



Propeller & Wing

Propellers propellant

capture energy turbines

Software turbine propellers wings

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use basic hydrodynamic aerodynamic profile data

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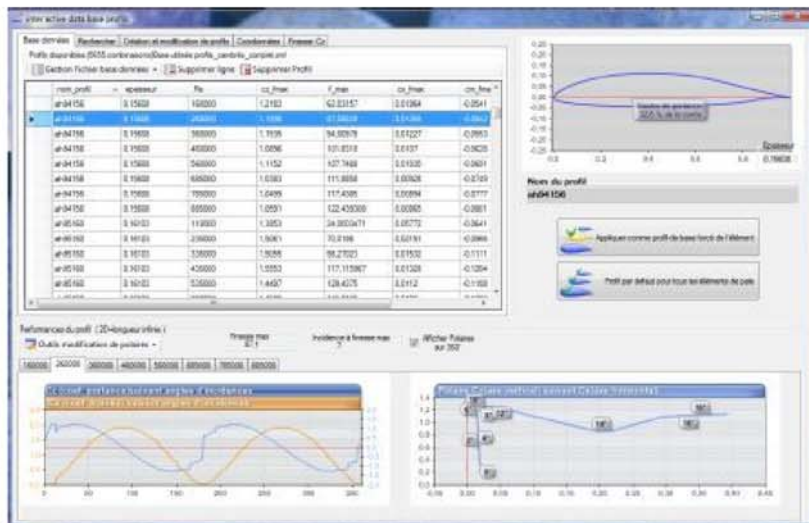
Modeling boundary layer and pressure on propeller blades or wing



Ranking and selection of profiles

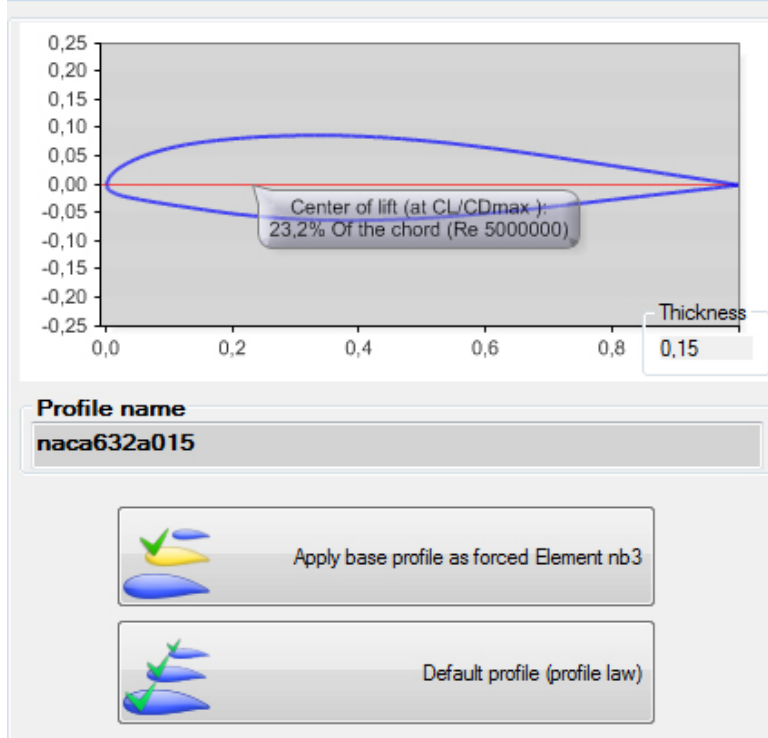
Profile data for each Reynolds number are stored in a sorting table.

Selecting a line will display the graphics performance profile Reynolds number and shape of the selected profile. (to learn [more about Cz, polar finesse and performance...](#))



The sorting table allows you to store the profiles according to the criteria of the selected column. For example, if you want to classify profiles lift / drag ratio, click the "finesse" column

Forcing a profile: to impose HELICIEL the use of a profile of your choice to the level of an element, it is possible to force the profile for the selected element in the 3D model. HELICIEL then use this profile for the element.

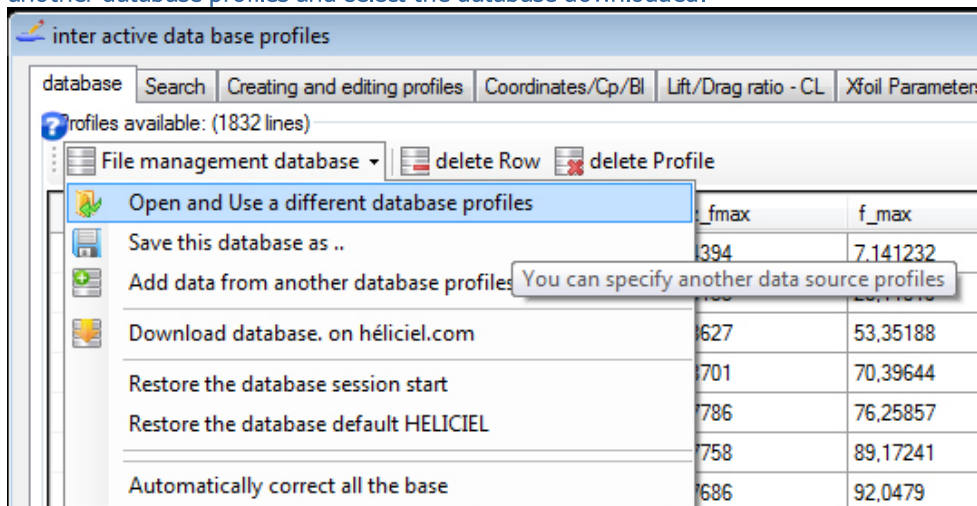


Database management:

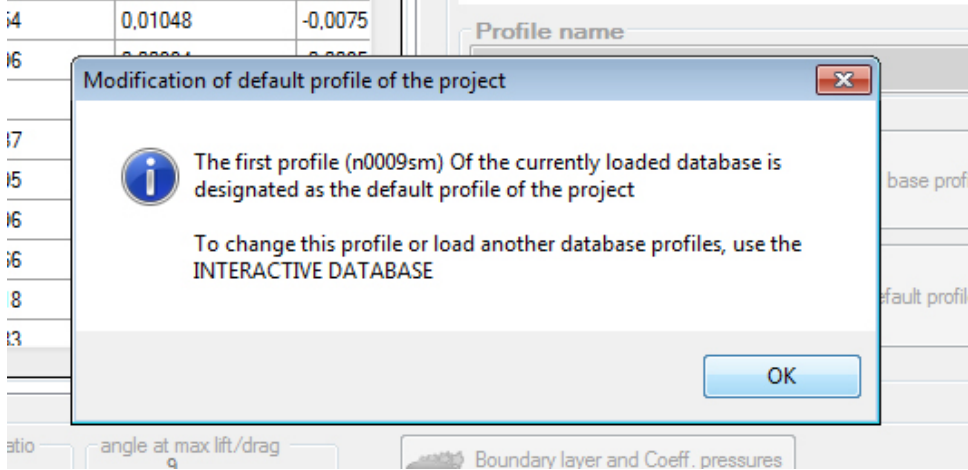
- **Add a database to the interactive data base Heliciel software**

HELICIEL uses the loaded database to select the profiles of your wing or propeller blade. If you want HELICIEL uses a class of profiles (flat underside, symmetrical NACA...) over another, just load another database containing only the desired shapes.

In the "Data File Management" menu of interactive data base HELICIEL, select use another database profiles and select the database downloaded.

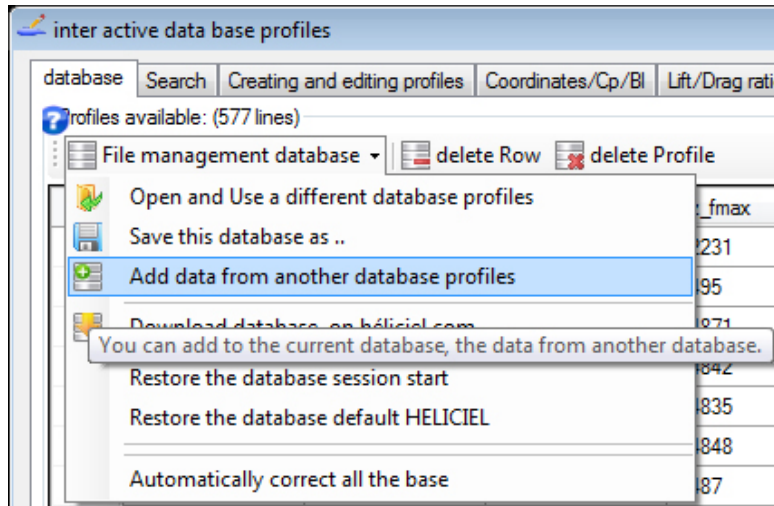


If the loaded database does not contain the default profile of the project, a warning message:



prompts you that default profile for your project has been changed.

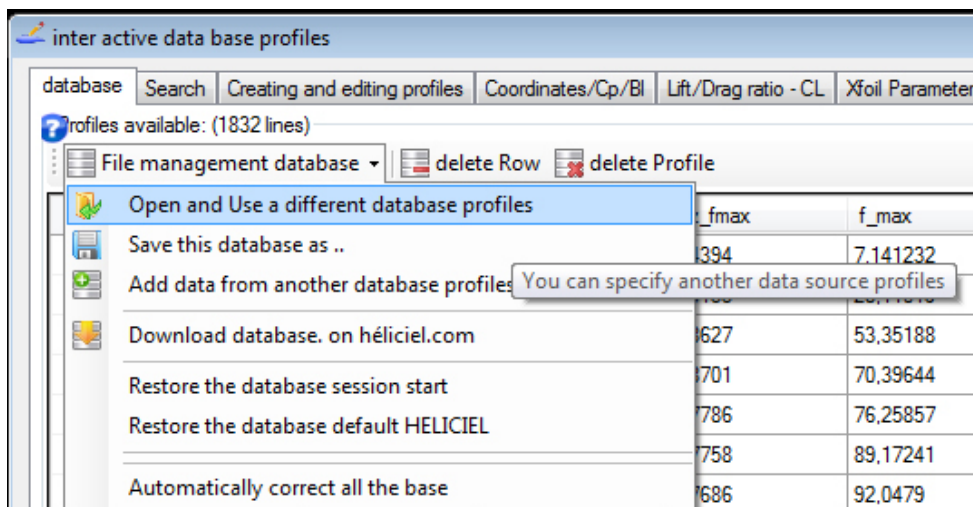
- **Add data from another database, the database in use**



You can add two databases, increasing the current database with data from another database. The current database can then be saved to be loaded into a future project ...

- **Download a database**

1. Download database (on page [free download databases heliciel](#)) and save it in the folder: C :/ Programs / HELICIEL / heliciel / bases Profiles /
2. In the "Data File Management" menu of interactive data base HELICIEL, select use another database profiles and select the database downloaded.



