

17-Nov-20

Tidal blades and rotor

Design and improvement



Agenda

1. quick presentation of Sabella
2. Current blade and rotor
 - Design
 - REX
3. Next blade and rotor



Quick presentation of Sabella

2008 | D03-30 kW

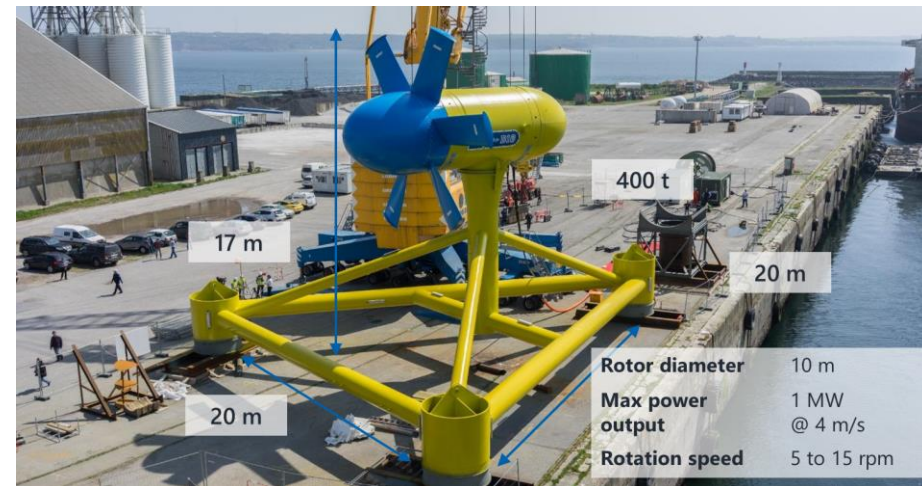
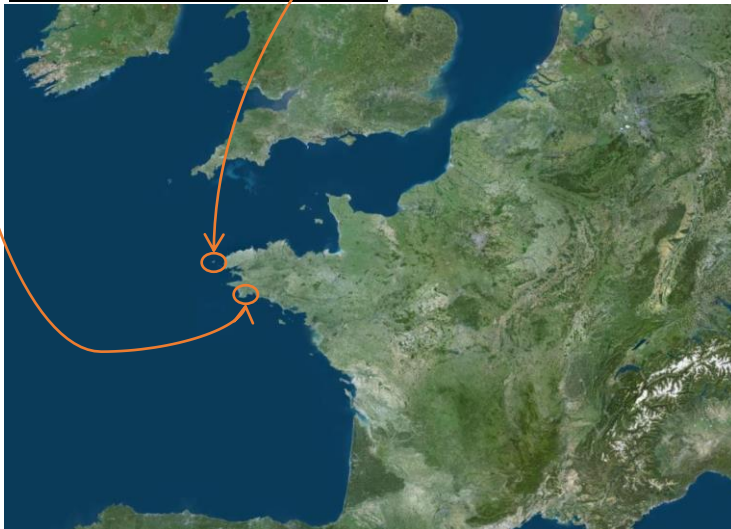
1st tidal turbine installed in France during 12 months

2015 | D10-1000 kW

1st tidal turbine to supply electricity to the French grid



Created in 2008
25 employees
EPCI



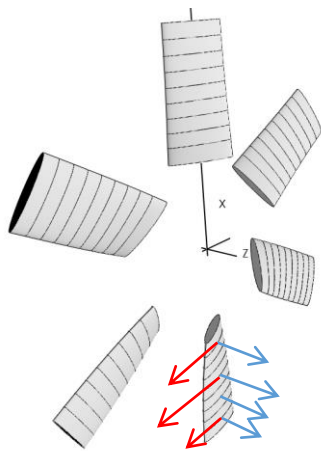
Current Blade & rotor design & manufacturing

