBS surface
  - TriMesh surface.
- **NURBS Surface, can be defined by:**
  - Control point positions
  - Control point weights
  - Surface stiffness in transverse and longitudinal direction
- **Designs may contain up to 1200 NURBS surfaces in Modeler Advanced.**
- **Compacting control points can introduce a discontinuity into the surface. Which may be useful for Chined hull vessel when it is designed using one surface.**

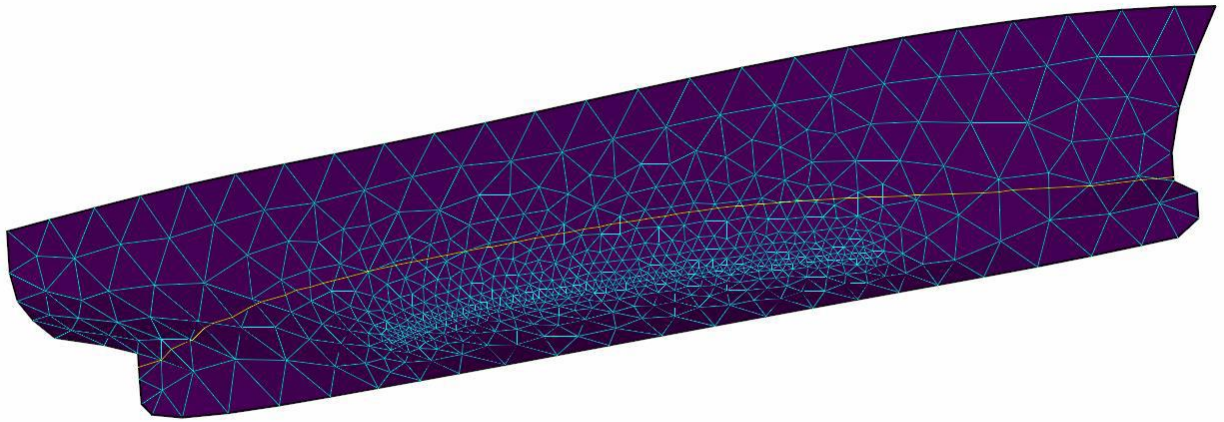


NURBS Surface before and after adding knuckle



Maxsurf Modeler (Basics/Surfaces)

- **TriMesh surface is a linear surface made up of triangular facets. So, it does not have control points, and can not be modified.**
- **The TriMesh surface is not designed to be smooth (you cannot use it for visual purposes or to extract lines plan from); it follows the input data points (Markers) exactly and is linear between the data points.**
- **TriMesh surface is dependent on the number of data points used to generate the TriMesh.**
- **The aim of the TriMesh surface is to provide a quick route from line or point data to a vessel surface model that may be used for analysis, like stability and seakeeping analysis.**



Maxsurf Modeler (Basics)

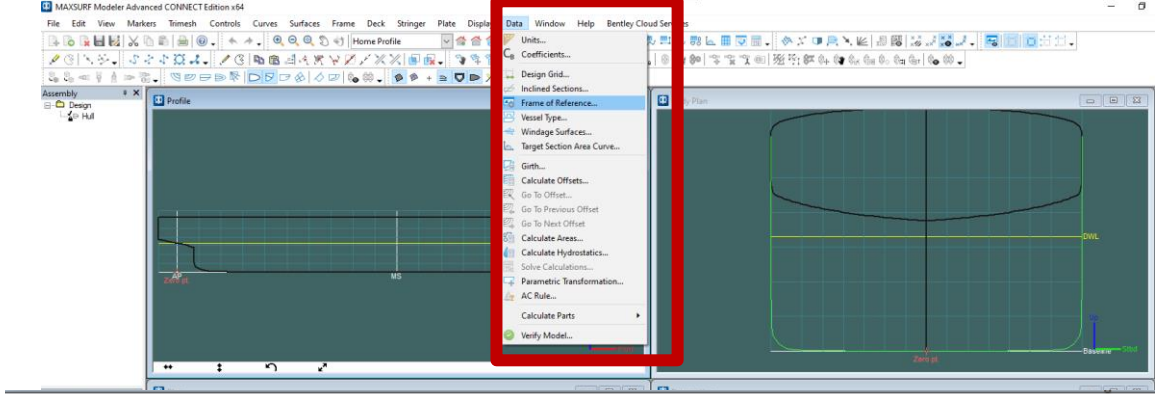
- **There are various methods to model your ship using Maxsurf Modeler. The best method you can employ depends on the available data:**
  - Lines Plan
  - Offset Table
  - 3D model of a parent ship
  - Main particulars only (Free modeling)
- **The four methods are introduced in four separate presentations. You can combine these different methods in your design.**

