dtbird®

A self-working system to reduce Bird mortality in wind farms

WHAT IS DTBIRD®

DTBird® is a self-working system developed to detect flying birds, that is able to perform real-time actions linked to bird detection.

Bird detection is based in artificial vision, a technology used in military applications.

DTBird® is a trademark of Liquen, a leading Spanish environmental consulting firm specialized in renewable energies.

Typical sites for DTBird® installation in wind farms (on and offshore) are meteorological towers and individual wind turbines.

Major applications of DTBird® are:

- Bird monitoring in sites proposed for Wind energy development and in operating Wind farms.
- Bird mortality reduction through real-time actions: Warning/Dissuasion signals to birds in collision risk, and Wind turbine automatic Stop.
- Bird Collision control.
- Scientific studies of Wind energy impacts on birds.

DTBird® C/ Mauricio Legendre, 16. 28046 Madrid (Spain).
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DTBird® has a modular design, and every module has a specific function, that is controlled by a central Analysis unit.

For every application, DTBird® offers a specific array of modules: Detection, Dissuasion, Stop Control and Collision Control.

DTBird® Detection

Bird detection is the primary action of DTBird® system. Detection is is performed by means of artificial vision techniques, used in military applications. Module can be installed in Wind turbine, Meteorological towers, or Masts.

Major features of DTBird® Detection module are:

- Continuous monitoring.
- Bird detection from a few meters to 1,5 km.
- Detection of any kind of bird: from passerines to large raptors.
- Identification of species from video recordings.
- Low power consumption, from 30 W/h.
- Easy installation and maintenance.

DTBird® Dissuasion

DTBird® Dissuasion module performs two tasks:

- Warning to birds flying in moderate collision risk area.
- Dissuasion of birds flying in high collision risk area.

Major features of DTBird® Dissuasion module are:

- Activation linked to real time bird detection.
- Warning and dissuasion signals adjusted to bird sensibility and legal requirements.
- Reduction of number and length of Wind turbine stops.
- Easy installation and maintenance.

DTBird® Stop Control

Stop Control module stops the wind turbine when birds are detected flying to collision risk area.

Wind turbine Stop is adjusted to target species and legal requirements, in order to minimize losses in energy production, with automatic restart when the collision risk disappears.

DTBird® Collision Control

Collision Control module records rotor swept area and potential collisions.

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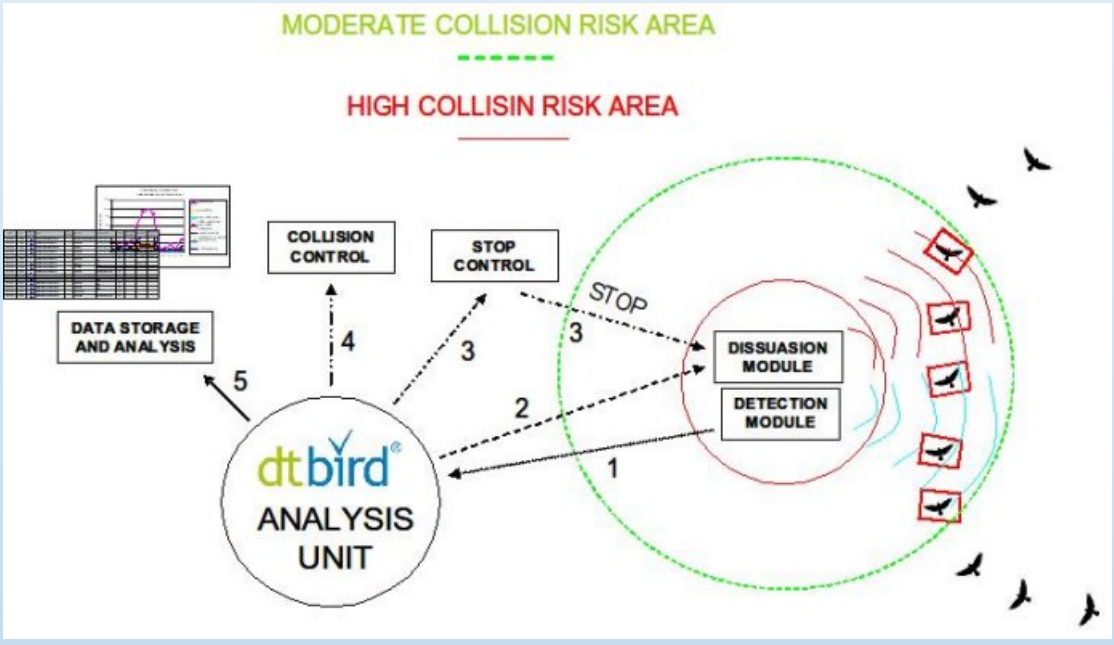
DTBIRD® OPERATION

1. DTBird® Detection continuously monitors surveillance area and detects flying birds in real time.
2. DTBird® Dissuasion emits Warning/ Dissuasion signals to birds flying in moderate/high collision risk areas.
3. DTBird® Stop Control sends a stop signal to the wind turbine according to collision risk.
4. DTBird® Collision Control records rotor swept area and potential collisions.
5. Data produced by all modules and environmental variables are recorded, and service reports, are available through on line DTBird® Data Analysis Platform.



