



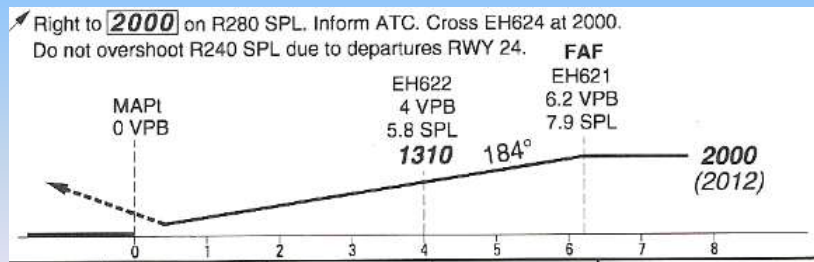
Pilots and birds, can we share the skies?



- Dominique Schilderman-Karelse
- Flight Technical Committee Dutch Airline Pilots Association
- Captain Embraer 190 KLM Cityhopper
- Regularly collided with birds



Approach Path



$$\text{Kinetic energy} = \frac{1}{2} M V^2$$

M = mass
V = Velocity



Critical phases of flight

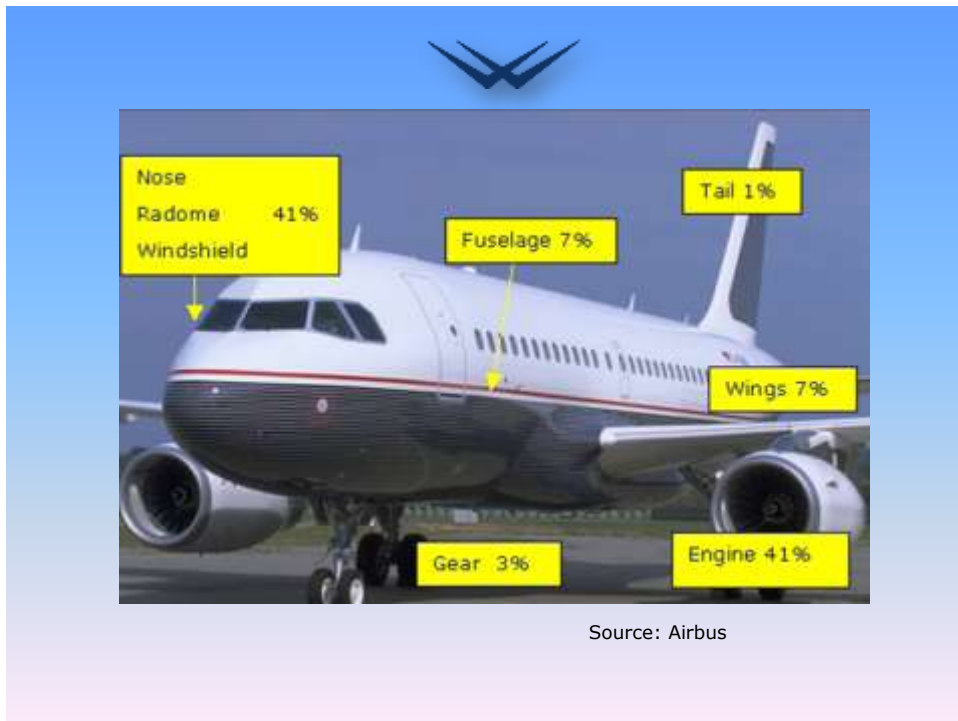
Take off

- 1-2 min.
- Engines full thrust
- High kinetic energy
- Severe engine damage
- Large asymmetric forces
- Limited maneuverability, heavy aircraft in climb

Approach and landing

- 3-4 min.
- Engine at low thrust
- Low kinetic energy
- Less engine damage
- Light aircraft in descent

