VOLACOM®
PROTECTING BIRDS & BUSINESSES

Airport bird protection by Volacom

Proudly presenting BCAS Air – the most technologically advanced airport bird control solution on the global market, keeping runways bird-free in a nature-friendly way.

Complete protection
We create a protected bird-free zone over the runway for a safe take-off and landing.

Fully autonomous
Our patented system detects, records, and deters birds without the need for a human operator.

Proprietary deterrence
Our patented system induces an Acoustic Startle Reflex (ASR) in birds – a scientifically proven and bird-friendly way to protect your airport, with no harm to wildlife.

Presenting Volacom

Volacom is a European hi-tech engineering company, offering complex solutions for bird and wildlife control for a large pool of industries. Think of us as a cross-field innovator, taking care of both businesses' and nature's needs.

Our proprietary bird control system was born out of the shared expertise between Volacom and our sister companies ACOM and Milara – global leaders in the market of HF amplifiers, radio-communication equipment, precision mechanics, acoustics and electronics. Over the last 30 years our Group's products proudly served the aspirations of people & businesses in more than 110 countries through a dealership network in 80 locations worldwide.

The investment in our own world-class facilities of over 20.000 m² gives us better control over time, cost and quality of production – from the dedicated R&D unit, through our manufacturing sites, testing grounds and training center – we have it all under one roof.

With a dedicated team of computer, mechanical, and electronics engineers, AI experts, ecologists and industry professionals, Volacom has been successfully operating internationally since 2012. Our solutions protect birds & businesses across the globe through a growing network of commercial and technological partners.

Magnitude of the problem

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Wildlife hazard at airports. Aircraft collisions with avian and terrestrial species

Data from latest official report by US FAA and USDA 1990–2020 (1) and AVISURE Incident database 1905–2021 (2)

243,064
total for 1990–2020
number of wildlife strikes (1)

534 total
341 civil / 193 military human fatalities as a result of wildlife strikes (2)

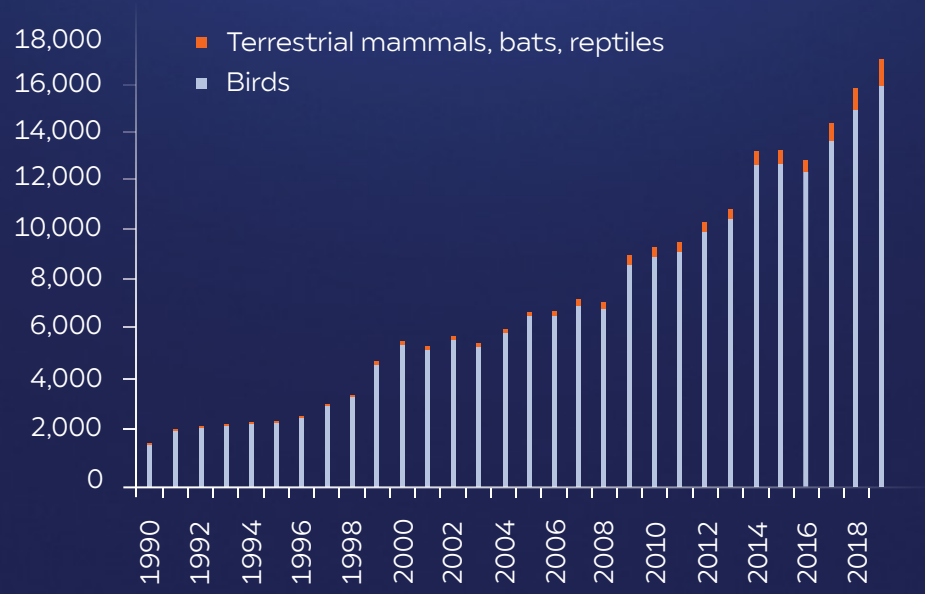
USD 6.1 billion total
USD 196 million per year
wildlife strikes–induced industry losses (1)

31,596 total
1,019 per year
nr of strikes resulting in aircraft material damage or negative financial effect–on–flight (NEOF) (1)

618 total
206 civil / 412 military destroyed / written–off aircraft (2)

62%
of bird strikes happen during day time (1)

Trend



Number of wildlife strikes per year: the increase in global air traffic results in alarming growth in the number of wildlife strikes, bringing about higher risk for human fatalities and skyrocketing financial losses