Note the speed of calculation. Mode thickness law imposed heliciel search the database profile whose thickness is closest to that requested..This research takes time proportional to the number of profiles present in the database. It is therefore advisable to work with small databases.

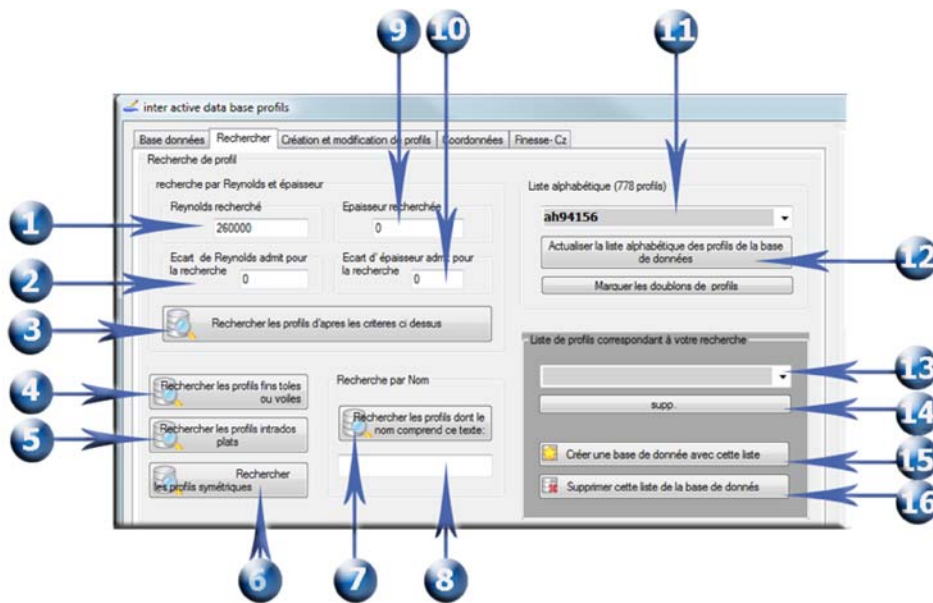
- **Search profiles:**

The interactive data base HELICIEL is the place where héliciel collects performance and selects the profiles.

The database is modifiable, this allows among other things, to refine the choice of control presentations in "Law Profiles thickness" mode..For this it is useful to select lists of profiles in the database,according to the criteria of your choice, and create databases "derived" containing your choice of profiles. If you save your database "derived" you can use it later and not have to redo the selection and sorting profiles.. So over your project you refine your preferred database and your propeller blades or your wings will be built automatically with your favorite profiles!

The search tab is a tool allowing you to quickly select and create "customized" database profiles ..

A small diagram explaining the functions of the search tab is usefull:

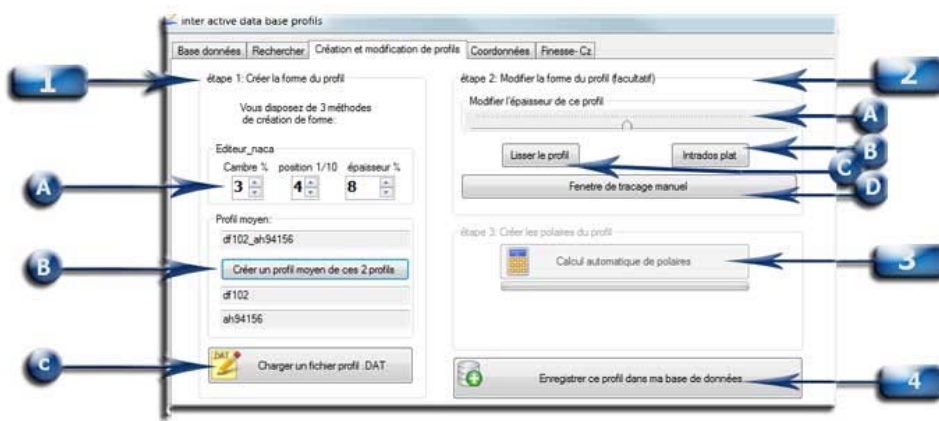


- The search profiles in the database can be defined by criteria::
 1. enter the desired Reynolds
 2. enter the Reynolds gap allowed in research
 3. start the search by criteria
 4. search of the finest profiles
 5. search for flat profiles
 6. Search symmetrical profiles
 7. search profiles whose name includes the text entered in 8
 8. Enter the search text
 9. Enter the thickness of the profile you are looking for
 10. Enter the thickness gap allowed for the search criterion
 11. profiles Alphabetical list of database
 12. If you have changed the database per adding or deleting profiles or databases, refresh the alphabetical list to reflect these changes
 13. List of profiles found matching your search
 14. it may be useful to remove the selected line in the list of profiles found.
 15. Uses the list of profiles corresponding to your research to create a new database.
 16. removes the list of profiles found in the current database.