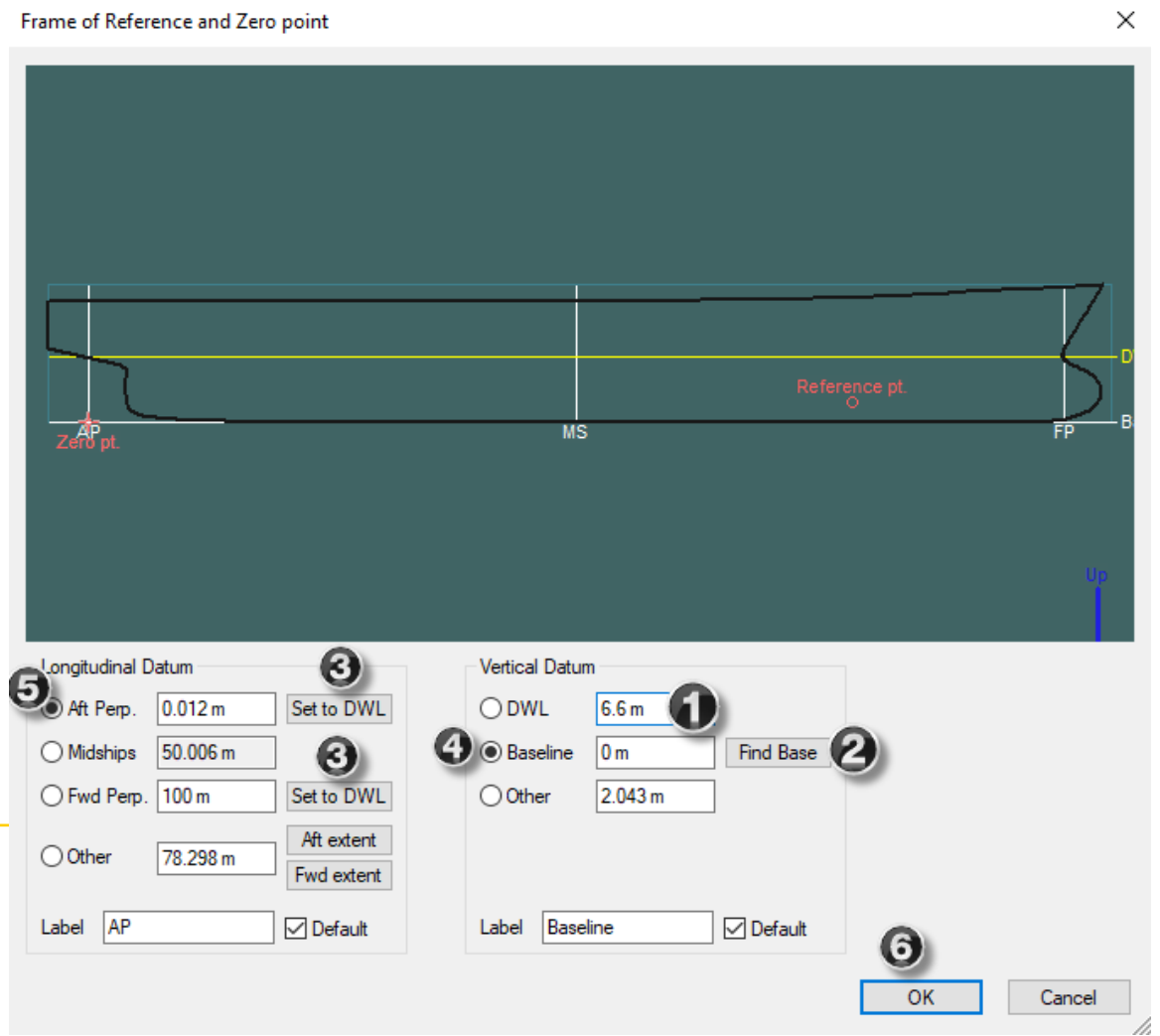
Model preparation for Stability calculations

Zero point and Perpendiculars

- **Define Zero reference point (Coordinate system) and hull lines.**
  - Go to **Data ➛ Frame of Reference**

1. Define design water line (DWL)
2. Press find base
3. Press (Set to DWL for Aft and Fwd perpendiculars)
4. Set vertical Datum to Baseline
5. Set Longitudinal Datum to Aft Perp.
6. Press Ok