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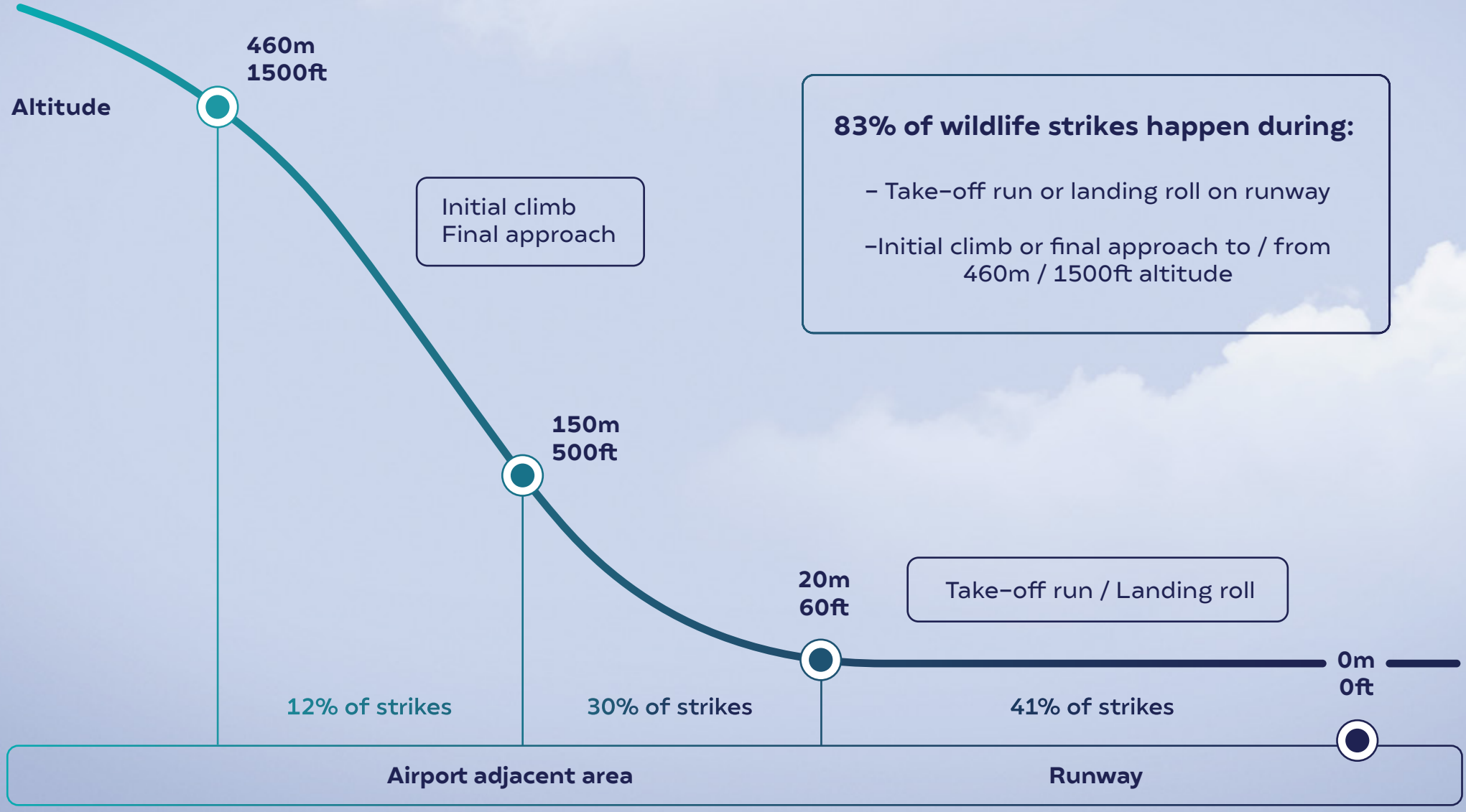
Wildlife strikes by phase of flight



83% of wildlife strikes happen during:

- Take-off run or landing roll on runway

-Initial climb or final approach to / from 460m / 1500ft altitude

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Damage caused by bird strikes

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Presenting BCAS Air

The Bird Collision Avoidance System by Volacom is a fully automated system for bird and wildlife control. It provides airport safety through detection, recognition, tracking and deterrence of avian and other species from protected zones, 24/7, in all weather conditions.

Detection

BCAS Air uses thermal imaging and a proprietary software to detect birds. The thermal imaging sensor allows 24/7 operation in all weather conditions, overcoming the shortfalls of day cameras. The software recognizes birds at long distances and commands the acoustic emittance.

Deterrence

Our proprietary acoustic module emits an acoustic signal which induces an involuntary physical startle reflex in species (ASR – acoustic startle reflex), making them change their course and leave the zone of discomfort created by the signal.

The ASR does not cause fear, nor stress and is completely harmless to wildlife. We have also scientifically proven that birds do not habituate to the signal via numerous experimental trials and the support of WWF, the Bulgarian Academy of Sciences and the University of Veterinary Medicine in Vienna, Austria.