These functions allow you to create and edit, transform your database. to go further in the freedom of creating profiles::

Creating and editing profiles

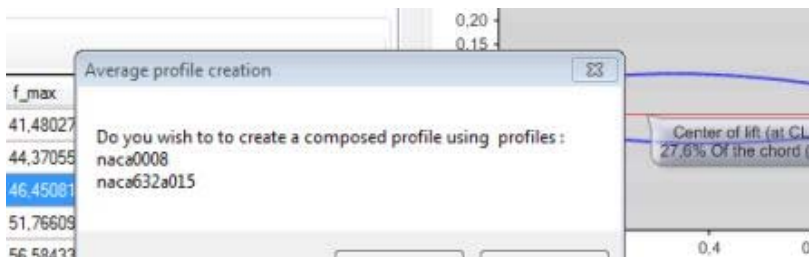
The creation of profiles tab gives you complete freedom of creation...as long as the shapes are aerodynamic or hydrodynamic . This tab allows you to create, transform, load, calculate the polar, Xfoil control..and use your creation as profile propeller blade or wing.



1. Creation of the profile shape:

you have 3 ways to quickly create a basic shape or final profile

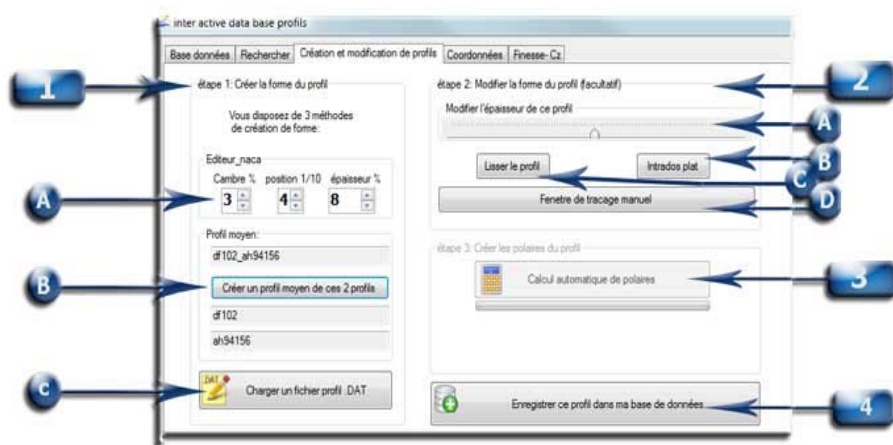
- A: A NACA 4 digits editor allows you to draw your profile by controlling the equation NACA
- B: Selecting 2 profile in the database table (Click on a table row in the database tab and down the Ctrl key, then holding click a line from another profile)



Click Yes and then click the **B button** to merge the two forms of the selected profiles

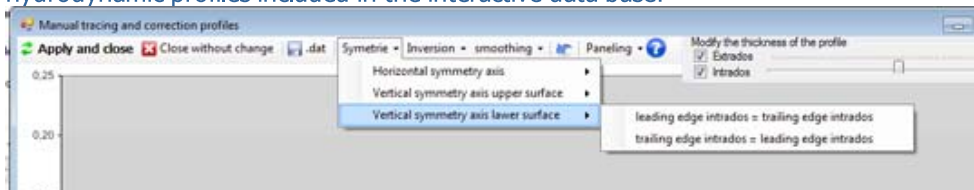
- C: You can import geometry as a file. DAT (Coordinate files of standard profiles) The outline of the profile is given by the lines x and y coordinates with 2 columns. The first line should give the point 1 in x and 0 y (trailing edge). then each line gives the coordinates to the coordinate point x = 0, Passing through the upper surface, and return to the point 1.0 through the intrados. The first line of the file starts with the name of the profile then the following lines are the coordinates.

2. modification of the shape: The shape of the profile published in the graphics area can be transformed in 4 ways:

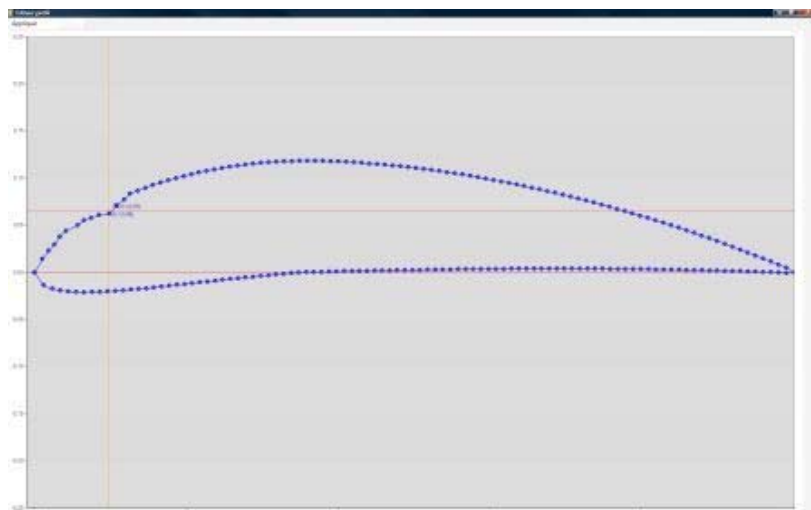


- A: cursor thickness variation profile. Move the slider to adjust the thickness (transferred in the plot window since version 9.00.8)
- B: Flatten the underside of the profile (transferred in the plot window since version 9.00.8)
- C: Smooth profile (transferred in the plot window from the 9.00.8 version).
- D: Use the plot window, interface tracing and correction of aerodynamic or hydrodynamic profiles