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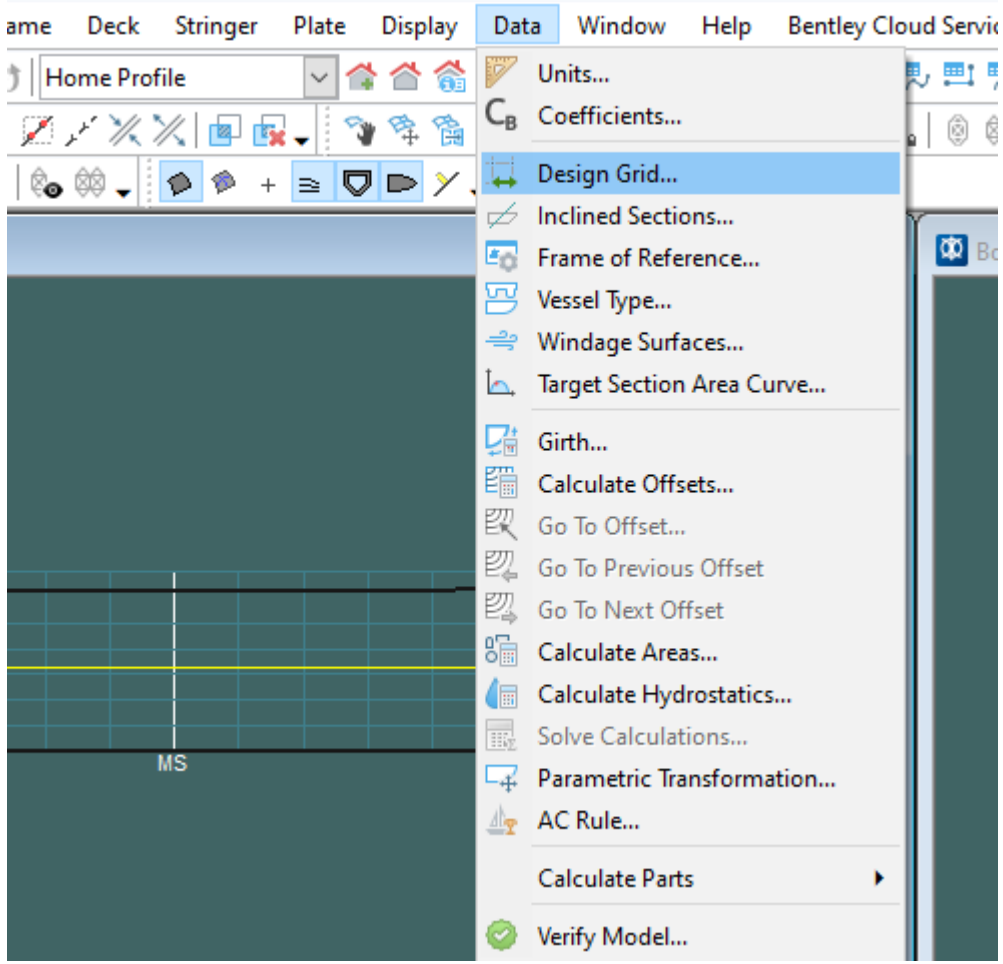
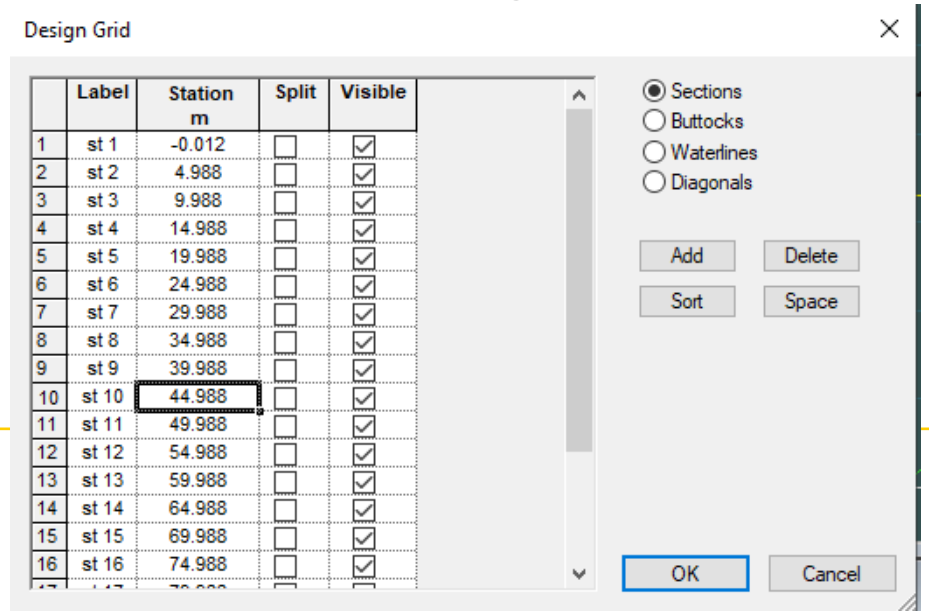
Hull lines

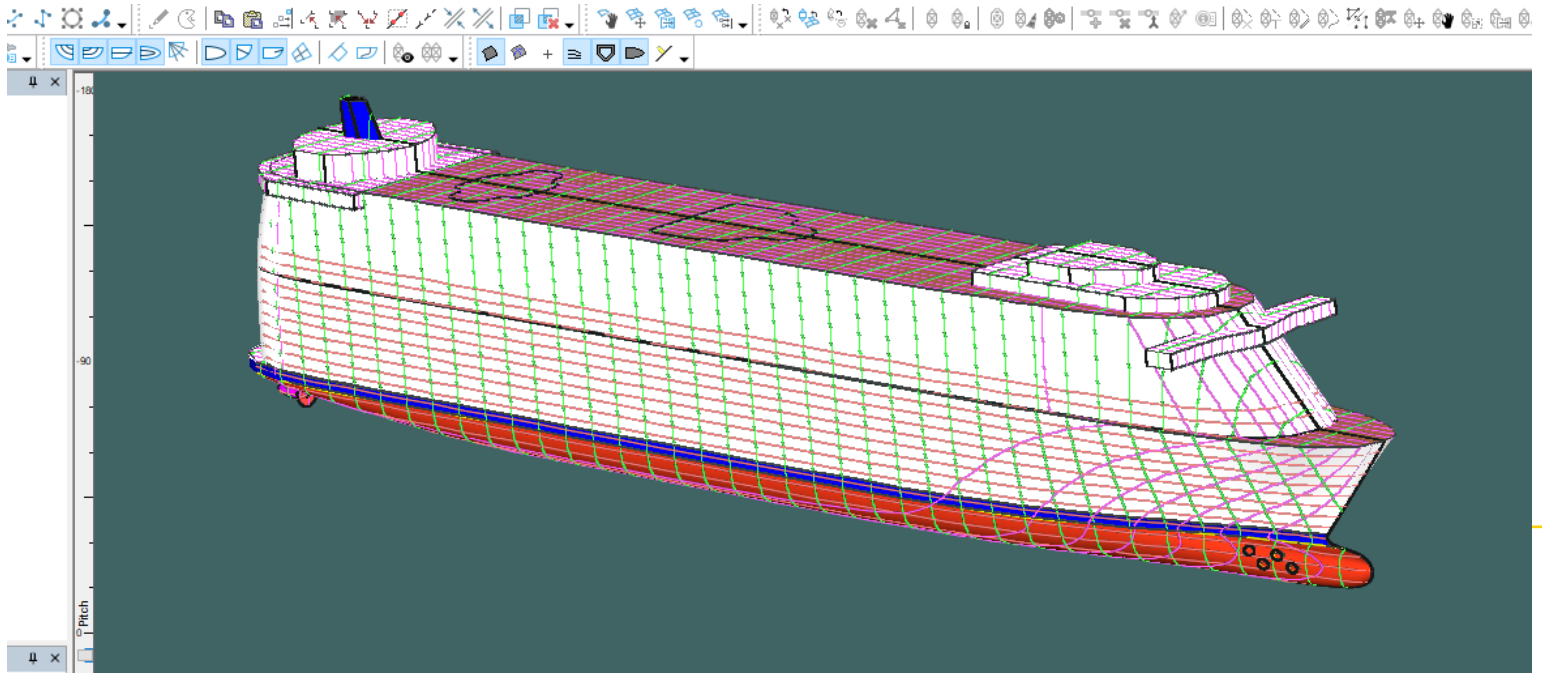
- **Define the hull lines (Data ➛ Design Grid)**
  - You can add Sections, Buttocks, Waterlines and Diagonals.
  - Add suitable number of Sections and waterlines to your ship, then define the space in between the lines and Press Ok