BCAS Air – Technology

Detection
Panoramic Thermal Imaging Camera

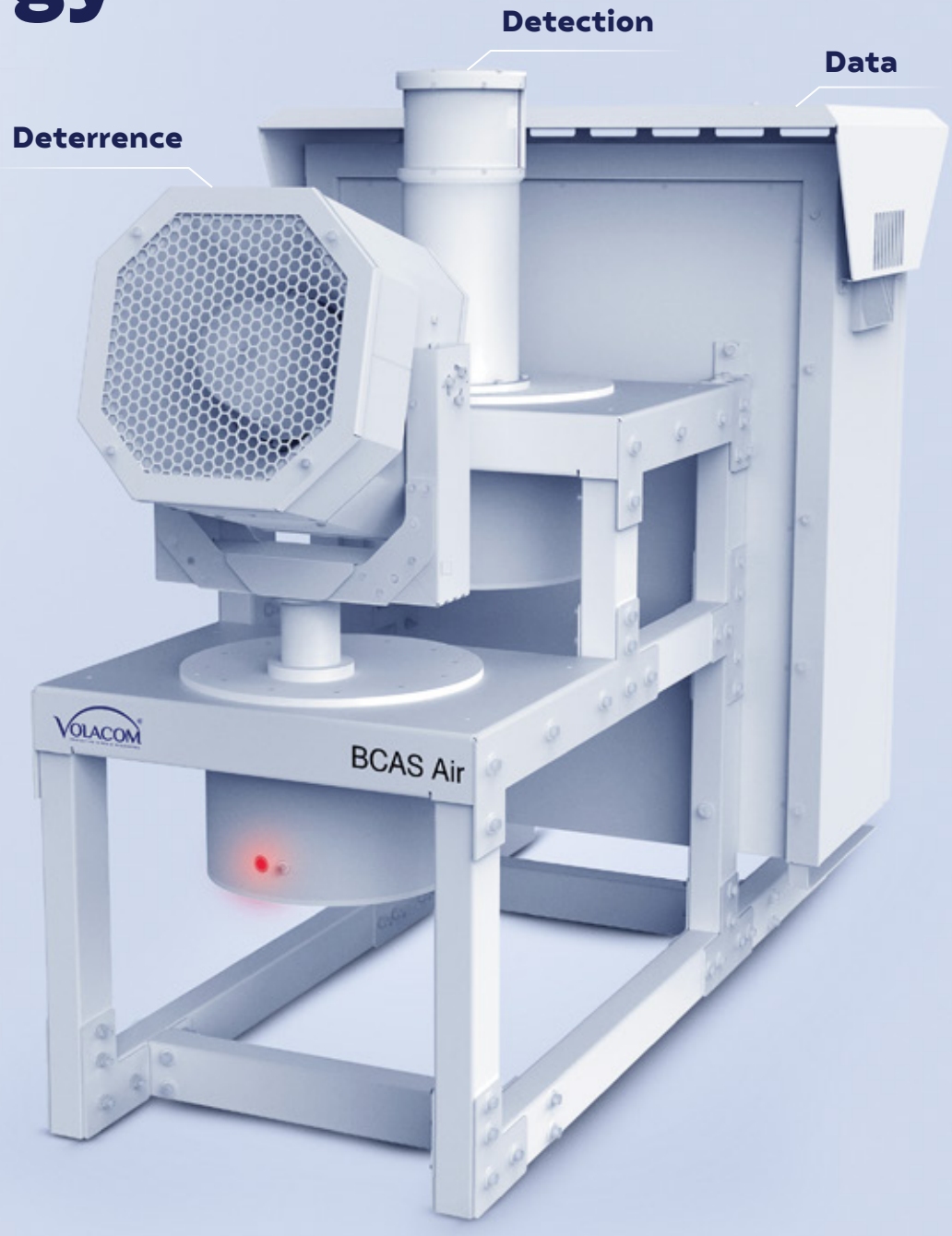
- 180° panoramic field of view of each unit
- 500+ meters detection of average-sized birds
- Detection, recognition, and tracking of birds in all weather conditions, even in zero-visibility
- Multiple bird detections

Deterrence
Acoustic Module

- Designed to evoke ASR (Acoustic Startle Reflex)
- Powerful acoustic emitter – 145 dB @ 1 m
- Effective deterrence at 400 m
- Unique sound wave – no habituation, no harassment
- Minimal noise disturbance – only upon detection
- Sound wave focused at targeted birds
- Runway clearance function – manual structured emission of signals by all units as little as 1 min before take-off / landing

Data
Monitoring and Control Center

- Modular web-based application
- Video record of every detection
- Remote control of all functions
- Quick storage and data retrieval
- Statistical database with detection logs
- Graphical display of data analyses



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BCAS Air – Step by step

1 Detection

BCAS Air uses highly reliable thermal imaging sensors to detect birds 24/7 in all weather conditions and at long distances. We detect average-sized birds at more than 500 meters and bigger species at more than 1000 meters.

2 Analysis

Once an object is detected, the data is analyzed by our proprietary software. Mathematical and logical algorithms determine whether it is a bird or another object of no interest.

3 Recognition

When the system recognizes the flying object as a bird, it points the acoustic module towards it, emitting our proprietary sound signal.

4 ASR deterrence

Acoustic Startle Reflex (ASR) is evoked by the sound emitted and the bird changes its course, flying away and keeping out of the protected zone.

5 Monitoring and data

BCAS Air operates autonomously, providing real-time remote data collection and monitoring. Volacom's proprietary software is a modular web-based application, giving access to all functions of the system. It allows quick storage and data retrieval for thousands of records. The system keeps a video record and a detailed database containing information on every detection. Graphical representation of statistics helps users get key facts quickly and in a user-friendly way.

Why BCAS Air?

