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Heliciel

Propeller & Wing   Propellers propellant   capture enegy turbines   Software turbine propellers wings   Index

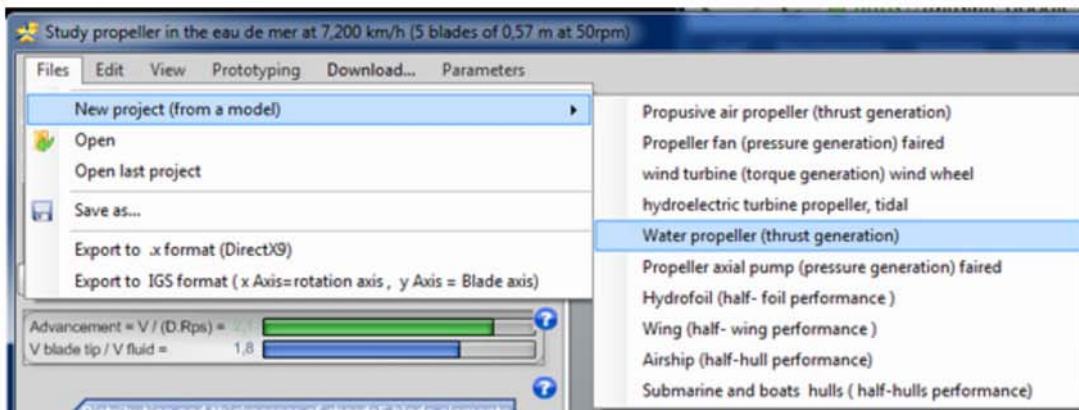# Tutorial design a boat screw propeller (2) The operating parameters and geometry
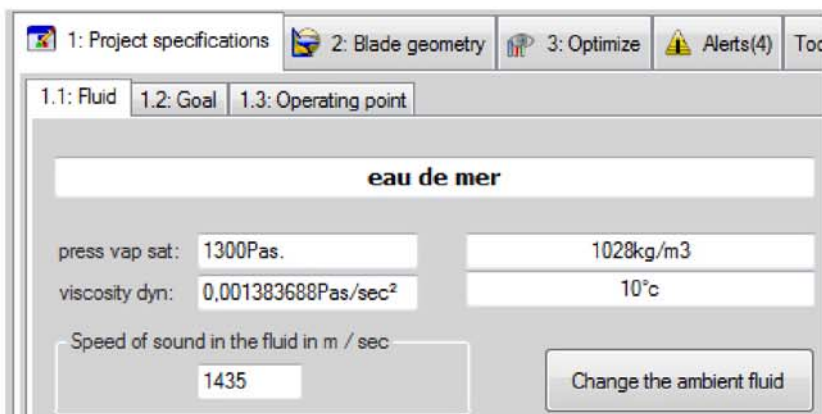
Modeling propellers heliciel

We saw in Tutorial design a boat screw propeller (1) how to define the specifications of our propeller. Now that we know what we want, let us see how to get it:
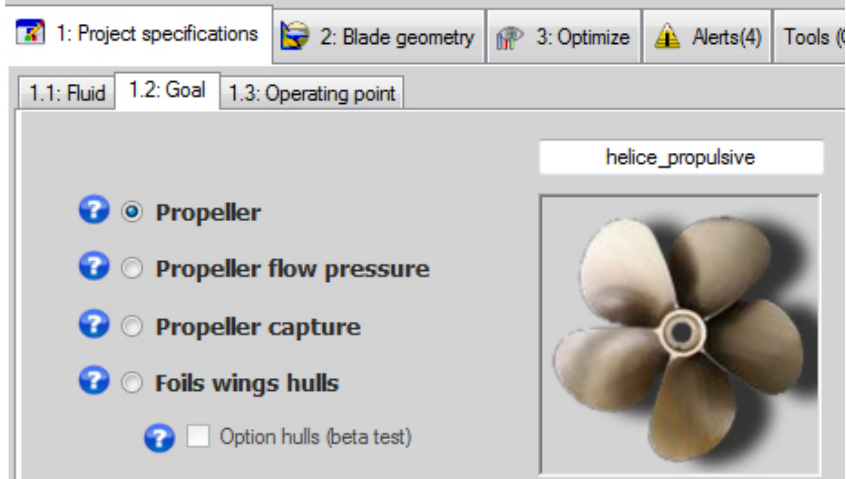
- open a model propeller propulsive water (boat) in héliciel:

- **tab1.1Fluid**:The default project propellers water propulsion, defines the fluid parameters of seawater ("eau de mer"):
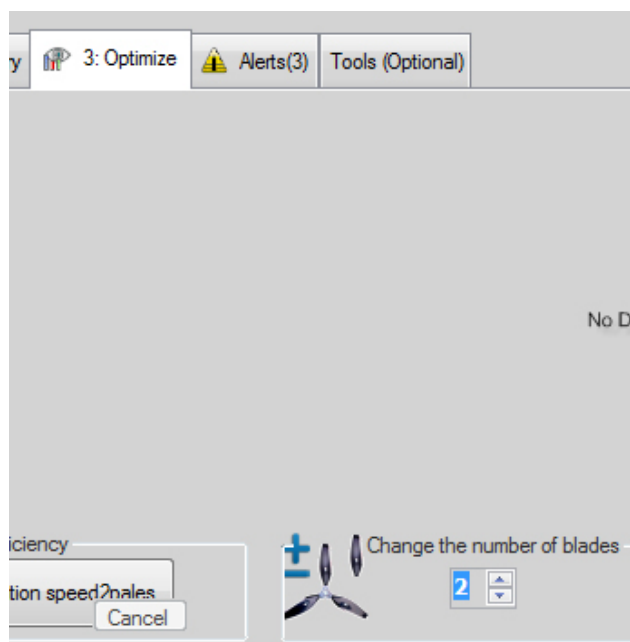

**Tab 1.2 Goal:** the goal is set on screw propeller

Tab 2.2 Profiles law: constant profile is NACA 1408

Tab 3:Optimize: The draft propeller water (boat) default is 5 blade propeller, we want to design a screw propeller simple in construction, so we will immediately change the number of blades in the **Tab 3:Optimize**, and apply two blades:

Having done this we will adjust the operating point, in particular cruising speed, 3 knots::
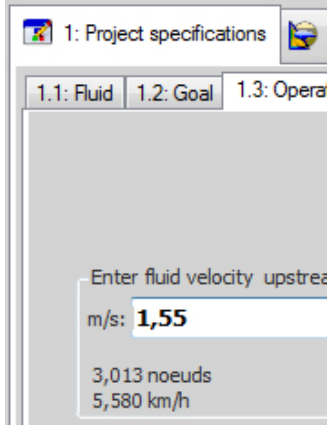
We will leave aside for the moment the rotation speed, because we do not know..(and we will use, after definition of the geometry, the search function of the optimum rotation speed)

Tab 2:1Blade geometry/Blade dimensions:Let's go to the geometry of our propeller blades. We will determine the diameter of the propeller:

We have seen that the loss of lift at the blade tip (see: <u>Wing and Hydrofoil Sailboats> losses wingtip blade</u>), can reduce our performance if our blade is short and the lift is distributed too close to the tip. We will therefore ensure that our blade is as long as possible and that its width is important to blade root, and low in blade tip.

The maximum blade length will be sought, taking into account the minimum navigable depth , and the position of the propeller shaft.

After many discussions between:

- the designer of the hull,
- the user of boat,
- the mechanic who will install the engine,
- Pythagoras, who said that the angle of the screw propeller shaft to the surface should be kept as low as possible so that the force is properly oriented,
- the neighbor who passes by,

We decide to meet everyone, that the blade may have a maximum length of 200 mm, representing a impeller diameter 400mm.

So Let's get the blade length to 200mm in the tab**2:1Blade geometry/Blade dimensions**
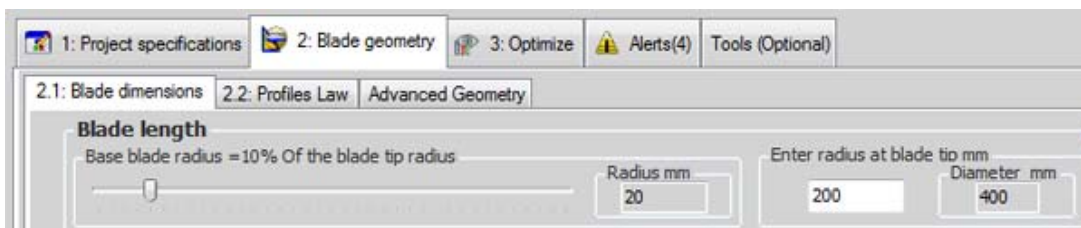
The blade root, is set by the cursor as a percentage of the length of blade, The radius of the blade root, determines the diameter of the propeller hub , we chose a hub 40 mm to accommodate a blade attachment system, thus a blade root radius of 20 mm or 10% of the blade length. It should be noted that part of the blade near the axis provides little lift because its speed is low compared to the blade tip.It is recommended to never fall below 10% of the blade length ...