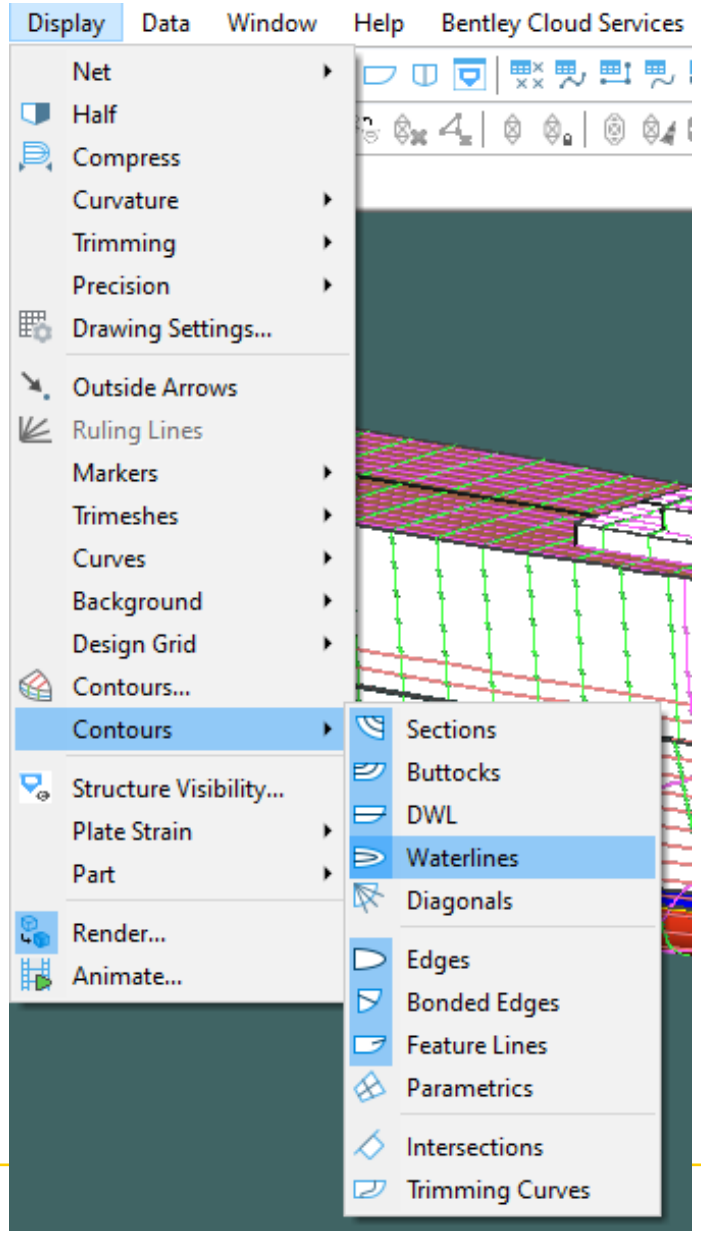




Maxsurf Modeler

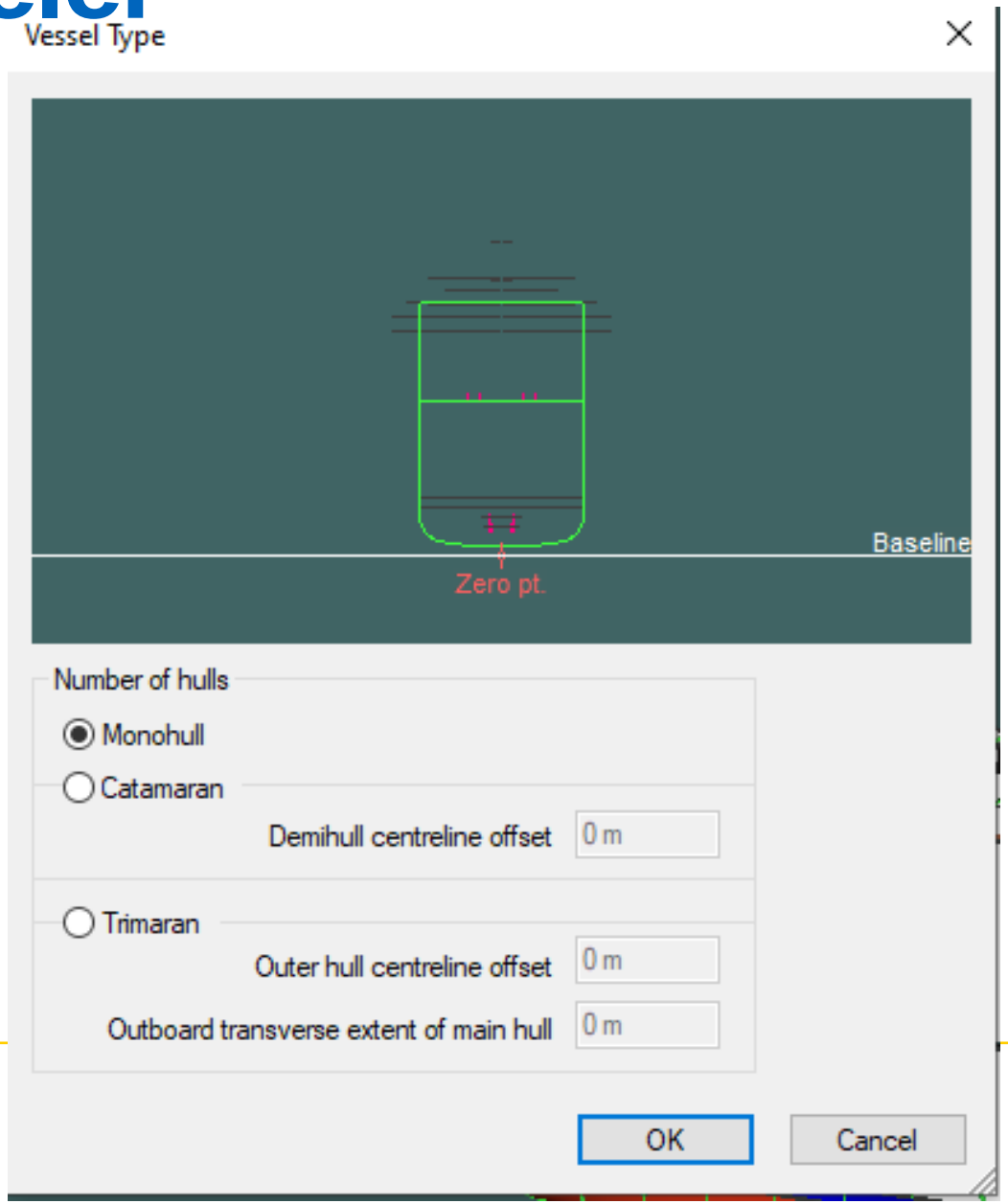
- **Display the hull line (Display ➛ Contours ➛ activate Sections, Buttocks, Waterlines, and DWL)**