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- Over 150 systems on 4 continents
- Custom design to satisfy the particular ornithological and operational needs of each airport
- Fully automatic solution with outstanding efficiency through a combination of bird control techniques
- Operational 24/7 in all-weather conditions
- No habituation – scientifically proven and field-tested for all types of birds
- Highest build quality, low maintenance costs and 15+ years lifetime expectancy
- State of the art technology and innovation, 100% quality control
- Harmless to wildlife
- Sensitization effect on birds towards protected areas
- Full compliance with ICAO, FAA, ECAC and other generally applicable airport non-interference and safety standards
- Patented technology and method – in the USA (US 8,598,998 B2 / 2013) and Russia (2615470 / 2017)

BCAS Air vs Alternatives	BCAS Air	Gas Cannon	Acoustic repellent	Bird control operator / team	HD camera detection system	Laser system	Radar system
Daytime detection	YES	NO	NO	YES	YES	NO	YES
Nighttime detection	YES	NO	NO	NO	NO	NO	YES
Low / Zero visibility detection	YES	NO	NO	NO	NO	NO	YES
Fully automated	YES	NO	YES	NO	YES	YES	YES
Deterrence capability	YES	YES	YES	YES	NO	YES	NO
Targeted sound wave	YES	NO	NO	YES	NO	NO	NO
ASR induction	YES	NO	NO	NO	NO	NO	NO
No habituation	YES	YES	NO	YES	NO	YES	NO
Sensitization	YES	NO	NO	NO	NO	NO	NO
Object real-time tracking	YES	NO	NO	YES	YES	NO	YES
Video recordings	YES	NO	NO	NO	YES	NO	NO
No harm to wildlife / No stress induction	YES	NO	YES	NO	YES	YES	YES
Statistical / Historical data	YES	NO	NO	NO	YES	NO	YES

Scientific Studies 1/2 – ASR Efficiency

ASR (Acoustic Startle Reflex)–inducing signals do not allow habituation, unlike other sounds or even predator–imitating sounds. According to scientific research, ASR is universally effective among avian species and mammals.

Experimental trials:

Chicken (*Gallus gallus*): 3 separate birds were exposed to a total of 12,975 ASR–inducing signals through the course of 5 days. No habituation was observed – birds reacted physically to 100% of the signals. During the trial the birds continued laying eggs which was another way of confirming that they were not stressed by the ASR despite the large number of repetitions.

Great reed warblers (*Acrocephalus arundinaceus*): 19 separate birds were exposed to 2 different acoustic signals each (predator–imitating and Volacom's ASR) to test both the behavioral and morphological response on a scale from 1 to 5. The birds had a physical reaction to each ASR emission and a stronger behavioral response to the ASR sound compared to the other sound tested in 18 out of 19 trials. Despite the stronger reaction to ASR (signaling high alertness) an increase in breathing rate was not observed.

Grey seal (*Halichoerus grypus*): 5 seals were exposed to 20 ASR–inducing signals each. All reacted to 100% of the signals, avoiding the signal area despite the presence of a food source. The use of an ASR signal leads to sensitization and extreme avoidance behavior by inducing a sustained flight response (Götz and Janik: Repeated elicitation of the acoustic startle reflex leads to sensitization in subsequent avoidance behavior and induces fear conditioning. BMC Neuroscience 2011 12:30.)

Results

100% physical reaction

100% no habituation

100% physical reaction

95% superior effect compared to the other sound

100% physical reaction

100% no habituation

100% sensitization

Scientific Studies 2/2 – ASR and Stress

Studies and trials, measuring the stress caused by exposure to ASR-inducing signals in birds and mammals

WWF, University of Veterinary Medicine, Vienna, and Sofia University

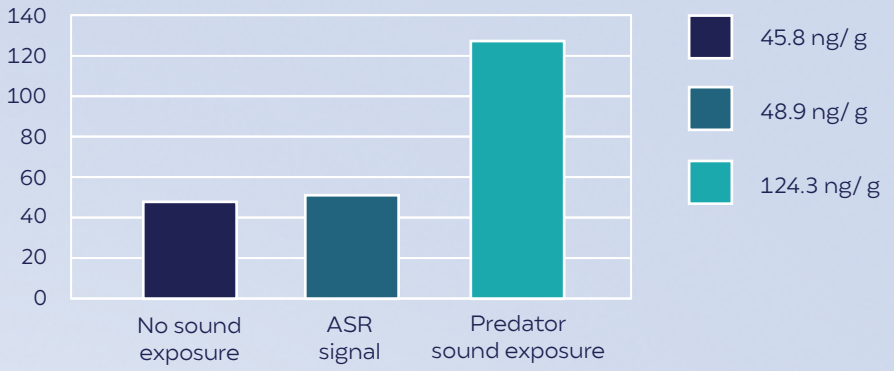
Study: Does Volacom's ASR-inducing acoustic signal cause stress in birds compared to no signal and a predatory signal

Sample: 12 adult chickens

Method: Measurement of corticosterone (stress hormone) levels

Results: No increase in stress levels

Corticosterone level measurements in bird droppings after exposure to different sounds



Bulgarian Academy of Sciences – Institute of Biodiversity and Ecosystem Research, Kalimok Research Station

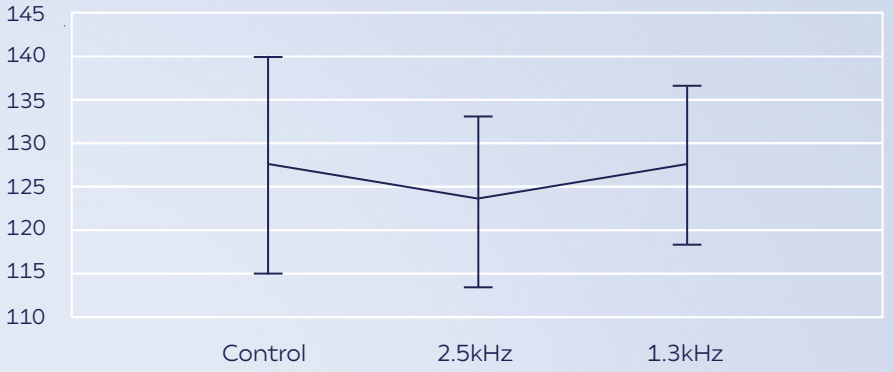
Study: Controlled-environment experiment on measuring stress caused by Volacom's ASR-inducing signal

