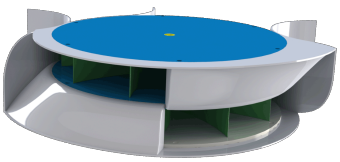
WindTrap

Convergent wind turbine

The Persan Mill (1400 ans)
With today's technology



Sommary

1. Introduction

I developed the WindTrap (patent) an innovative 1400 years old wind turbine with the technologies of today:

The Persan Mill

R & D, already carried out, was carried out with two teams of researchers from two Nantes research centers. The CETIM for numerical simulation with ANSYS software. CSTB for wind tunnel testing.

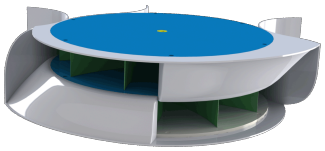
At the end of this R & D, the test reports of these independent research organizations correspond to our expectations and show the truly innovative nature of this concept.

The objective is to design, manufacture and market a new-generation wind turbine model that finds its first interest in an original blend of well-known and mastered technologies. A patent was filed on October 1, 2010.

2. Competition

The majority of the vertical-axis wind turbines (axe vertical) below no longer exist. I think they were not performing well.
The wind prefers to bypass the obstacles and there is not enough wind that penetrates into these wind turbines.
The main challenge for the WindTrap is to promote wind entry. What I do by a depression inside the product. So you have to be very careful. The price / performance ratio must be excellent. What I believe. But it must be confirmed with the prototype n ° 2.

3. Objectives of the project



1. Use of the wind turbine in a wider wind range than the 3-blade wind turbines
2. Decrease the visual impact
3. Decrease noise pollution

4. Use wind corridors (natural or artificial) to concentrate the energy to be extracted. The topology of the installation site must generate a venturi effect to concentrate the wind and therefore its energy. The WindTrap adapts dimensionally to these built structures (bridge, water tower, street furniture, building, etc.), or / and natural corridor (well-oriented valley, pass, ...). It is preferable to extract energy from the wind when concentrated
5. The wind prefers to bypass the obstacles, the main challenge is to favor the entry of wind into the obstacle which is the WindTrap thanks to the internal depression what the vertical axis windmills do not make
6. Adapt to turbulent wind zones and especially in urban areas

4. Descriptif

WindTrap is a wind turbine (or hydro) type VAWT (*) and BAWT (**), keeled. It is composed of several innovations including a patented one.
(*) Vertical axis wind turbine
(**) Building Augumented Wind Turbines

The WindTrap is mainly composed of:
- a movable deflector (for example made of sheet metal)
- two contrarotating rotors

4.1. Déflecteur

A rotating deflector allows:
- To accelerate the speed of the incoming flow by an adapted form in input
- Promote the passage of wind in the WindTrap
- Generate a vacuum zone inside the WindTrap, allowing wind "aspiration".
- To protect the rising blades from the wind by the screen / cover part of the deflector. They are therefore not slowed down
  The deflector housing makes the moving parts less visible (visual pollution)

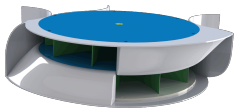
- This crankcase avoids the projection of dangerous debris during the accidental bursting as happens on the three-bladed wind turbines.

- Bats can not be caught by rotating blades (no side impact), they identify the crankcase as an obstacle
- Birds are also protected (grid possible on WindTrap)

4.1.1. Deflector empennage

- The fins of the deflector allow the windmill to be self-oriented so that it remains always facing the wind.
- Their shapes participate in the rear depression
- These empennages can be the advertising medium.

4.1.2. Screen

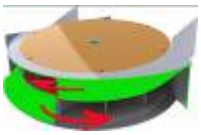


On the majority of vertical-axis wind turbines, even optimized blades are braked when they "re-ascend" the wind. This degrades the performance of wind turbines. The Windtrap blades do not "wind up" because they are protected by the deflector screens..

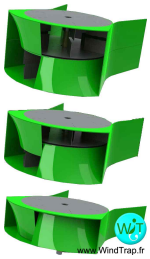
4.1.3. Speed control

The deflector allows self-regulation of the speed of the rotors. This self-regulation allows the use of WindTrap on a much wider wind range than for three-bladed wind turbines. Several speed control methods are possible

1. The first uses the wind speed to mechanically self-regulate (less source of failure) the speed of rotation of the turbines. Two tared hatches (see red rectangle on the image) will open more or less according to the speed of the wind and will allow the wind to penetrate the deflector to slow the blades rising upwind.



