mecaflux
Heliciel

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Managing the incidence(attack angle) of blade profiles or wing

Whatever the law of selection profiles HELICIEL apply default, the incidence(attack angle) of selected profile providing the lift / drag ratio maximum. Twist of the blade will be built taking into account the induced velocities and incidence lift / drag ratio maximum.

In some cases, it may be useful to consider the incidence(attack angle) that we want to give to an element of the blade or wing. HELICIEL leaves the possibility for the user, to select the incidence, he wants to apply to the profiles base of the elements.
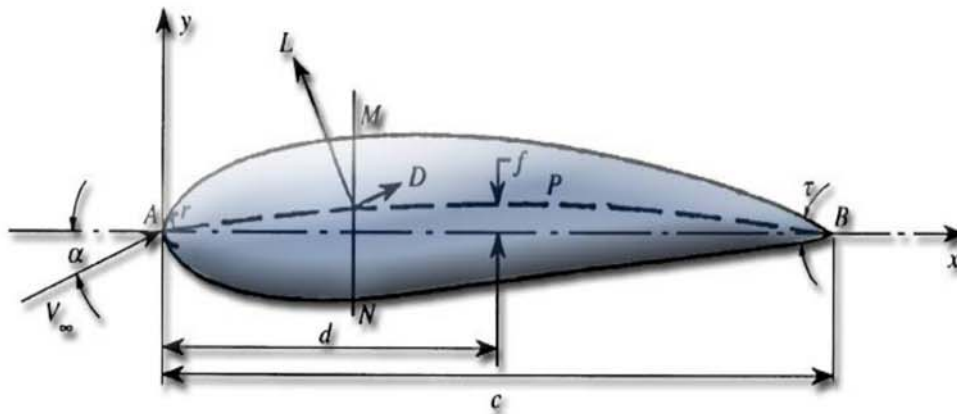
- L= Lift force perpendicular to the movement of the fluid in Newtons
- D=Drag force parallel to the movement of the fluid in Newtons
- alpha=Angle of incidence

If the angle of incidence(attack angle) of lift / drag ratio maximum, of a profile is one that guarantees us the best thrust / torque for propeller, and the best torque / rotation speed for a wind turbine propeller, this angle of incidence, can , do not represent the ideal goal. In this case is it interesting to force the angles of incidence of the profiles manually.

- For wind turbines, it is often useful to apply angles of incidence "maximum lift" in the area of the blade root to allow a better start of the machine. Profiles involved, being near the center of rotation ,loss of lift / drag ratio deteriorated slightly, the overall performance of the propeller of which the most effective area is 0.7 times the radius.
- For highly loaded propellers, which should generate a strong thrust with limited diameter. When the work surface has been maximized, and that the rotational speed is imposed by the engine performance, it is possible to increase thrust by increasing the angle of incidence, mais ceci degradera le rendement...
- If the propeller cavite, it may be useful to decrease slightly lift, reducing the incidence, but the thrust will be reduced ...

The calculation of induced velocities and the pitch of the blade (or wing) will be made taking into account the performance, with the angle of incidence forced. This allow to distort the blade and see the effects on the performance ...

To access the incidence (attack angle)management, left click on the element in the 3D model, et sélectionner dans le menu contextuel:"forcage de l'incidence":