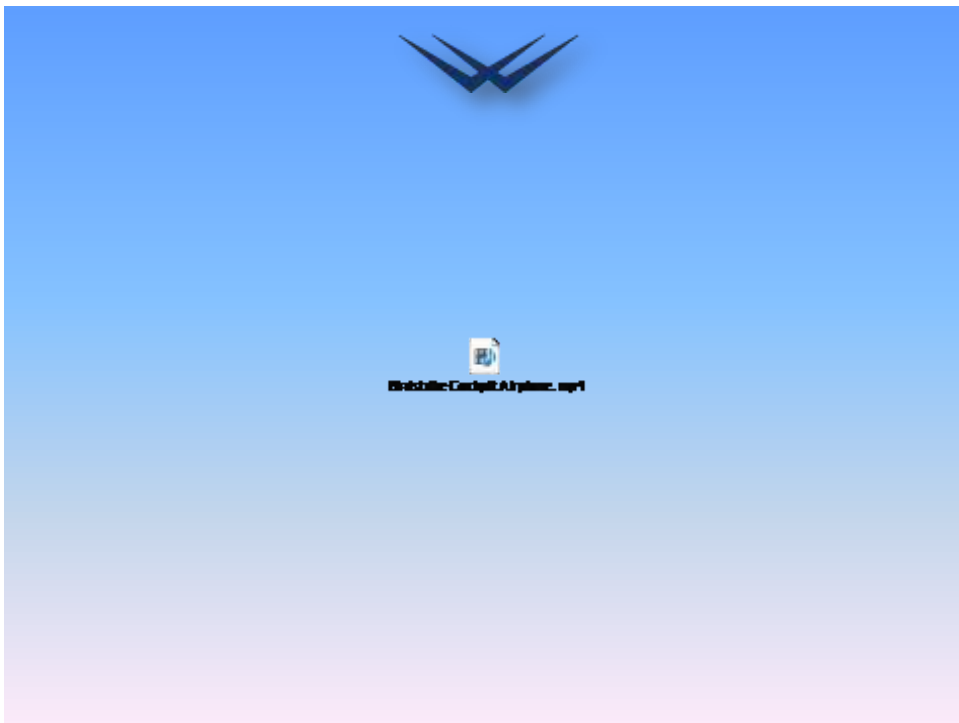




Average weight of Greylag goose (Grauwe gans) in the Amsterdam area in the Netherlands is **2,9 kg**

	Engine inlet area A (m ²)	Mass per bird (kg)
Ingestion of a single large bird	< 1,35 m ²	1,85 kg
	1,35 < A < 3,90	2,75 kg
	3,90 < A	3,65 kg

Engine inlet area of Embraer 190 is 1,65 m²



Why can't we avoid?

- We don't see the bird!

If we would see the bird:

- Reaction time is just a few seconds
- Aerodynamic forces
- Mass of aircraft gives large respond time
- Passengers, obstacles, ground, air traffic control



What can we do as pilots?

- Increase awareness in crew briefing
- Delay take-off 1-2 minutes
- Consider the consequences of a go-around
- Maximum speed 250kts below 10.000'
- Report every bird strike and near-miss



Dutch Federative Bird Strike Steering Committee

- Founded 2010
- Chairman is Dutch Ministry of Infrastructure and Environment
- Results expected from 2013



Stakeholders

- Ministry of Infrastructure and Environment
- Provincial governance
- Municipal governance
- Amsterdam Schiphol Airport
- Dutch Airline Pilots Association
- Bird and nature conservancy organisations
- Dutch confederation of agriculture and horticulture (farmers)

New members:

- Air Traffic Control Netherlands
- KLM Royal Dutch Airlines

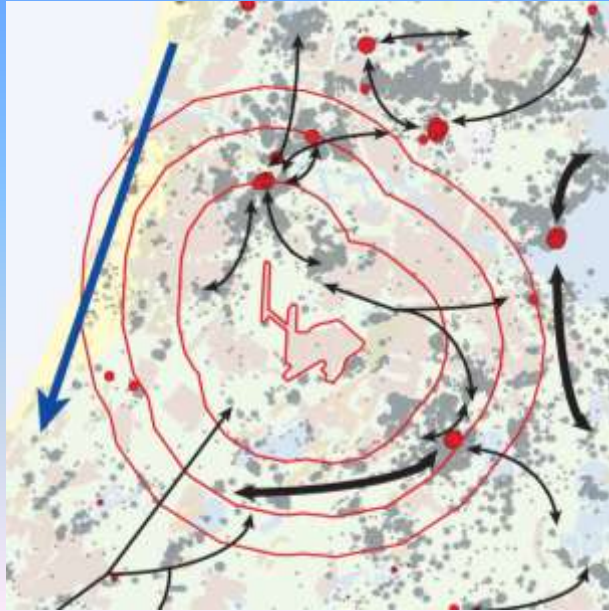


Schiphol Amsterdam Airport



Source: Arcadis

Greylag goose movements around Schiphol



Source: Sovon

4 Pillars

- 1) Population control
- 2) Limit breeding grounds and rest areas
- 3) Limit foraging areas
- 4) Use of a bird detection system



1) Population control

- Reduction of breeding pairs in 10 km zone from 10.000 to 1.000 pairs
- If current approach not effective, more professional approach will be considered.



2) Limit breeding grounds and rest areas

- Expanding bird mitigation measures with regard to spatial planning and land use.
From 6 - 10 or 6 - 13 Km?
- Development of reliable risk assessment method for new spatial planning initiatives.



3) Limit foraging areas

- Speeding up the process of plowing grain stubble
- Stimulate cultivation of alternative crops



4) The use of a bird detection system

- One year test period 2012- 2013

Step 1

Store, analyse and use data of system

1. Improve current wildlife hazard programme
2. Improve bird controller effectiveness
3. Adjust runway use
4. Improve spatial and land use planning



4) The use of a bird detection system

Step 2

- Concept of operations for real-time use of the detection system

Many issues:

- Safety
- Liability
- Economical



Summary

- 1) Reduce bird presence in aircraft flight path
- 2) Increase pilot awareness
- 3) Learn more about bird behaviour with new technical possibilities



Thank you