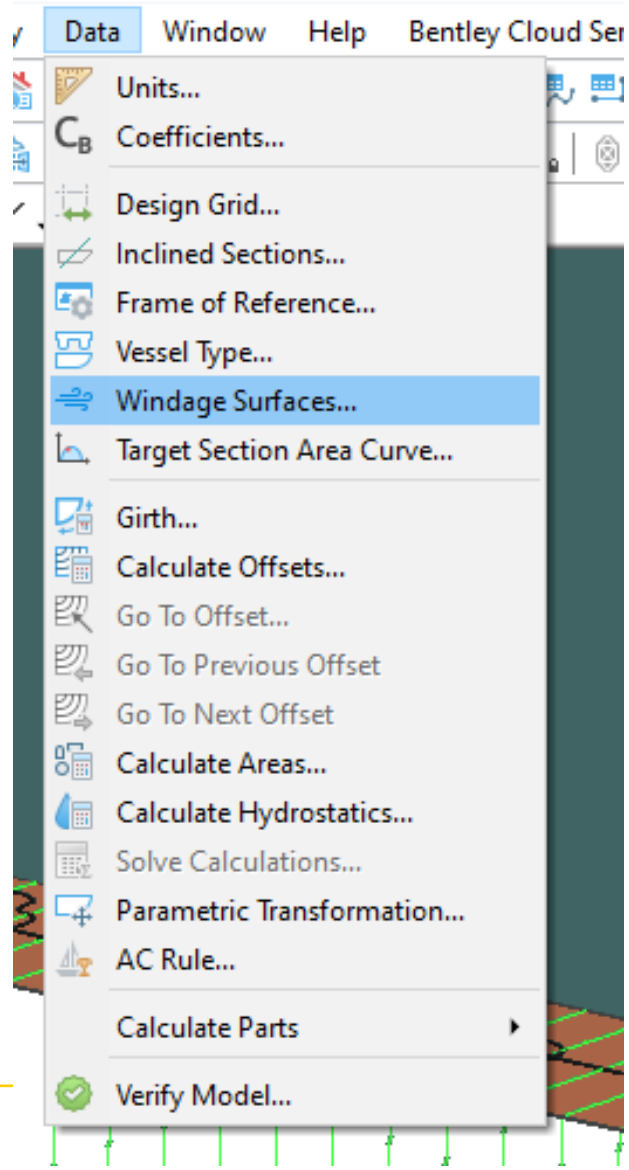




Maxsurf Modeler

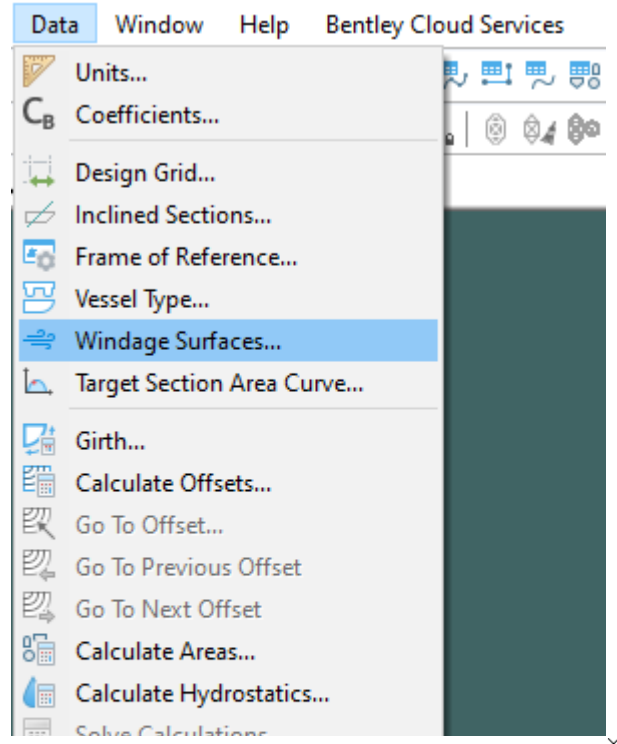
- **Define vessel Type**
  - Monohull
  - Catamaran
  - Trimaran

