



**TONI** 

Birdstrike Prevention





**The problem of bird strikes is as old as the aviation industry. Bird strikes on turbofans not only result in significant costs, but can also lead to a plane crash and injury to persons.**

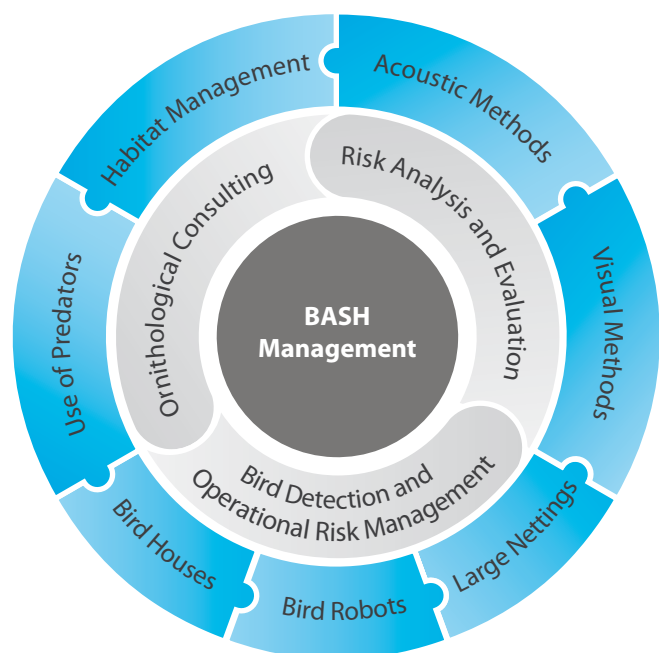


There are many solutions to the problem of avoiding bird strikes. But 100% safety is not possible. The use of technology in this situation can significantly minimise the risk involved. Therefore, it is necessary to carry out a risk analysis of an affected area and manage it professionally.

The latest radar technology allows the exact localisation of birds and to monitor their behaviour. This allows air traffic to be controlled or bird control measures to be initiated. It was possible to reduce bird strikes on many airports, also military airfields, by up to 95% with this system.

TONI Bird Control Systems – a team of bird control specialists, ornithologists and radar technicians will provide you with comprehensive and integrated bird strike solutions.

In the Birdstrike Academy seminars are held for airport bird control personnel.





# Bird Strike Prevention

## Bird Strike Risk Analysis and Ornithological Consulting

### Bird Strike Risk Analysis

Birds populate a certain area for two reasons: the search for food and breeding. Also, the air over runways warms up very quickly and attracts birds.

In order to assess the risk from birds it is necessary to analyse ornithologically the area around the airport.

- Why are which birds preferring this area?
- Which bird migration routes are affected?

Only when the ornithological background is understood can the most suitable control method be selected and implemented.

At TONI you receive ornithological advice from experts.

### Selection of Suitable Bird Control Measures


The result of the ornithological consultation is an evaluation of the population of the affected area. Specific bird control measures can be derived and selected from this.

If there is a heavy population, suitable measures to minimise the risk of bird strikes are e.g. predators, bird robots and lasers.

### Sequences of an Ornithological Consultation

1. Study of the local bird population
2. Survey of the airport's location and important bird migration routes
3. Determination of the fundamental risk potential
4. Field study using the bird radar to statistically record the actual population
5. Determination of the specific risk potential





**Modern Radar Technology  
Allows Professional Bird Strike Risk Management**

# Bird Detection and ORM

## Modern Radar Technology Allows Professional Bird Strike Risk Management (ORM)

There are numerous solutions to the problem of keeping birds away from airports. Optimal results are only possible if the right choice is made after taking into consideration the various methods of operation and the environmental conditions. But at the same time 100% protection is not possible. Therefore, it is necessary to professionally manage the bird strike risk in an affected area. This can be implemented with Bird Detection and ORM (Operational Risk Management).

### Bird Detection

The latest radar technology allows you to exactly localise birds in every weather. S-band (100mm) radars with a range of 6-8 nm are used. Even the smallest flying object of ca. 2 mm can be plotted. The latest software analyses the data of all flying objects and classifies them on the basis of their typical flight behaviour. Thus, you can safely differentiate birds from insects and aircraft.

A single small bird is certainly not a problem for an aircraft. But if thousands of small birds flock, then they are just as dangerous as single large birds. The reflectivity of the radar enables the number and size of the birds to be classified; this together with the flight behaviour allows the risk potential to be calculated.

### Operational Risk Management (ORM)

**ORM stands for effective risk management with state-of-the-art technology.**

#### ■ Procedure:

After analysing all flying objects the software automatically classifies their risk to air traffic. Warnings are relayed to your tower, which can warn and control air traffic as required.

#### ■ Your Additional Benefit:

Due to being able to exactly locate birds, it is possible to initiate direct bird control measures and to measure their short- and long-term effectiveness.