Modeling aerial propeller in heliciel

Modeling boat marine propeller ineliciel

Modelisation helice ventilation dans heliciel
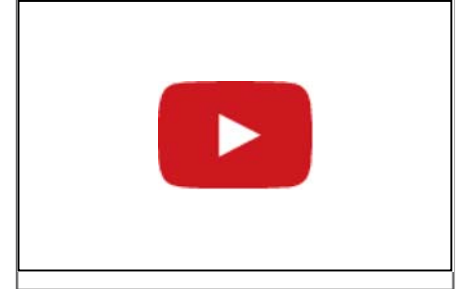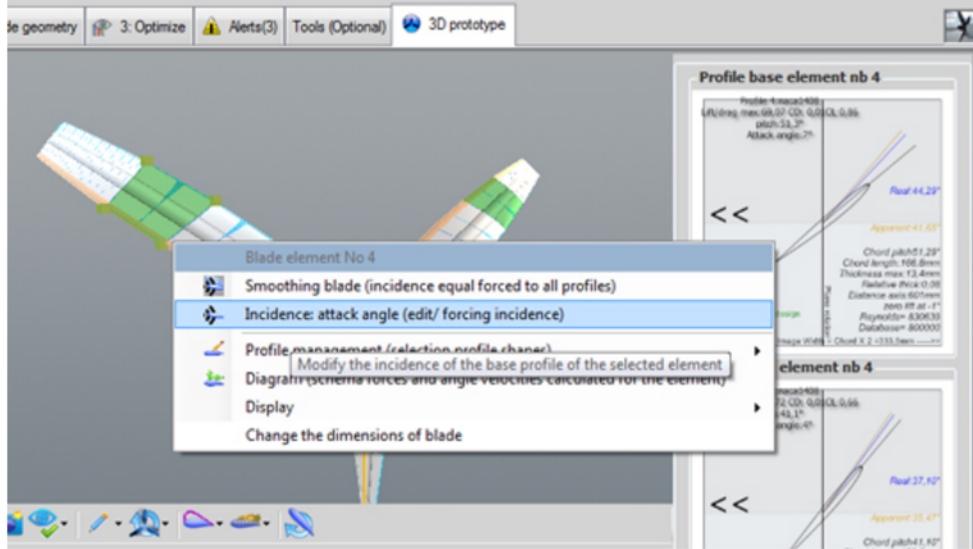

Modeling propeller ventilation in heliciel

tidal turbine modeling in heliciel

Kaplan propeller modeling in heliciel

**Profile base element nb 4**

The management interface incidence, proposes to select an angle of incidence to be applied to the base of the selected item. A little reminder of current performance profile is given. It is possible to select another item, and apply the angle of incidence for all items at once if desired.
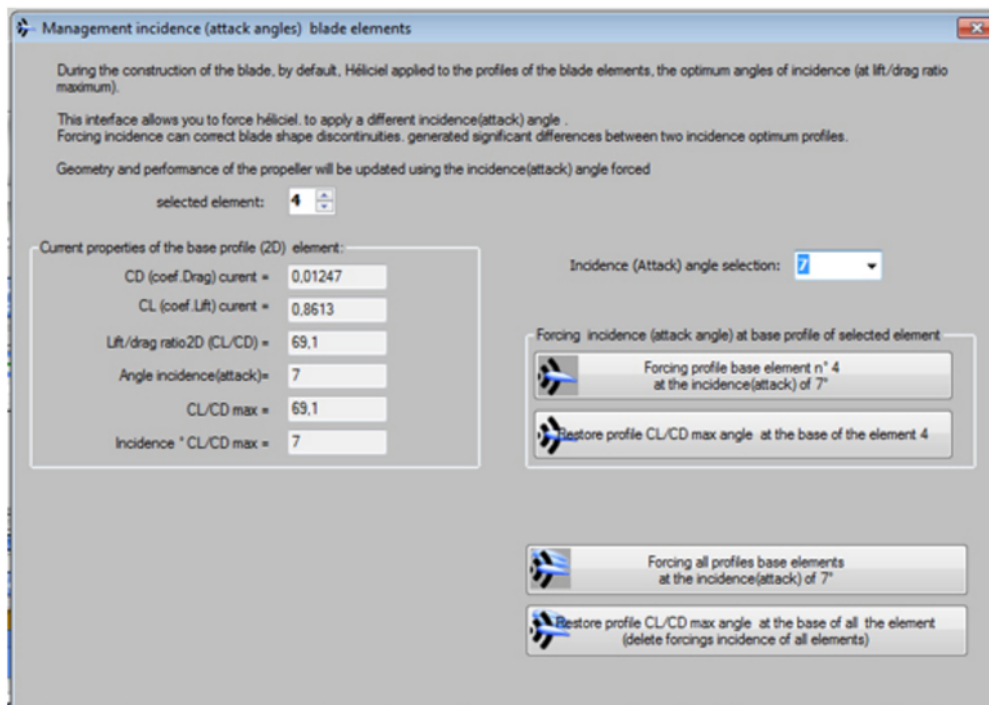
Do not confuse the incidence (attack) angle and pitch. The incidence angle is the angle formed by the chord of the profile, with the direction of fluid. The pitch is the angle formed by the chord with the plane of rotation