Sample: 19 adult great reed warblers

Method: Breath rate measurements

Results: No increase in stress levels

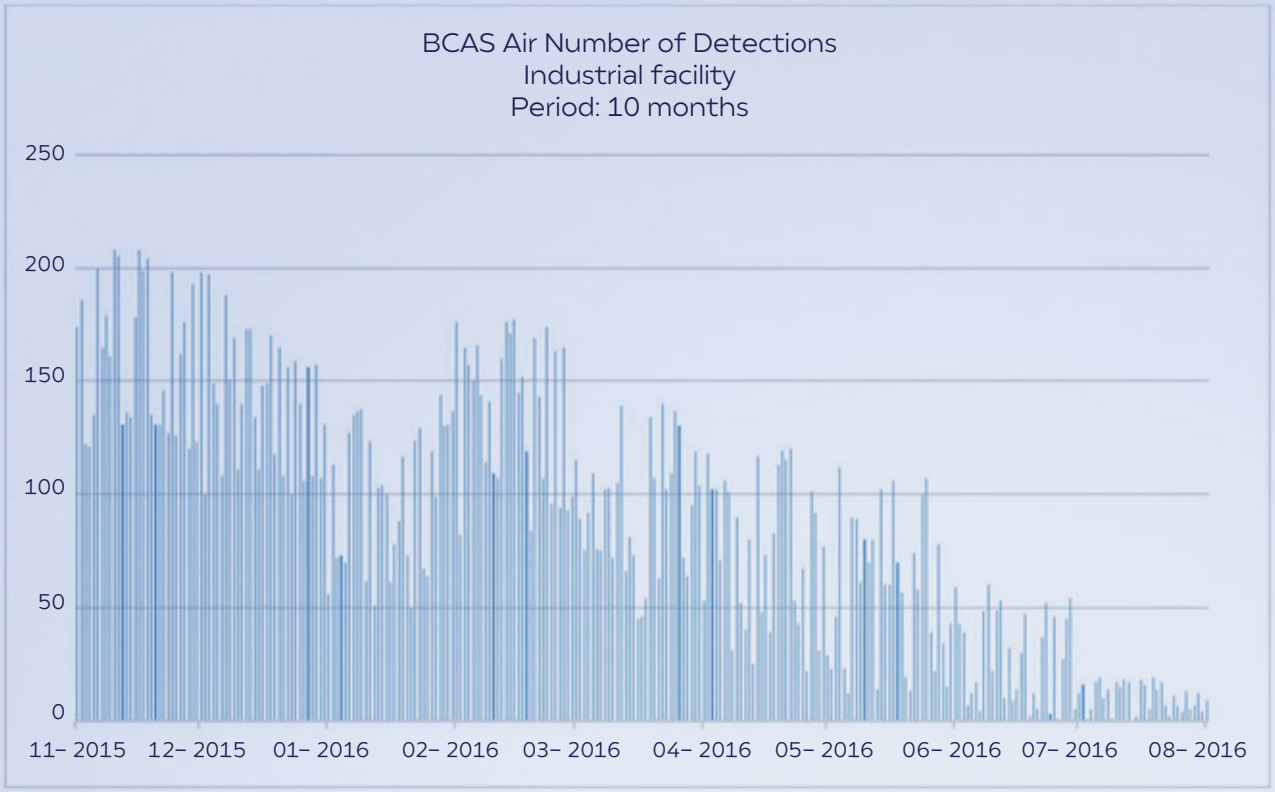
Breath rate measurement results graph (max, min, mean)



Case Studies – Sensitization

Sensitization is the increased effectiveness of an eliciting stimulus as a function of its repeated presentation (APA Dictionary). In terms of wildlife control, it is the opposite of habituation – instead of getting used to a stimulus species sensitize, becoming more sensitive and less tolerant to it.

Statistical records and real-time observations reveal sensitization of birds towards specific areas shielded by BCAS Air's ASR-inducing signal emissions after the introduction of the system, for different time periods, species, and geographical locations. On-site operators report either a general visible decrease in the average number of birds (in the case of airports) or standard route change of entire flocks (bypassing industrial sites instead of flying directly over them).