2. The second method requires that the two screens (in green) be independent and rotate to progressively obstruct the air inlets and open the air inlet to the rising blades



3. The third method is the progressive closure of the wind turbine, this method being the least economical of the three is adapted to the regions where the wind is extreme.

4. Finally, the conventional methods of regulation are obviously possible (brake, ...)

4.1.4. Using the WindTrap over a wider wind range

The WindTrap belongs to the family of slow wind turbines. The ends of the blades move at a speed lower than the wind speed, thus reducing the noise emission (no more whistling). The energy is ensured by a strong torque. This high speed is not useful.

The mat is not compulsory. This absence allows the economy of the mat (saving about 26% of a wind turbine 3 pales). The blades of the WindTrap are of very simple shape, which is not the case of the blades of the 3 blade wind turbines

The shape of the blades of the horizontal axis wind turbines is very sophisticated. They must turn in a perpendicular plane (!!!!) in the direction of the wind. They must thus transform a linear energy into energy in rotation, (loss of efficiency)
The blades must convert, at best, two types of forces (drag and lift). They must withstand high speeds (the blade ends can wait for 400 Kms / h), gyroscopic forces, vibrations (shadow of the mat, ...), gusts of wind, extreme wind.
The high wind speeds, even if they are infrequent, require equipping these large wind turbines with brake safety systems dimensioned accordingly and design robust mats therefore expensive.

Their study requires various skills and resources (therefore expensive) to arrive at a form of blade that is only a compromise.

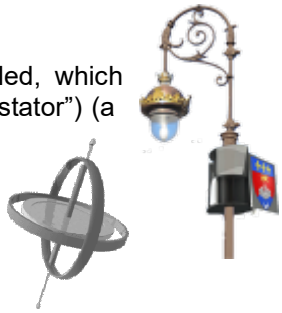
For the WindTrap:

- Speed control (see above) is suitable for high wind conditions and is ideally suited for turbulent winds (speed and direction).
- Enhanced energy efficiency through the display and internal vacuum. The wind preferring to circumvent obstacles, we raise this difficulty by creating this internal depression.
- Low visual impact and dimensional adaptability (see illustration).

The installation in natural or artificial wind corridors (building, ...) will give the full measure of the product and will allow to increase the yield by the Venturi effect generated by the topography of the place of installation.

The WindTrap is in the "water mill", which the "3 blade wind turbines are to the" rainmills "because it is more interesting to extract energy when concentrated..

4.2. Contrarotativity of Rotors



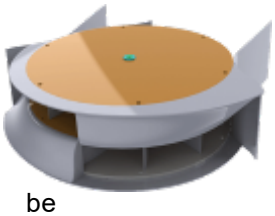
- With 2 revolving rotors, the relative speed of the generator is doubled, which increases the efficiency of the generator. ("Rotor/rotor" and non "rotor/stator") (a rotating collector will be required in prototype No. 3).
- Contro-rotatability suppresses parasitic vibrations and suppresses gyroscopic twisting. The installation is finally possible on mats of lampposts and at any place of this last because the generator can be hollow (prototype N ° 3).
- The design of a specific alternator is the next step of the project (prototype N ° 3). The WindTrap should ultimately come down to an "intelligent" alternator with integrated blades and a moving baffle.

4.3. Mast

The mast is not compulsory for its operation, there is no more parasitic oscillation of the type "shadow of the mat" for the blade passing before the mast and for the mat itself (less mechanical fatigue). The dimensions of the WindTrap can adapt perfectly (in width and height) to the wind corridor to recover the venturi effect of the wind corridor.

5. Intérest

5.1. Sound levels



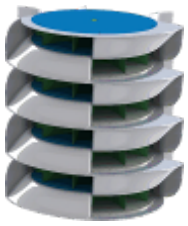
The ends of the 3 blade wind turbines rotate much faster than the wind speed. This phenomenon generates an audible "whistle". The turbines of the WindTrap are inside the deflector housing ensuring sound insulation. The housing of the deflector can be soundproofed more intensely with a suitable sound insulation.

The principle of the counter-rotating blades is used on the propellers of nuclear submarines to better transmit the mechanical torque and favor the discretion of the submersibles (less audible vibrations or not)

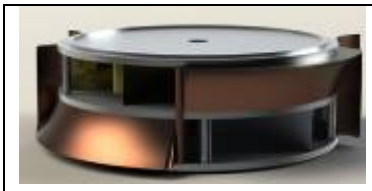
5.2. Venturi effect

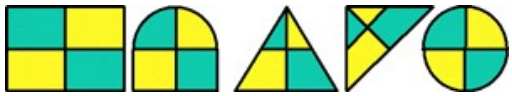
The wind deflector makes it possible, by its shape, to increase the wind speed in the WindTrap
To this end, the venturi effect of the installation site is added.