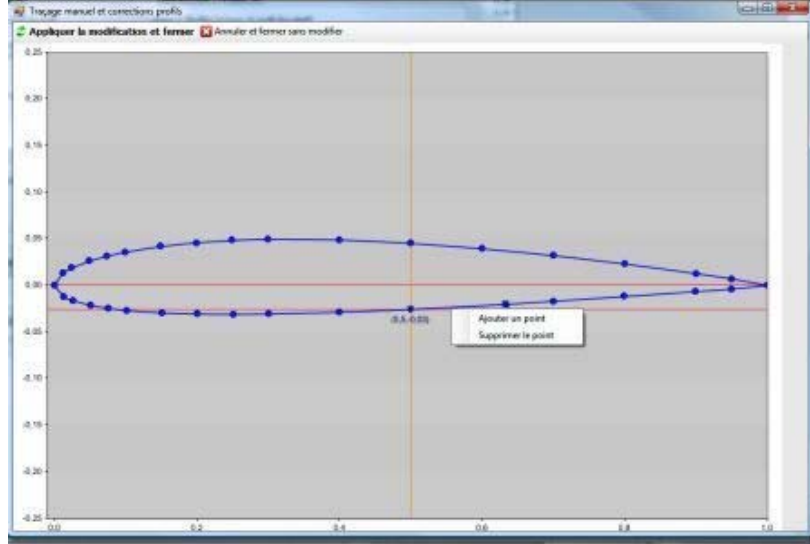
Introducing **the Interface "plot window"** and correction of aerodynamic or hydrodynamic profiles included in the interactive data base:



Various tools of symmetry, inversion, smoothing, modification thickness are available for a fast and accurate creation of your profiles on measures. You simply start the procedure for calculating polar to add your profiles to your database. You can save your drawing format dat..:



points can be moved by dragging the mouse or the keyboard arrows for maximum accuracy

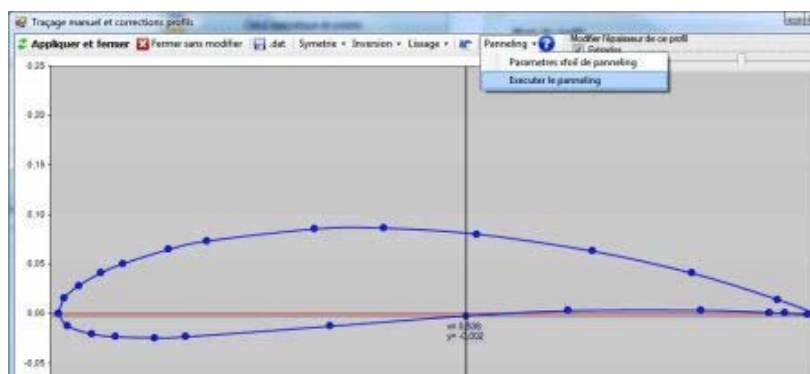


You can add or delete items by clicking the right mouse button.

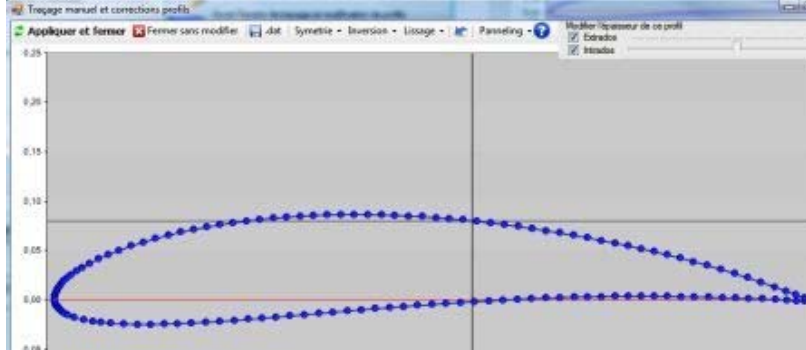
This correction interface or creating profiles is very useful for preparing coordinate files downloaded from the net (for example at the site http://www.ae.illinois.edu/m-selig/ads/coord_database.html) a "Xfoil parameters" tab to control the method of paneling Xfoil.

The method of paneling of Xfoil is executed before each calculation of polar, but it can also be executed from the interface tracing to correct profile:

The paneling Xfoil can manage the distribution and allocation of items making up the profile so that the angles between the parts of the profile are minimum.



The paneling allows better convergence Xfoil calculations, but also a smooth profile.



3. Calculating polar

The interactive data base HELICIEL includes piloting XFOIL. The interactive data base HELICIEL includes piloting XFOIL. This allows to directly inject the geometry of your design profile for the calculation of its polar, over a range of Reynolds number and angles of conventional incidences. Héliciel Xfoil launches, and records the results of polar directly into your database.

The calculation of the polar profile can take up to 20 minutes for hard cases! N'utilisez pas votre Pc pendant le calcul car l'interruption de calcul des polaires est possible mais votre base de données sera dans un état incertain. Reloading the database session start, is strongly recommended in case of stop calculating polar before finalizing!

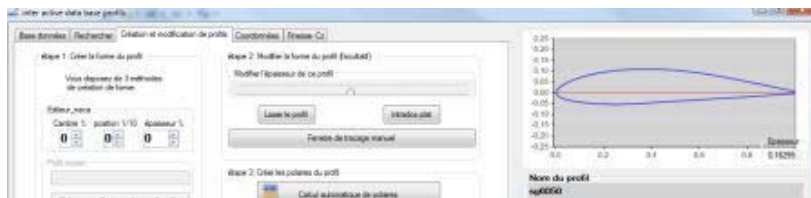
The procedure for controlling XFOil deserves to be detailed:

Heliciel launches XFOil and injects the geometry of the profile that you created.. WARNING: If your profile has shapes too far from an airfoil, XFOIL can not calculate it! Xfoil does not always converge, which makes it a little tricky to use, when calculating a given angle at a given Reynolds does not converge, Héliciel slightly changes the Reynolds or angle (0.1°) to attempt the convergence. This automated procedure attempted convergence, achieves far more successes for "difficult" profiles. After calculating polar between zero incidence and stall, Héliciel extrapolate performance of 360 degrees per adding the performance of plane plates, or through symmetry whether the profile is detected to be symmetrical. Control and correction of inconsistent data is made, to avoid storing in your database erroneous data.