> Héliciel calculates speeds induced following the performance to the selected incidence and adjusts the pitch of the profile relative to the direction of fluid velocities induced corrected.

Here for example, this three-bladed propeller turbine, has the profile of basis for its element 3 who was forced to an incidence of 48 degrees from the direction of the fluid..
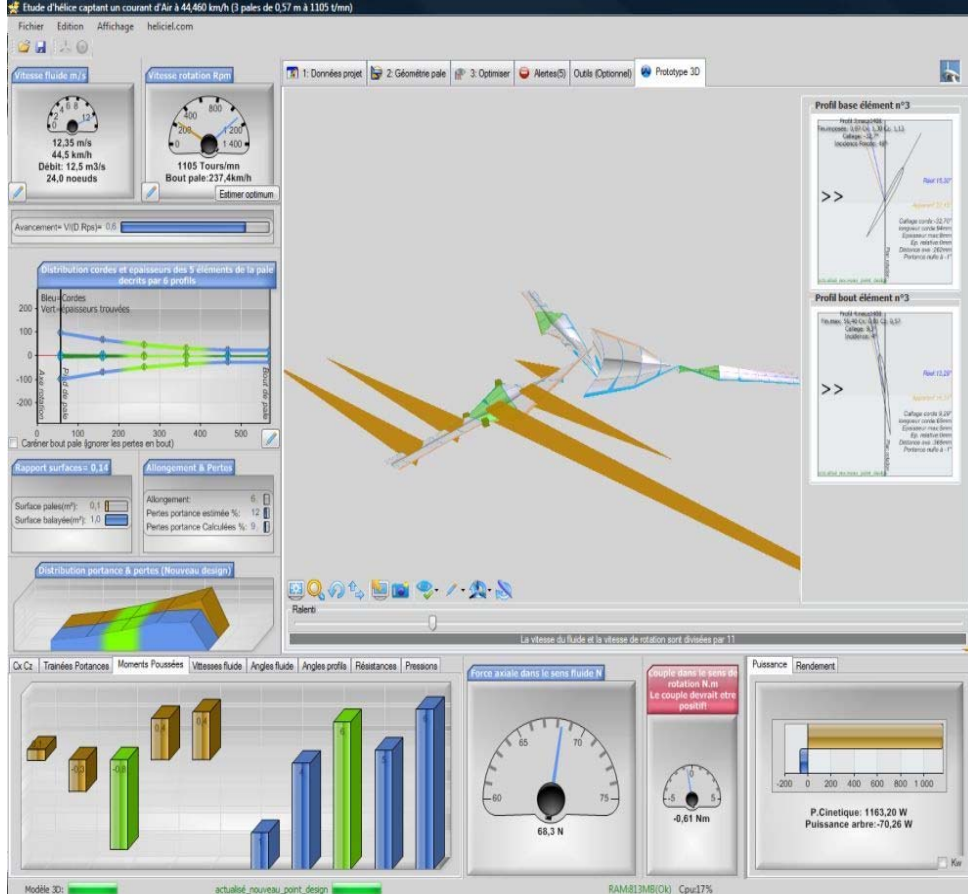
It can be seen that the torque is reversed and the torque of the propeller became negative..If the propeller rotates at 1100 revolutions per minute (as the test is done), it would suffer in this configuration, a braking torque of 0.6 newtons... This scenario is very improbable but we can see the effects of incidence forcage on performance, and its use for braking components simulating.