Current blade and rotor

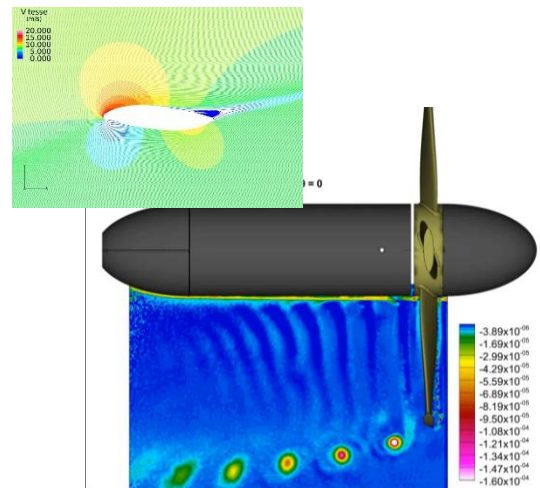
Design

- **6 blade rotor**
 - small diameter (10 m) for high power (1 MW)
 - high torque at low speed
 - self starting at low flow velocity
- **Symmetric blades**
 - Reduced performance (slightly)
 - But no need for yaw nor pitch

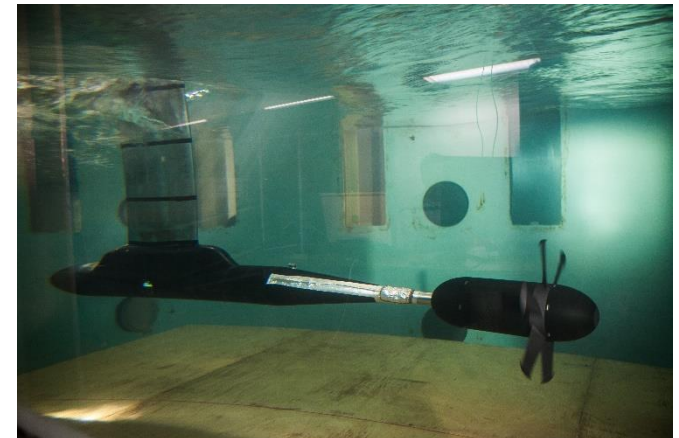
BEM



CFD



tank test



Current blade and rotor

Manufacturing

- carbon fiber composite
- 3 main parts : spar, blade shape, winglet
- Fixed to the hub with steel flange
- 2 process used : pre-preg for spar, infusion for blade shape

implementation by race boat manufacturers



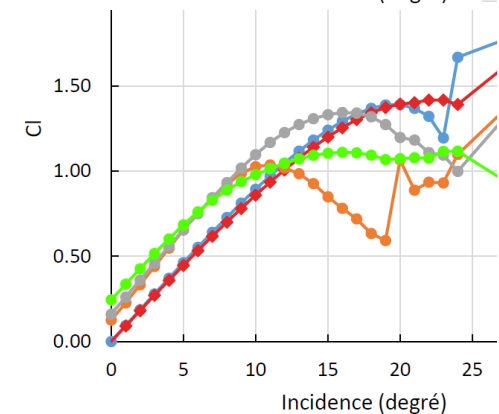
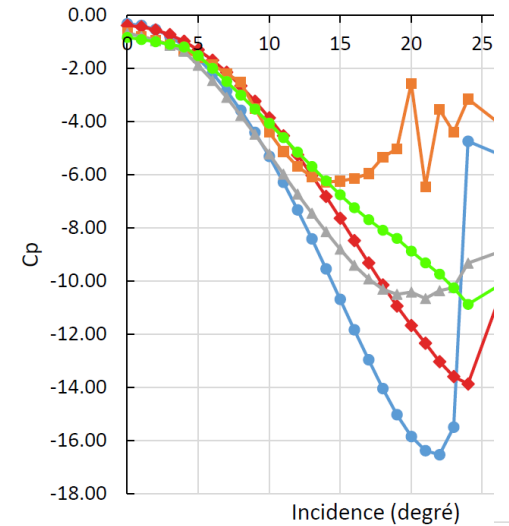
On going studies, next design

2D section performances

Site with shallow water → cavitation risk

foil shape with low Pressure coefficient (C_p min), keeping high Lift/drag ratio

→ not an easy task with symmetric foil.



