



A SELF-WORKING SYSTEM TO REDUCE BIRD MORTALITY IN WIND FARMS



DEVELOPMENT FACTS

DTBird® is a technological product and a trademark of LIQUEN, an Spain's leading environmental consulting firm specialized in renewable energies.

DTBird® is the product of a collaborative effort of biologists, engineers, and conservationists.

RESEARCH & DEVELOPMENT

2005	System design and research planning.
2006-2008	Development of Detection Module in collaboration with Spanish Regional Administrations (Comunidad de Madrid and Junta de Castilla y León) and Environmental Conservationist Organizations (Fondo de Amigos del Buitre and Grupo de Rehabilitación de Fauna Autóctona y su Hábitat).
December, 2008	Spanish Ministry of Science and Innovation grant the project.
March, 2009	Detection Module installation in a wind farm.
November, 2009	Web interface and Database release.
December, 2009	Dissuasion Module release.
January, 2010	Dissuasion Module installation in a wind farm.
October, 2010	Collision Control Module release.
November, 2010	Collision Control Module installation in a wind farm.
February, 2011	Stop Control Module release.

INSTALLATIONS

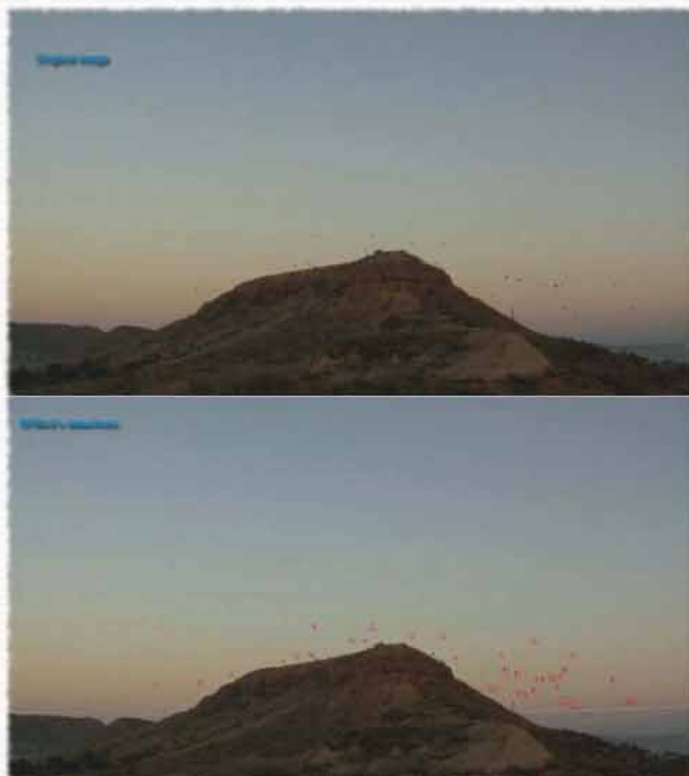
March, 2009	Molinos del Ebro. SAMMCA Group. Zaragoza (Spain). DTBird® Installation in wind turbine model Made AE5X-800 kW.
January, 2010	DTBird® installation in Natural Park "Parque Regional del Sureste". Madrid (Spain).
January, 2010	Acciona Energía. Navarra (Spain). DTBird® Installation in wind turbine model AW1500.
March, 2011	Leitwind. Toscana (Italy). DTBird® Installation in wind turbine model LTW80-1500.

BUSINESS PRESENTATION

- Madrid (Spain), March 3 ,2010. Business presentation and function demonstration to Wind Energy project developers, Government Environmental Agencies and Conservationist Associations.
- Warsaw (Poland), April 20 - 23, 2010, European Wind Energy Conference & Exhibition, Poster presentation: "A self-working system to reduce bird mortality in wind farms".
- Dallas (Texas, USA), May 23 - 26, 2010, American Wind Power Conference & Exhibition. Stand in the Spanish Pavilion.
- Brussels (Belgium), February 14 - 17, 2011, Europe's Premier Wind Energy Event. Stand.
- Trondheim (Norway), May 2 - 5, 2011, International Conference on Wind Energy and Wildlife Impacts. Stand.

NOWADAYS

- Negotiation with clients and Environmental Agencies.
- International business development.



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May 2-5 2011, Trondheim, Norway

WHAT IS DTBIRD® ?

DTBird® is a self-working system developed to reduce bird mortality in wind farms.

Major applications of DTBird® in wind farms are:

- Bird monitoring, previous to wind farm installation and throughout the operation.
- Bird mortality reduction in operating wind farms.
- Bird mortality control in operating wind farms.

DTBird® has a modular design. Every module has a specific function and is controlled by a central Analysis unit.

There are 4 modules available: Detection, Discussion, Stop Control and Collision Control.

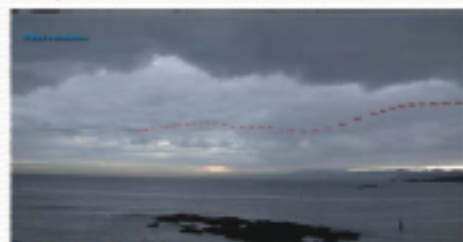
DTBIRD® — MODULES

DTBIRD® — Detection

Bird detection is the primary action of DTBird® system. Detection is based in real time analysis of high resolution images.

Major features of DTBird® Detection module are:

- Automatic detection in real time.
- Continuous monitoring.
- Bird detection from a few meters to 1 km.
- Easy installation and maintenance.



DTBIRD® — Discussion

DTBird® Discussion module performs two tasks:

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

Major features of DTBird® Discussion module are:

- Activation linked to real time bird detection.
- Adjustment to bird sensibility and environmental conditions.
- Easy installation and maintenance.

DTBIRD® — Stop Control

Developed to reduce mortality of medium and big size birds, including most raptors species and vultures. DTBird® Stop Control module continuously surveys monitoring area, and stops the wind turbine when birds are flying to collision risk area. Installation only requires an update of software and connection to wind turbine.

DTBIRD® — Collision Control

Collision Control module has been developed to control mortality of medium and big size birds, including most raptors species and vultures.

DTBird® Collision Control module performs the following tasks:

- Real time detection of potential collisions.
- Collision sequence recording.

Easy installation and maintenance is a major benefit.

DTBIRD® — OPERATION

1. DTBird® Detection continuously monitors surveillance area and detects flying birds in real time;
2. DTBird® Discussion emits warning/discussion signals to birds flying in moderate/high collision risk areas.
3. DTBird® Stop Control sends a stop signal to the wind turbine according to predefined risk collision conditions of flocks or medium to big size birds.
4. DTBird® Collision Control detects and records potential collisions.
5. Data produced by all modules and environmental variables are recorded, and service reports, available on line, analyze recorded data.

MODERATE COLLISION RISK AREA

HIGH COLLISION RISK AREA



DTBIRD® — BENEFITS

- The state of the art bird monitoring technique and mitigation measures to accomplish environmental requirements.
- Applicable from one single wind turbine to a complete wind farm.
- Bird mortality reduction by means of warning and discussion signals to birds in collision risk areas, or wind turbine stop.
- Objective monitoring and analysis of bird activity and mortality.
- Bird species identification from records.
- Unintended operation (7 days a week).
- Easy installation and maintenance: wind turbines, meteorological towers (in and offshore), power lines and buildings.
- Low power consumption.