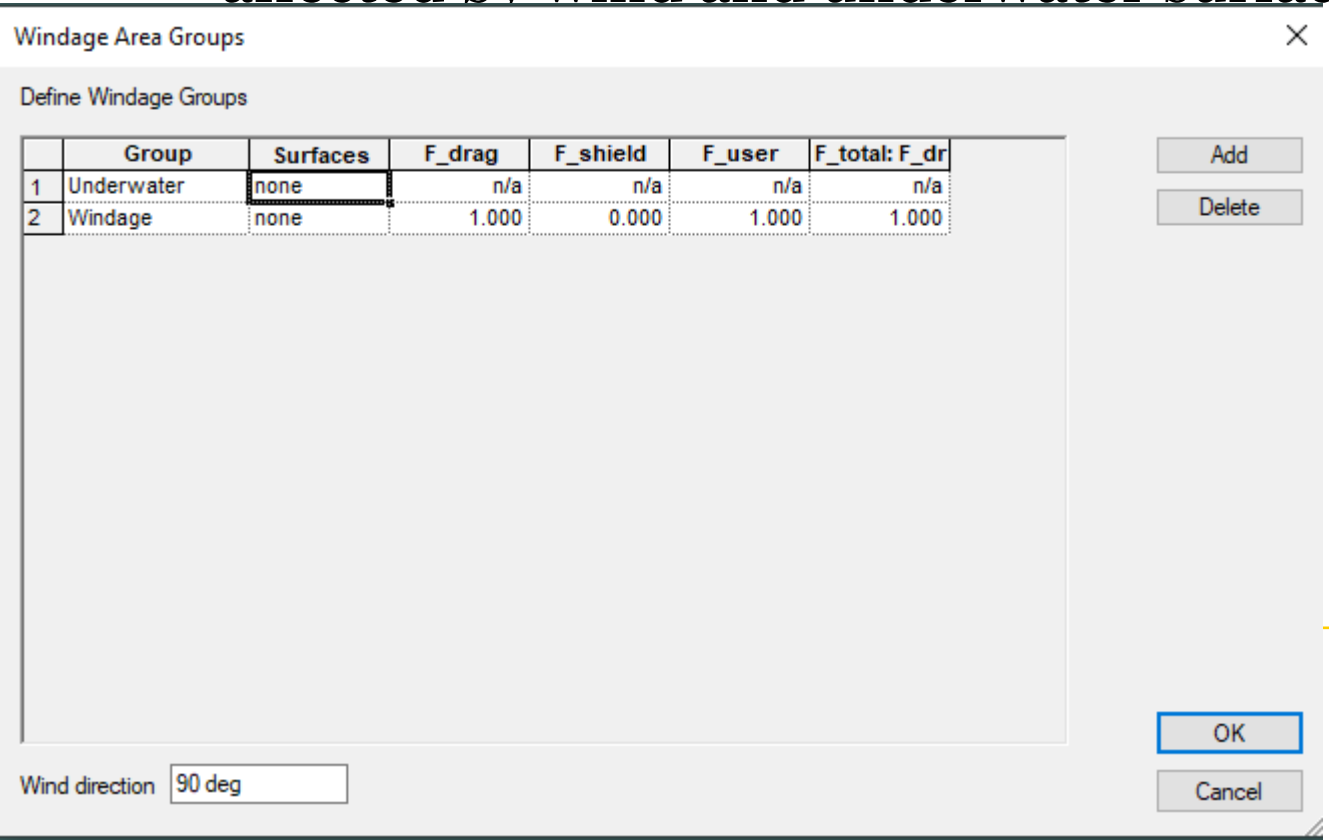


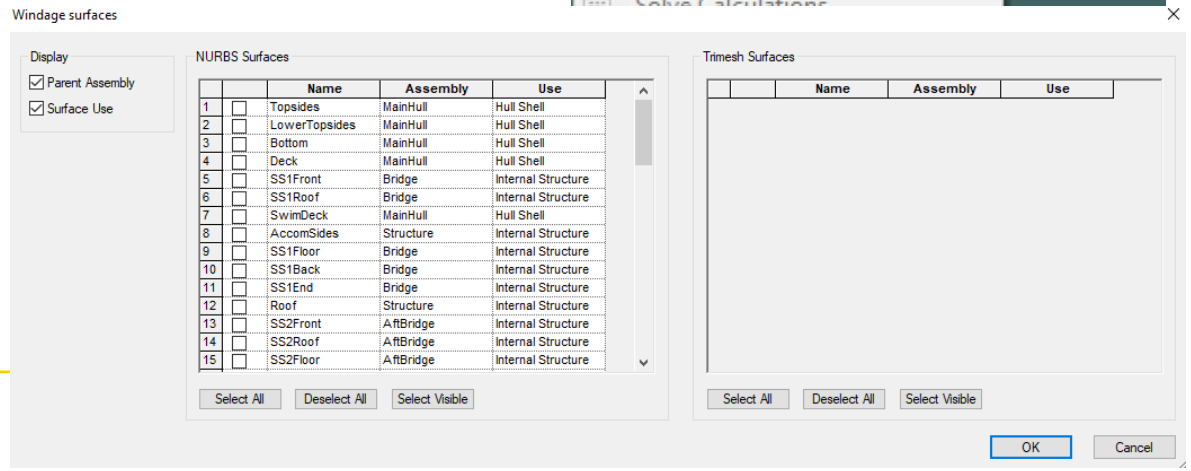


Maxsurf Modeler

- **Define Windage surfaces:**
  - Go to the profile view ➛ Data ➛ Windage surfaces ➛ Define the wind direction and add surfaces to be used in wind