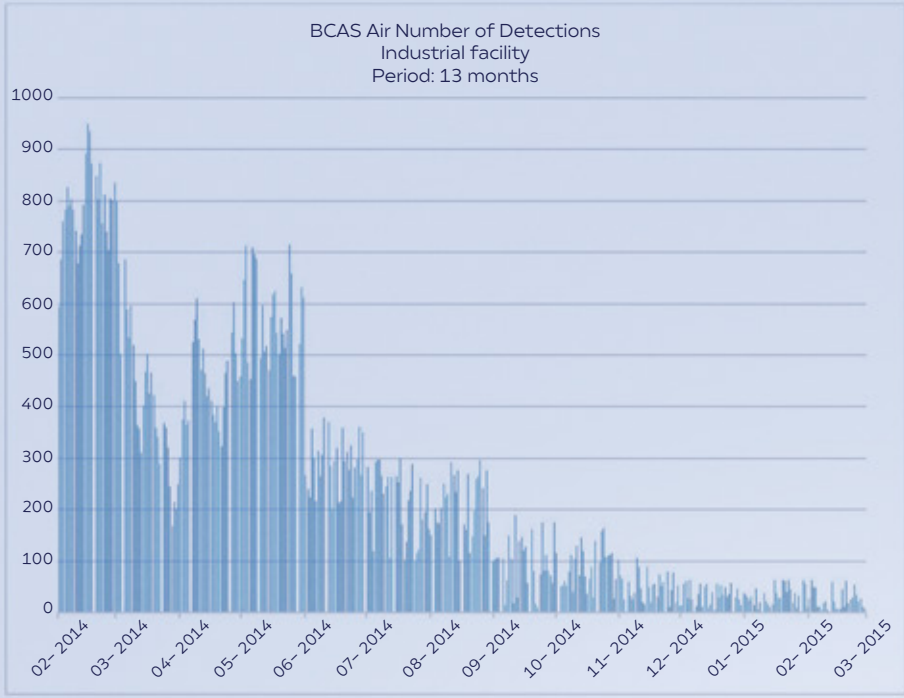
Daily number of detections at an industrial facility in Bulgaria through the course of 10 months

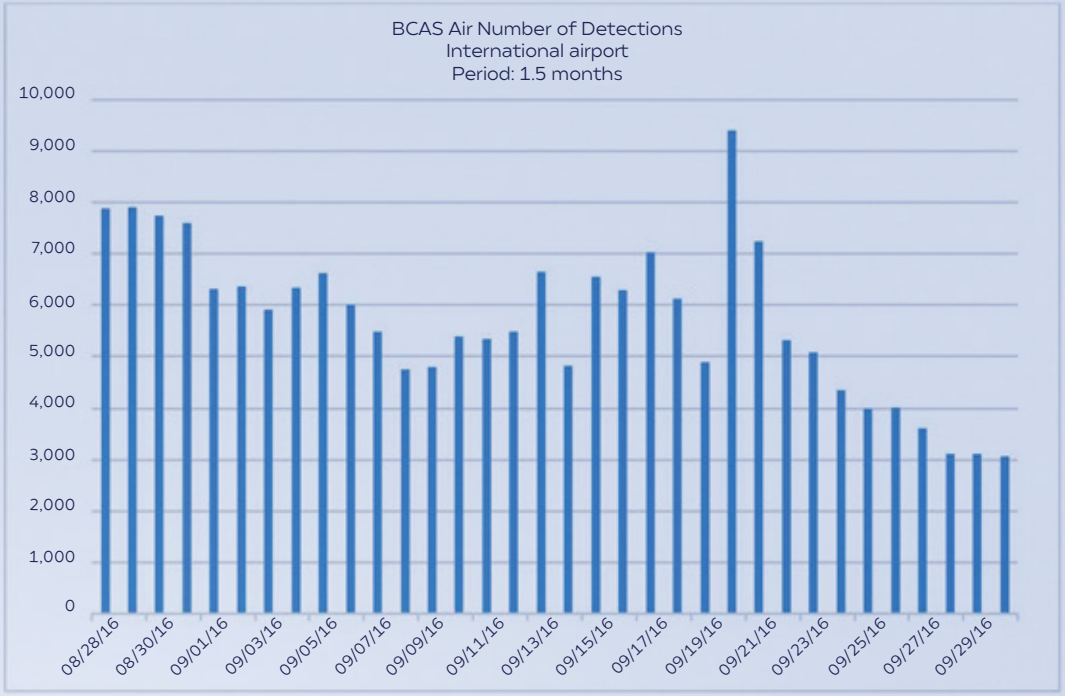
Two landfills in proximity, providing a food source

Main species: Yellow-legged gulls, pigeons, sparrows, starlings

94% decrease in the average daily number of birds in the BCAS Air-covered zone

Case Studies – Sensitization





Daily number of detections at an industrial facility in Bulgaria through the course of 13 months