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DTBIRD® DATA ANALYSIS PLATFORM

DTBird® daily updates data to a Data Analysis Platform, available on-line to the Clients:

- Access to detected bird flights, environmental variables and DTBird® actions.
- Automatic Service reports summarizing service profile, bird flights, DTBird® actions, and accidental collisions detected.

The access to the Platform is done through www.dtbird.com, with 2 access right levels.

- Administrator. Total access, data editing, export data and videos and allows to request automatic reports.
- Reader. Export data and videos and allows to request automatic reports.

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DTBIRD® PRESENCE WORLDWIDE

DTBird® is currently installed in:

- **Greece**. RenInvest. WTG Vestas V52-850kW. *October, 2012.*
- **Italy**. Energie Rinnovabili Toscana. WTG Leitwind LTW80-1500. *March, 2011*.

  Extended installation covering complete wind farm. WTG Leitwind LTW80-1500. *May, 2012*.
- **Norway**. Statkraft. WTG Siemens SWT-2.3. *November, 2011.*
- **Spain**: Molinos del Ebro (Sammca Group). WTG Made AE 56 (Gamesa). *March, 2009.*

  Off Shore Experimental Station. Cluster of Energy, Environment and Climate Change. *October, 2011*

  2º installation Off Shore Experimental Station. *April, 2012.*

DTBird® has been proposed in onshore and offshore wind farm project worldwide.

DTBird® presence in published Guidelines of Environmental Impact Assessment:

- Good Practice Guidance and associated Toolkit. GP Wind project. *June 2012*.
- A review of methods to monitor collisions or micro-avoidance of birds with offshore wind turbines. Bureau Waardenburg bv, commissioned by: The Crown Estate, SOSS, through the British Trust for Ornithology. *February 2012-September 2011.*
- Guidelines of Environmental Impact Assessment of wind farms on birds and bats. SEO/Birdlife. *January 2012.*
- Methodological Guide for environmental analysis of projects in Natura 2000 Sites. Junta de Castilla y Leon (Spanish Regional Government). *December 2011.*

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WHY DTBIRD®

Recommended by BirdLife Protection Organization

- DTBird® is recommended by the Spanish BirdLife International partner (Sociedad Española de ornitología).

Required by Enviromental Agencies

- More than 10 positive environmental decisions of wind farms in Spain and Italy, from September 2011.

Reviewed and Recognized

- DTBird® Offshore, one of the two "most complete systems by not only detecting actual collisions but also providing visual data for potential collision events". A review of methods to monitor collisions or micro-avoidance of birds with offshore wind turbines. (Bureau Waardenburg – The Netherlands).

Performance and settings

- Daylight continuous monitoring.
- Detectability 86-96 % of all birds flying in a radius of 150 m to the Wind turbine (Scientific data).
- Automatic Warning and dissuasion of birds in collision risk with Wind turbines.
- Automatic Wind turbine Stop.
- Collision detection capability >95%
- 2D & 3D track of bird flights.
- Daily updated data in DTBird Data Analysis Platform, available on-line to Clients, and automatic generation of Service Reports.

Highlights

- Already tested, with more than 4 years in operation in wind farms.
- Complete solution for bird monitoring and bird mortality reduction in wind farms.
- Continuos operation from sunrise to sunset (over 200 Lux), even in extreme environmental conditions.
- Very high Detectability of all birds, producing Video and data recording of every flight.
- Identification of species from video recordings.
- Monitoring of the whole rotor swept area (360º), and collision risk area.
- Real-time warning and dissuasion of birds flying in collision risk areas.
- Wind turbine stop linked to real time detection of birds flying into moderate and high collision risk areas, with adjustment to target species and legal requirements.
- Record of environmental variables.
- Easy installation and maintenance.
- Daily updated on line access to recorded flights, and advanced data analysis tools.

Clients repeat

- 2º contract in Offshore Experimental Station (Campus of International Excellence) in Spain
- Installation extended for Energie Rinnovabili Toscana in Italy covering the complete wind farm
- Planned extension of service in Norwegian installation for Statkraft.

Warranties

- 2 years worldwide.

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