resistance Calclaution ➛ Add ➛ select surfaces affected by wind and underwater surfaces ➛ Ok







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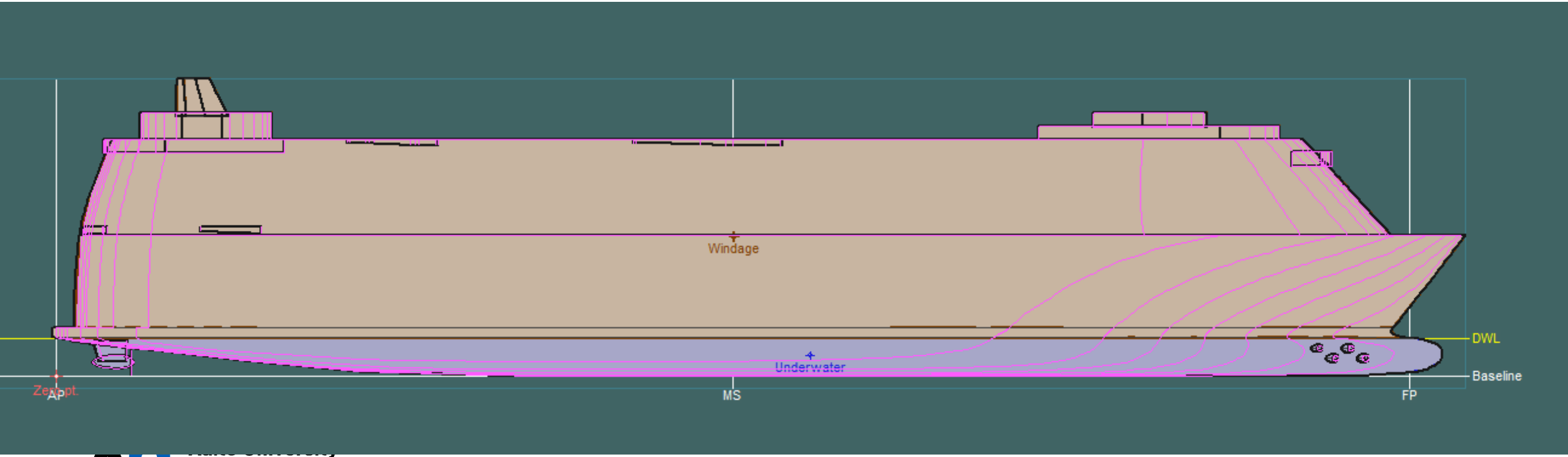
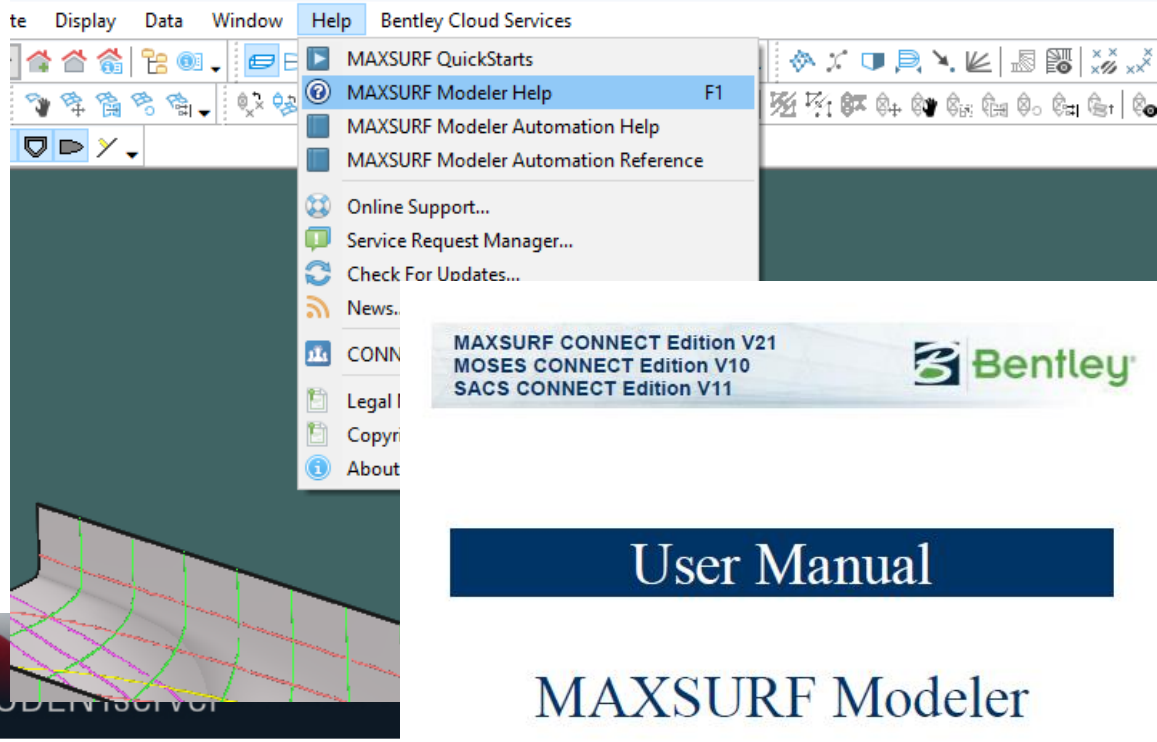
Windage surfaces