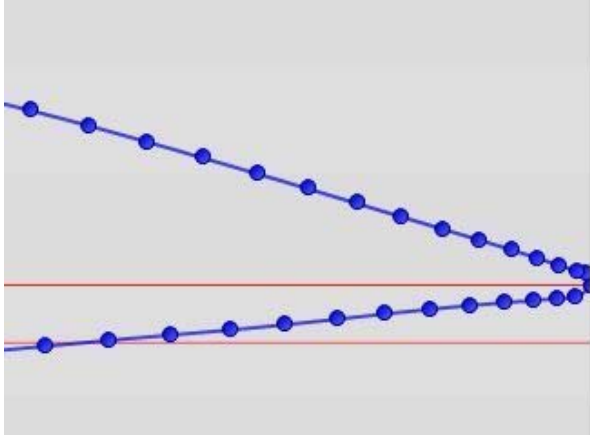
IMPORTANT: Xfoil better computing performance profiles tapering

Some downloadable profiles on the net have defects trailing edges badly tapered, rounded or square. Before running this calculation, make sure that the trailing edge is tapered! XFOil otherwise be difficult to converge and do not find all the polar

Example profile correction with a trailing badly tapered or rounded:

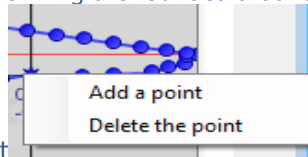


If you try, for example, the calculation of the performance profile (sg6050), which you imported the coordinates as file ".dat", from the great and valuable site: http://www.ae.illinois.edu/m-selig/ads/coord_database.html, Xfoil converge on just one or two numbers reynolds so, your calculated data will not be very useful. Yet the profile looks good at first glance! Click on the window plot manual to edit your profile shape and observe the trailing edge detail:



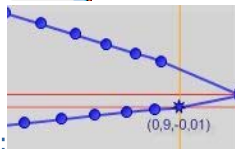
The trailing edge has many points forming a rounded or square, and this prevents the convergence performance calculations with Xfoil! The trailing edge should form a point without thick! The interface plotting is used to correct this defect very quickly:

1. Delete the too many points, forming the rounded around the trailing edge with



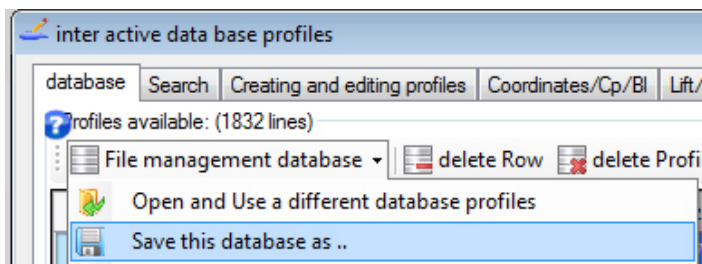
right clicking on the the point

2. for the trailing edge, tapering to a point, like this:
3. Make sure that the general shape is correct if necessary by moving the points in the wrong place

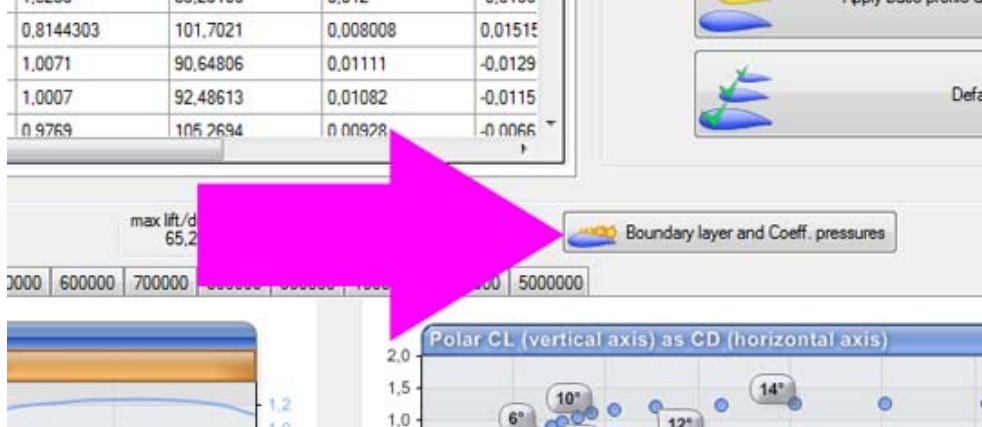


This correction of the trailing edge profiles significantly improve Xfoil convergence.