Landfill in proximity, providing a food source

Main species: Yellow-legged gulls, pigeons, sparrows, starlings

97% decrease in the average daily number of birds in the BCAS Air-covered zone

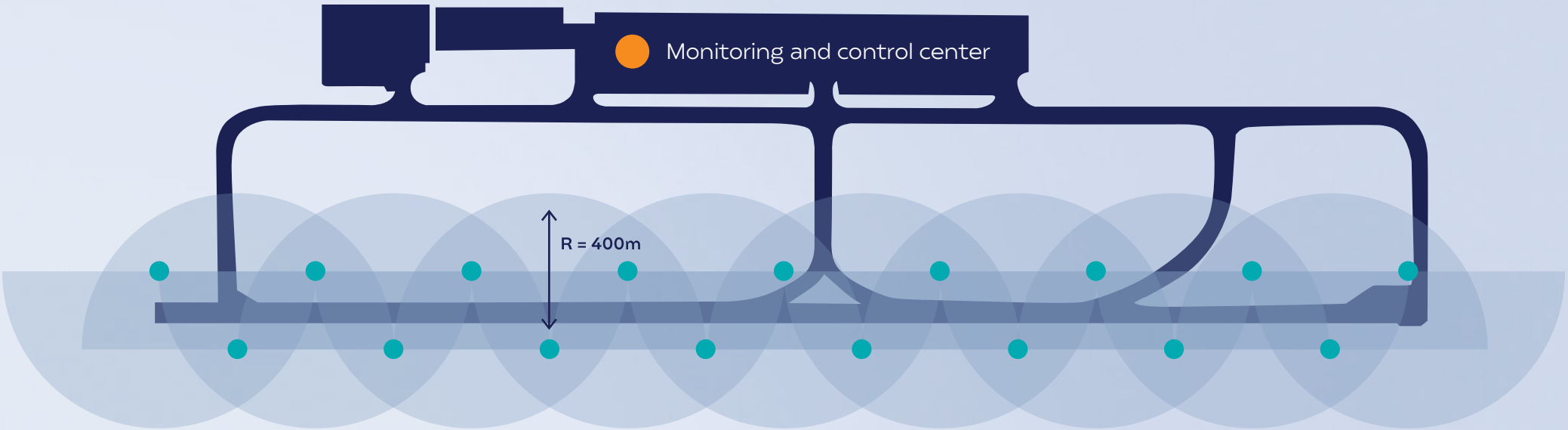
Daily number of detections at an international airport in Rwanda through the course of 1.5 months

Meat processing plant and a landfill in proximity, providing a rich food source

Main species: Black kite

61% decrease in the average daily number of birds in the BCAS Air-covered zone

Standard airport runway configuration



BCAS Air unit

Detection and deterrence zone

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Technical Datasheet

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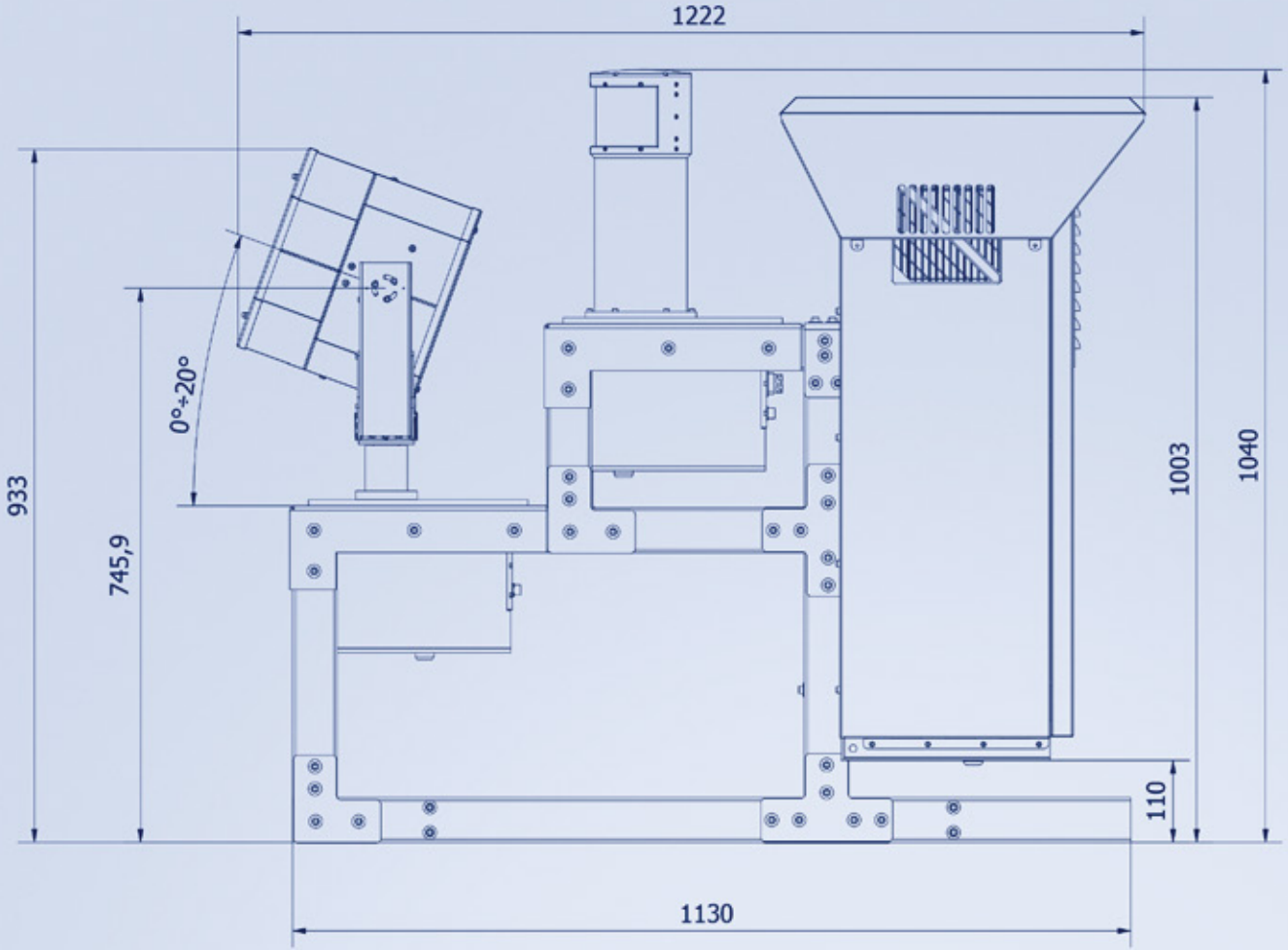
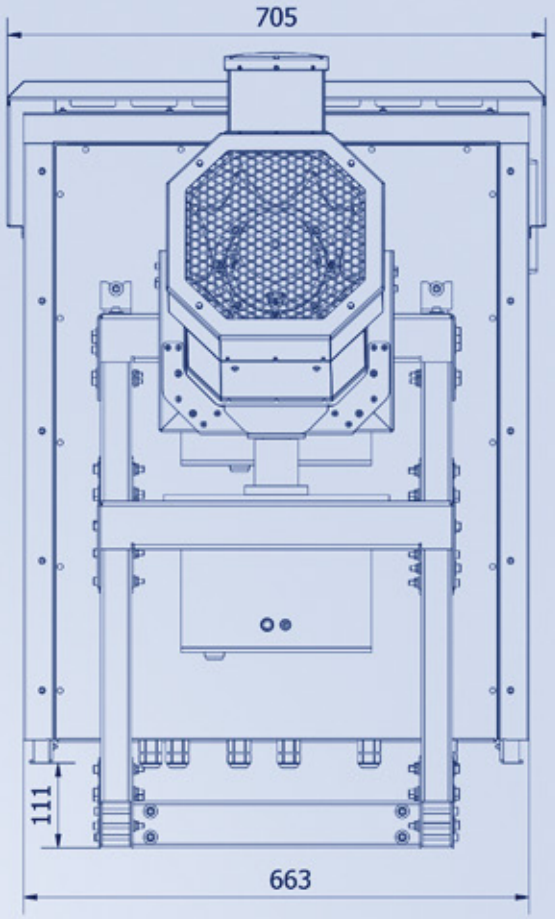
Camera specification	
Detector type	Uncooled LWIR Thermal Imager
Resolution	640px x 4096px
Pixel size	17 µm
Spectral band	7.5 – 13.5 µm
Performance	<50 mK @ f/1.0
Focal length	19/25/35/50 mm
Vertical field of view (VFOV)	26°/20°/14°/9.9°
Horizontal field of view (HFOV)	32°/25°/18°/12.4°
Spatial field of view (IFOV)	20° x 205°
Bird detection range (100cm wingspan)	max. 1300m @ 50mm focal length
Maximum horizontal angle of rotation	180°
Scanning rate – 180°	12s @ 25mm focal lenght
Minimum scanning angle (horizontal)	1°
Power supply	24VDC / 2A
Acoustic specifications	
Sensitivity 2x1W/1m	123 dB
Sound Pressure Level (Peak)	145 dB
Beam width	± 15° @ 2kHz/–3dB
Deterrence signal	Proprietary for inducing ASR
Max power	600W
Nominal impedance	2x4 ohm
Power supply	24VDC / 2A