# MERLIN Bird Radar

## The First Fully Automatic Radar Solution

### Modern Radar Technology

The MERLIN radar system is the first professionally used system for the automatic detection and monitoring of bird movements. The S-band radar technology makes the radar operable in all weather conditions and 24/7 operable.

Specially developed software analyses the radar raw data using typical flight patterns and automatically classifies the risk to runways. Fully automatic feedback via monitors to the airport tower and bird control personnel is possible.

Operational Risk Management routines for bird strike risk can be implemented.

### Supervision of Bird Control Measures

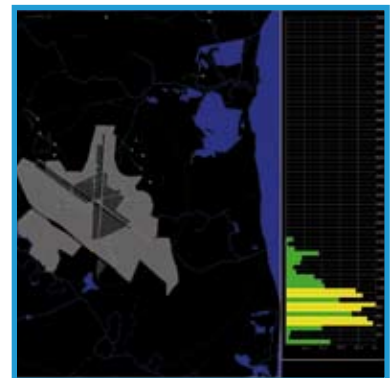
It is also possible with Merlin's technology to measure the success of the system and the bird control measures.

Up to now, the personnel were dependent on visual checks and ornithological knowledge.

With MERLIN bird control measures can be supervised and controlled - a quantum leap in airport bird control.

### MERLIN Technical Data

- Frequency: 2920 - 3080 MHz, 10 cm wave length (S-band)
- Range: 6-8 nm, 360°
- Software recognises all flying objects in real time (1-2 s updates)
- Calibration to small/medium/large birds and bird mass
- Automatic identification and classification
- Alarm function
- Non-sensitive to weather, 24/7 operable
- Ca. 45 bird radar systems are already in operation worldwide. The bird strike risk has been significantly reduced, in many cases by more than 90 %.



**MERLIN Radar for automated  
Bird Detection and Operational Risk Management**





# Bird Control Solutions

## Habitat Management

The attractiveness of locations determine the strength of a bird population.

This can be influenced by specific measures e.g. shorter vegetation, the netting of water reservoirs, passive bird control measures on buildings and falconry.



## Use of Predators

Often birds can only breed because hostile predators are missing.

The use of saker-, peregrine and other falcons with various teams distributed over the day can create hostilities in the affected territory.



## Bird Robots

Predators can only be controlled to a certain degree and can themselves be a risk to aircraft. Therefore, flying models in the form of predators are used. These are controlled by experienced pilots.

The models are capable on long ranges and flying high.







### The methods of bird control differentiate in

- their short, medium- or long-term effectiveness
- the personnel costs
- the temporal operability (days/nights)
- the sensitivity to weather

### Acoustic Methods - Predator Cry Systems

Birds react to acoustic stimuli. This is used by predator cry- and blank firing systems. These imitate predator- and the warning cries of the birds to be controlled.

The habituation effect is reduced by modulating the cries, changing frequencies and intensity.



### Acoustic Methods - Directional Acoustic Systems

With the Long Range Acoustic Device acoustic signals up to 150 dB can be directionally beamed up to 1,500 metres. It transmits bird cries and other noises that disturb birds.

LRAD is a product for the professional. Only trained operators are allowed to use it. The LRAD is usually combined with a laser (LDU).



### Visual Methods

Research has shown that birds perceive light at 532nm wave length particularly well. The TOM500 laser system is with its green light very effective. The laser is only directed downwards so that it is completely safe.





# Bird Control Solutions

## Netting

For historical reasons airports are often close to landfill sites. These are irresistible attractions to birds.

The only one solution is the large-area netting of the landfills, and also the neighbouring reservoirs, hangars and other buildings.



## Bird Houses

Bird Houses are used to attract birds so that they can be easily controlled and the population reduced by exchanging the eggs (in accordance with the Augsburg Model).

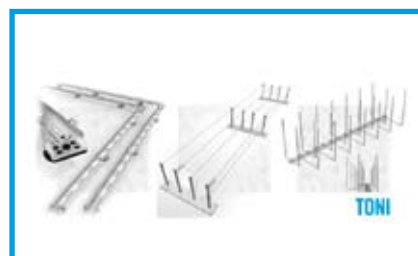
This method is animal-friendly and highly effective in the long-term.



## Bird Control Measures on Airport Buildings

Birds create living room in and on buildings, in which they breed and contaminate. The caustic excrement damages the structure and technical installations.

Therefore, it is important to install bird control measures in airport buildings. We provide a number of extremely effective systems e.g. electrical systems, spikes, wire systems etc.





# Birdstrike Academy

In the Birdstrike Academy we hold seminars for airport bird control personnel.

**Our seminars consist of various modules and can be booked individually.**

- Ornithological principles
- Birdstrike risk analysis
- Bird Detection and ORM
- Theory and practice of bird control methods
- MERLIN / ABAR bird radar system
- Technical basis
- MERLIN data banks
- MERLIN ATC Automatic Bird Strike Risk Alerting
- System security
- Data processing and reporting
- MERLIN mobile and stationary system

In our members area on [www.birdstrike.de](http://www.birdstrike.de) you can book current seminars and order seminar material.





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