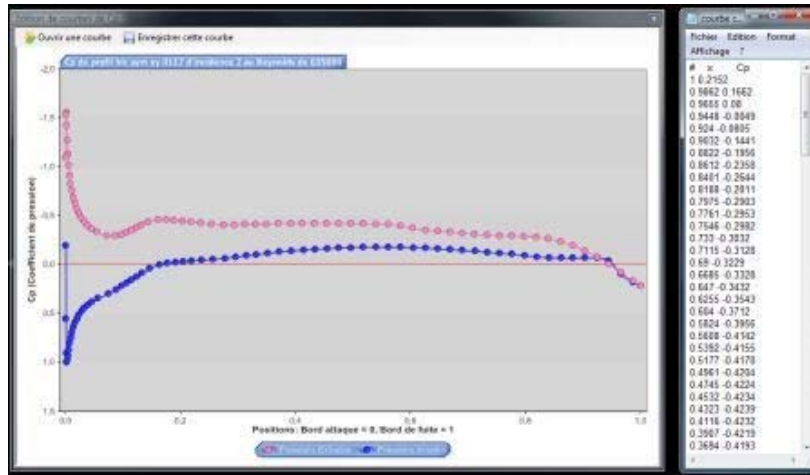
4. save the profile and performance data in your database,.



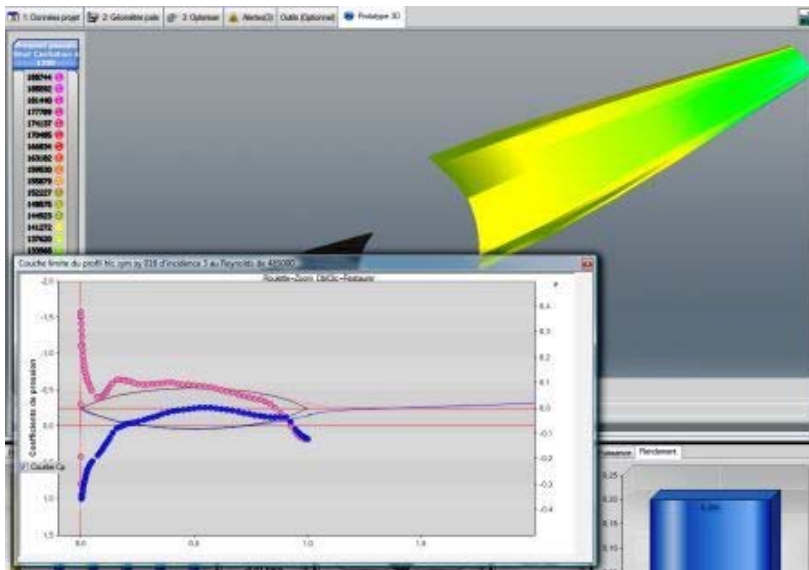
Editing pressure curves (Cp) of a profile, to the number of reynolds, and the angle of incidence specified: The pressure distribution around a profile tells us about the risk of cavitation, the balance of forces around the profiles and provides a global view, to guess the behavior of the angles of incidence and Reynolds selected.. The edition curve Cp, is a function of Xfoil, it is simple to start from the interactive data base by selecting a line in the list of profiles and clicking "Edit curve Cp":



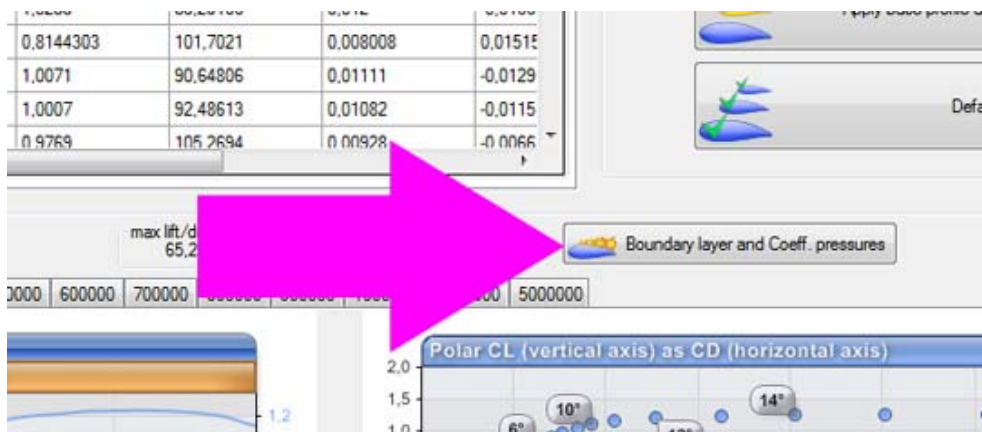
Xfoil recalculates the pressures with the parameters of the "parameters Xfoils" tab. Your pressure curve s' can then be displayed and recorded



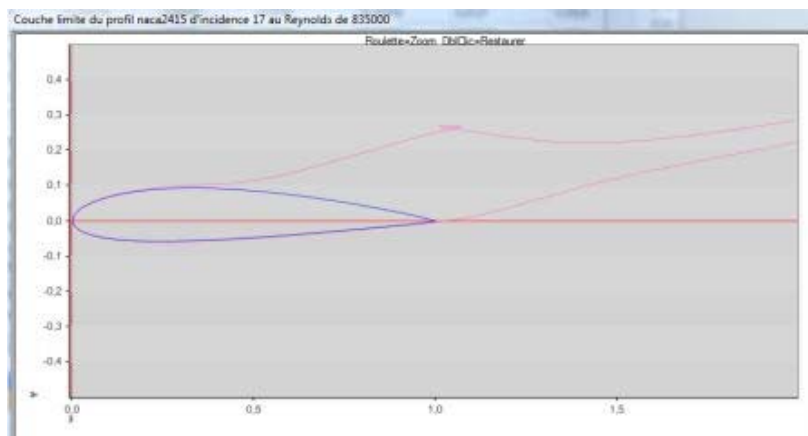
The pressures can be displayed on the 3D model as colored surfaces:



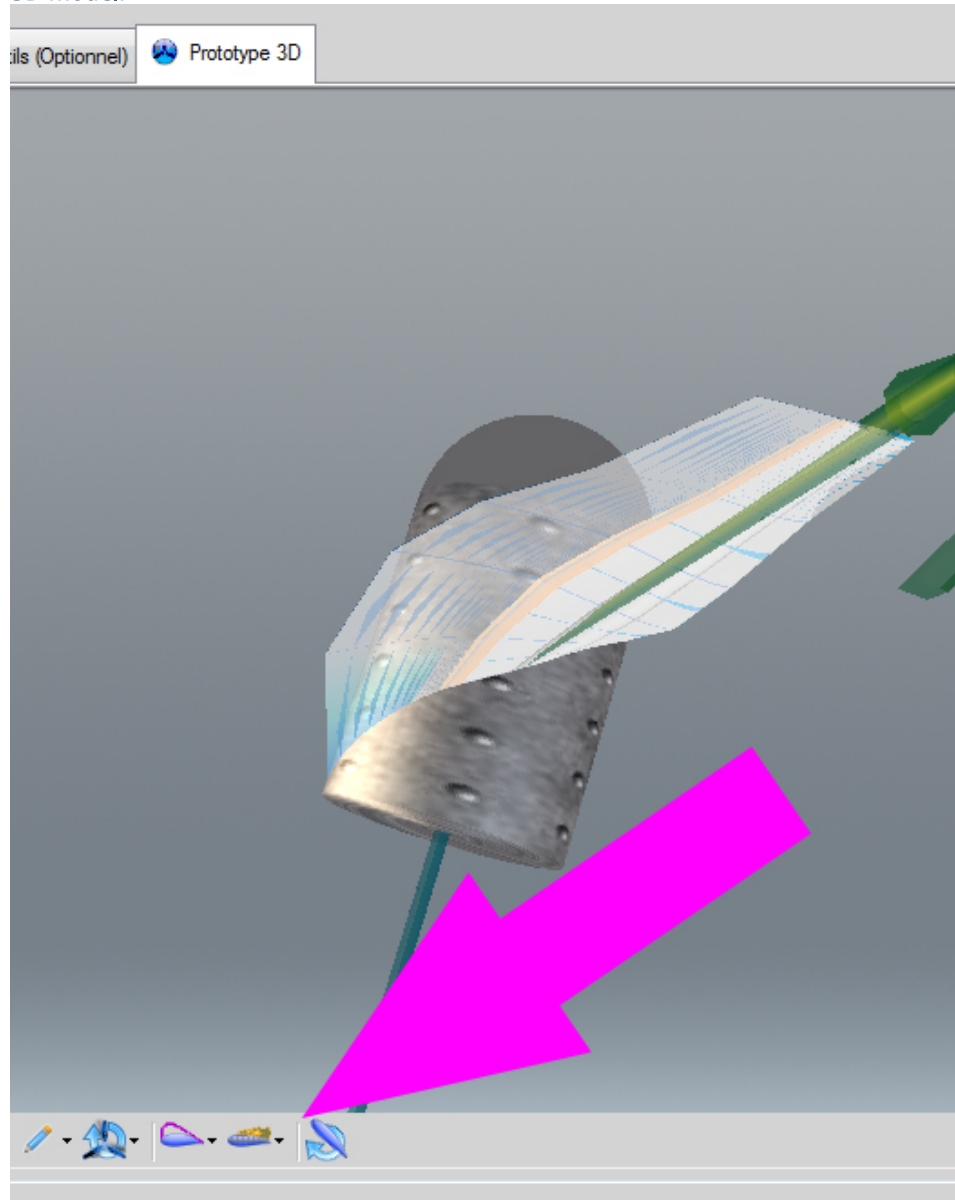
The boundary layer can be calculated:

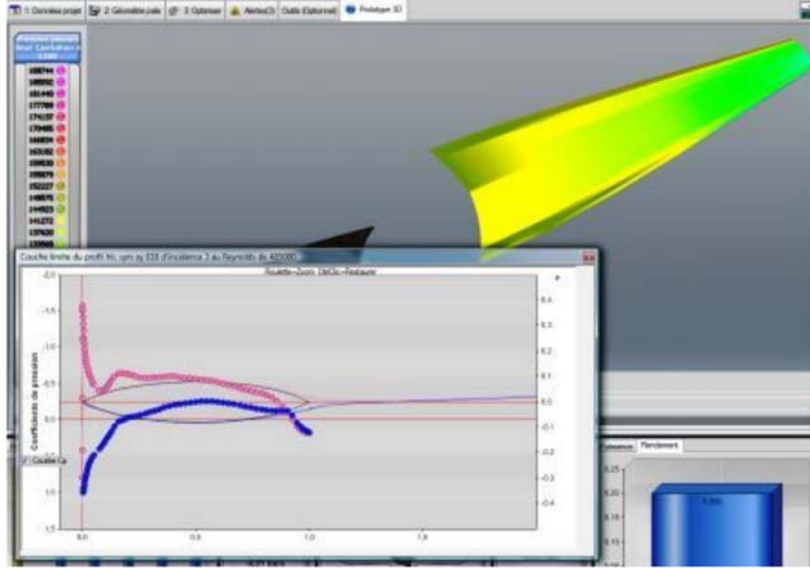


This gives the boundary layer in graphical form:



the boundary layer and the pressure on the blade can be viewed and edited on the tab 3D model:





Modeling boundary layer and pressure on propeller blades or wing:



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