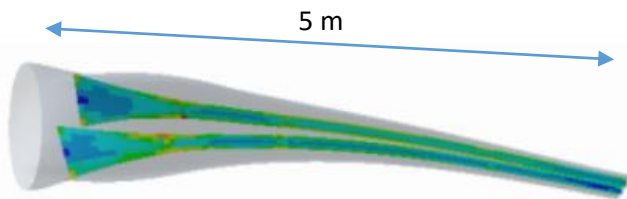
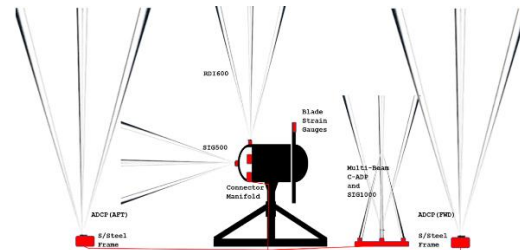
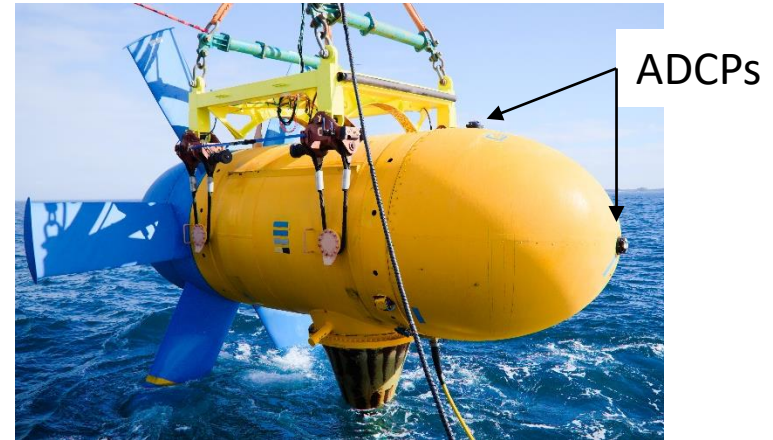
European project: RealTide

Goal:

Advanced monitoring, simulation and control of tidal devices in unsteady, highly turbulent realistic tide environments

→ To better design the rotor, lower its cost, reduce environmental impact

- Novel material (fibres and resins)
- Evaluation of real turbulent loads
- Design/manufacture/test a blade



European project TIGER

Goal of the project

New technologies development and implementation on real site, increase performances and lower its cost

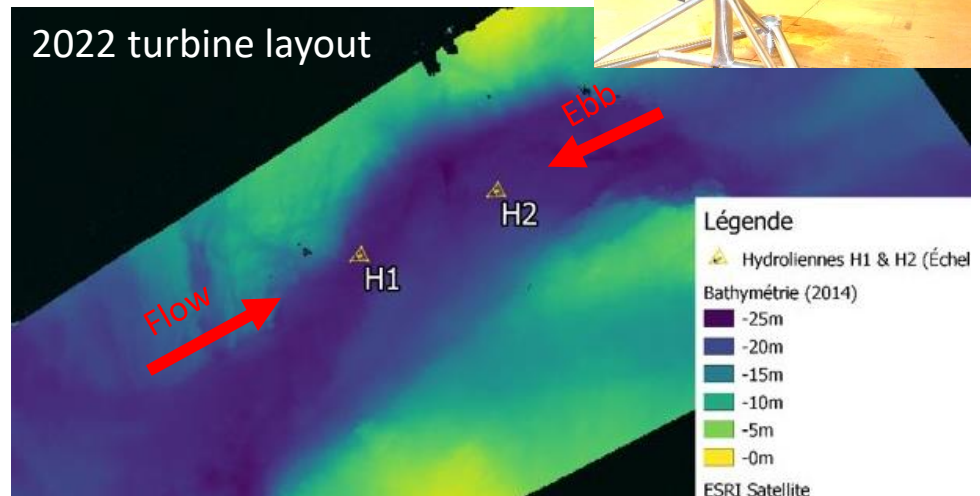
Goal for SABELLA's rotor

Use of a pitch system

- To reduce loads
- To increase Energy production
- To evaluate failure rate

Evaluate **real** wake impact on rotor performance

Evaluated on numerical simulation and tank tests



*Merci
de votre attention*



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sabella
 *ride the tide*