Control module specification	
Dimensions	H/W/D 900/700/500 mm
Weight	70 kg
Power supply	85–264 VAC / 50–60Hz / 5.9A
Connection and communication specification	
Communication interface	Ethernet
Ethernet type	10/100 Mbps, RJ–45
Protocols	TCP/IP, HTTPS, FTP, SNMP
Ethernet standard	IEEE 802.3
User interface	Web–based UI
Environmental conditions	
Operating temperature	–20°C ÷ +55°C
Storage temperature	–20°C ÷ +60°C
Operating relative humidity	100%
Ingress protection Camera / Acoustic / Control modules	IP65 / IP54 / IP54
Physical specification	
Overall dimensions (excl. Excl. mounting screws and accessories)	H/W/D 1040/705/1222 mm
Weight Camera / Acoustic module (excl. mounting frame)	14 / 15 kg
Build material (modules)	AL5754–H111, AL6082–T6, anodized
Build material (mounting frame)	AL5754–H111, AL6060–T6, chemically coated
Weight (mounting frame)	18.5 kg

Dimensions, mm





Other bird control solutions by Volacom

BCAS Mobile

- Car-mounted acoustic emitters
- Manual operation from car cockpit
- Applicable to airport bird control units

BCAS Laser

- Automatic or hand-held bird deterrence laser
- Safety class 3B
- Green laser beam emittance
- Applicable to airport bird control units and birds on the ground

Volacopter LZ73-PRO UAV

- Bird deterrence unmanned aerial vehicle
- Equipped with a powerful acoustic emitter
- Manual operation through a remote control unit
- Up to 60 min flight time

TCS Air

- Ground-mounted or mobility case-mounted detection-only system
- Thermal imaging sensor allowing detection of aerial objects 24/7, in all weather conditions
- Proprietary detection software
- Database with video and statistical records of every detection
- Intended for detection and tracking of UAVs / avian species

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Give us a challenge!

Tell us about your bird problem
or become our partner in protecting birds & businesses.

We'd love to hear from you:
office@volacom.com

Bozhurishte Economic Zone | 6 Valeri Petrov str. | Sofia, Bulgaria

volacom.com

@volacom.bird.control

@volacom