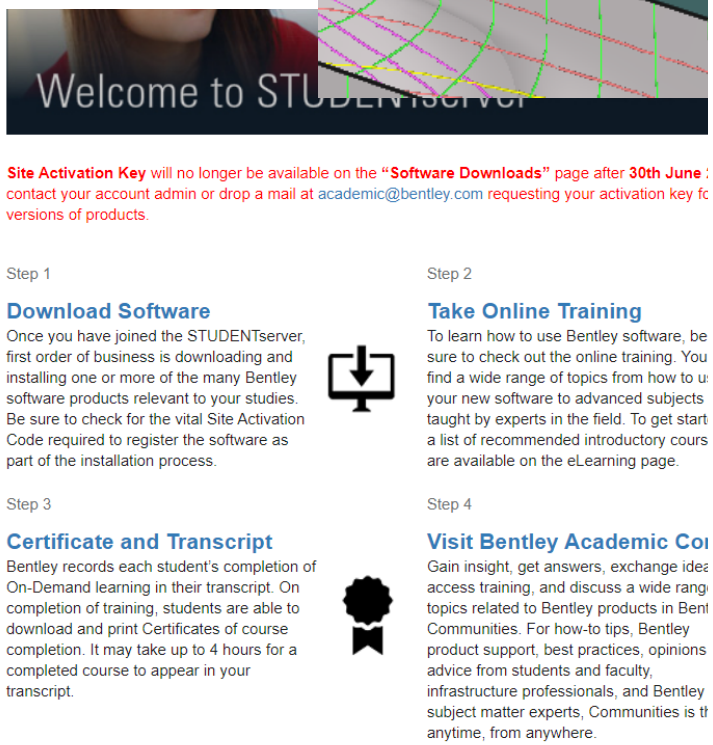


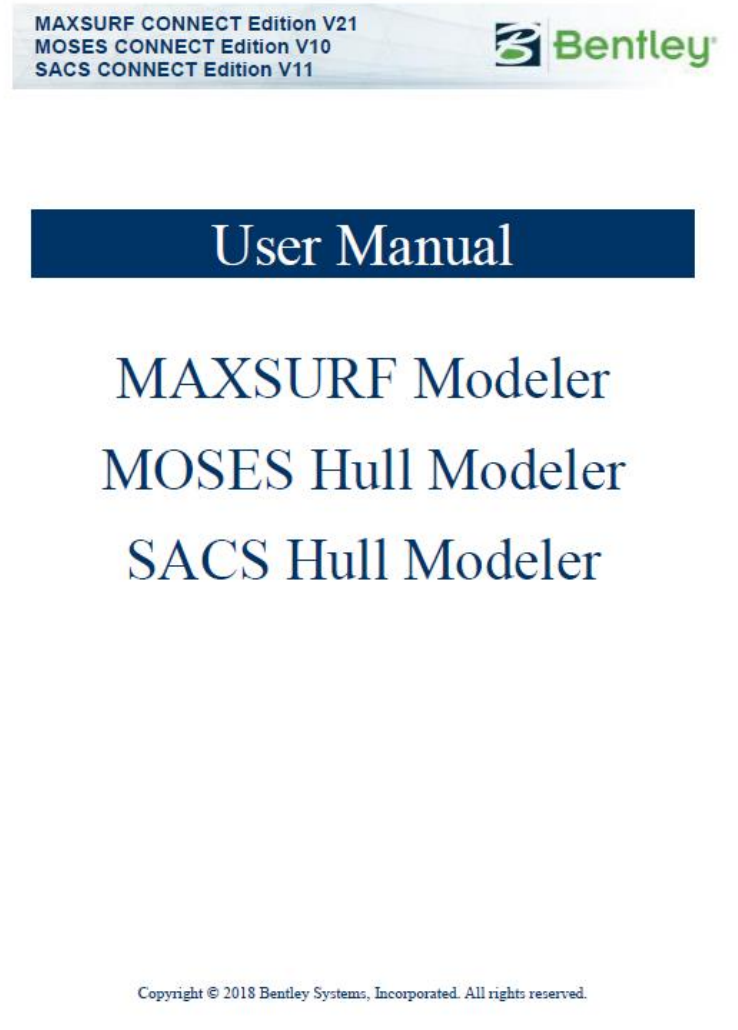
Maxsurf Modeler Help

- **You can always refer to Maxsurf user manual if you need any help.**
  - Press **F1**.
  - Or, (Help ➛ **Maxsurf Modeler Help)**
- **You can also get free online training and certificate from the following link.**

http://apps.bentley.com/studentserver







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