5.3. Modularity and adaptability



The WindTrap are stackable one on top of the other allowing the power to be adapted to the needs of the user in a simple way.
In addition, in order to best match the topography of the installation site, the air intakes and screens of the WindTrap are adaptable shapes.





5.4. Other advantages

• The body of the wind turbine does not turn, there is no risk of winding of cable (economy of the anti-winding system)
• In addition no pods, heavily equipped, in motion

6. Power and cost

The dimensions of the WindTrap depend on the desired electrical power.

He concludes that WindTrap, even at this stage of development, is 60% more efficient than wind turbines of the same type.

Performance Comparisons

7. Stages of the project

7.1. Phase 1 : Concept validation **(Completed)**

- Study and numerical simulation carried out by the CETIM (www.cetim.fr/en)
- Test of the prototype N ° 1 in the CSTB wind tunnel (www.cstb.fr) (see youtube)

Test report confirms expectations

7.2. Phase 2 : Manufacture prototype n ° 2 **(Waiting)**

Pre-production version for presentation and demonstration

- Manufacture and wind tunnel testing (from CSTB to CETIM)
- Choice of the "best" alternator

7.3. Sales and Installation

- Pilot installation
  - partner customer
  - or reseller partner
- Validation period
- Improvement
- Marketing / Production and Industrialization

7.4. Phase 3 : R&D pour prototype n°3 (innovation for new patent filing)

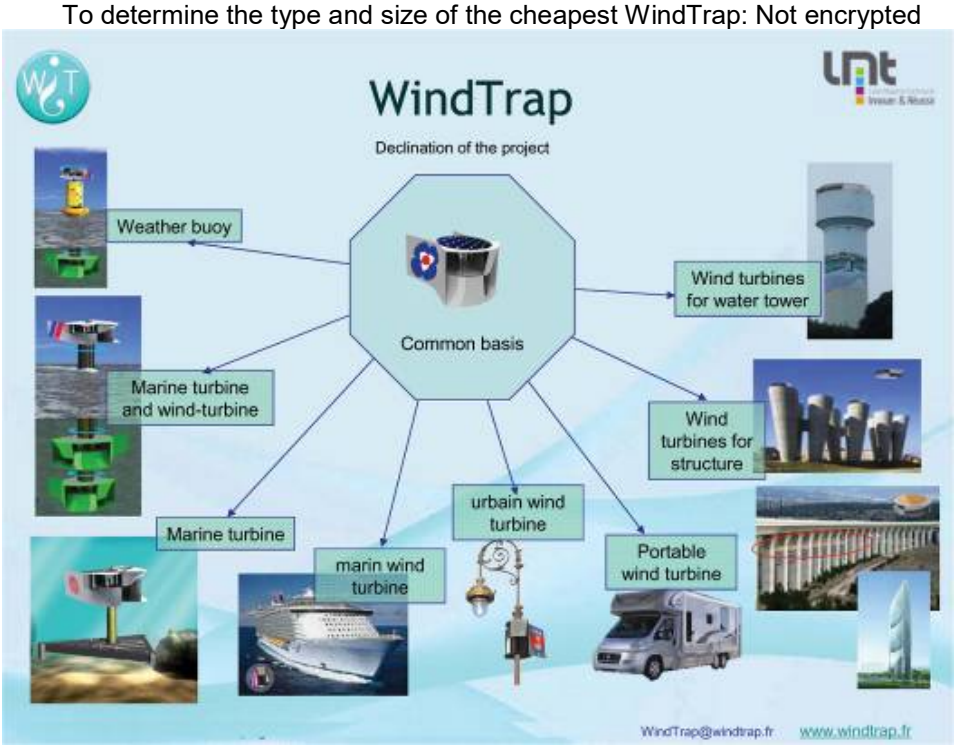
The Final version

Study of improvement for:

- Rotor blades
- In-house R & D
- Braking system
- Rotating manifold
- Specific bearing
- Programmable intelligent alternator

8. Marketing studies

To determine the type and size of the cheapest WindTrap: Not encrypted



9. Proposal

In phase 1, I invested more than 50 000 € and I am looking for a partnership to finance the rest of the project.
Phase 2 (same as phase 1)
Vidéos sur Youtube

https://www.youtube.com/watch?v=y51Nz_08LvA&feature=youtu.be

ou https://www.youtube.com/watch?v=ldGafXZdvlo&feature=youtu.be

Thank you for your attention
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