The blade width at the root (profile chord at blade root) will be set to 100mm, and the width at the blade tip (profile chord of the blade tip) will be set to 20mm.
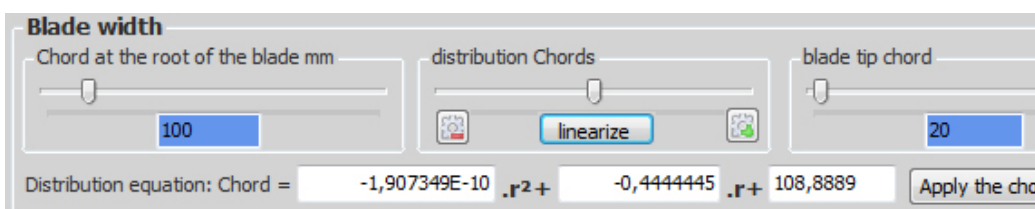

dick "**linearize**" to distribute the cords linear way: :
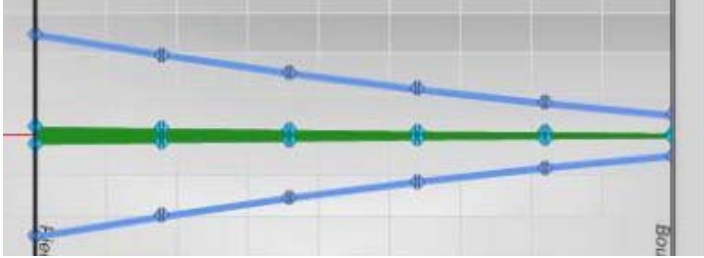
Our geometry (provisional draft) is determined, and we can start building and testing

performance of our model, using the function "**Re build propeller**": (in the toolbar at the top left of the software). Whenever you change the geometry of your propeller, you will see the active "Rebuild" button to indicate that your propeller must be rebuilt
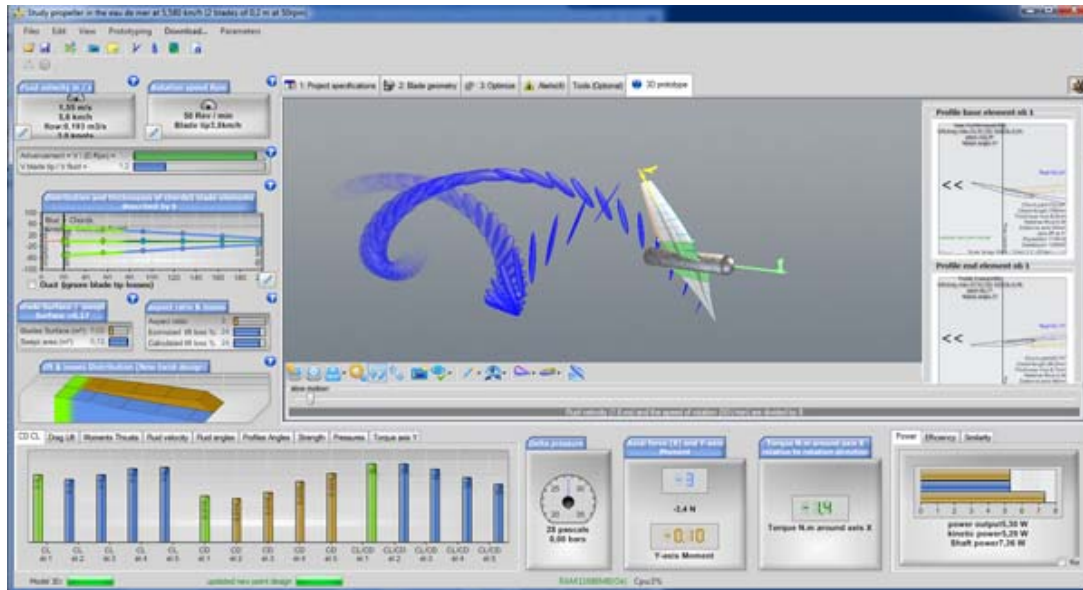
Use the control knob rotation in the tool bar at the bottom of the 3d model, to stop the rotation of the propeller and observe.

See now, how to choose a speed, depending on the desired performance .....

Next:Tutorial designing a boat propeller (3)