

# **Havarikommisionen**

**Accident Investigation Board Denmark**

## **Annual Report 2011**

May 2012

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## 1. FOREWORD

The Accident Investigation Board for Civil Aviation and Railways (the Accident Investigation Board, AIB) is an independent institution under the Ministry of Transport. Its main task is to investigate accidents and incidents in the aviation and railways sectors in Denmark, and in the aviation sector in Greenland and the Faroe Islands.

The Accident Investigation Board's investigations are not concerned with attributing guilt or responsibility, but are aimed solely at preventing incidents and accidents in the future.

Through this annual report, the Accident Investigation Board wishes to

- provide information on the year's investigation activities within the Accident Investigation Board;
- report on the implementation status of recommendations made by the Accident Investigation Board; and
- provide statistical information concerning the accidents and incidents investigated by the Accident Investigation Board.

The annual report contains general information about investigation activities, not detailed information about individual investigations. Reports and statements concerning individual accidents and incidents can be found on the Accident Investigation Board's website ([www.havarikommissionen.dk](http://www.havarikommissionen.dk)).

Chapter 2 contains a brief introduction to the Accident Investigation Board.

Chapter 3 provides an overview of the Accident Investigation Board's investigation activities in 2011. This is done on the basis of figures for received and closed cases, which give a highly simplified picture, since the investigations vary considerably in scope and form.

Chapter 4 presents an overview of the implementation status of the recommendations made by the Accident Investigation Board, which can be studied in greater depth in Annexes 1 and 2.

Chapter 5 presents the statistical figures which can be found in Annexes 3 and 4.

## 2. THE ACCIDENT INVESTIGATION BOARD

The Accident Investigation Board for Civil Aviation and Railways (the Accident Investigation Board) is an independent institution under the Ministry of Transport. The Board's duties to investigate aviation and railway matters are laid down in the Aviation Act (Consolidating Regulation No 731 of 21 June 2007/Consolidating Regulation No 959 of 12 September 2011) and the Railways Act (Consolidating Regulation No 1249 of 11 November 2010).

The main task of the Accident Investigation Board is to investigate accidents and incidents in the aviation sector in Denmark, Greenland and the Faroe Islands and accidents and incidents in the railways sector in Denmark. Where Danish passengers or Danish-registered aircraft or trains are involved, the Accident Investigation Board can take part in investigations carried out by another country's investigation authorities.

The Accident Investigation Board's investigations are not concerned with attributing guilt or responsibility, but are aimed solely at preventing accidents and incidents in the future.

### 2.1. Mission and vision

The Accident Investigation Board's mission is as follows:

#### **The mission of the Accident Investigation Board**

The Accident Investigation Board should, through independent investigations, make recommendations to prevent accidents and incidents in rail and aviation.

The role and duty expressed in the mission statement are fundamental to the functioning of the Accident Investigation Board, and as a supplement to the mission statement, the Accident Investigation Board's vision serves as a guide for its activities.

#### **The vision of the Accident Investigation Board**

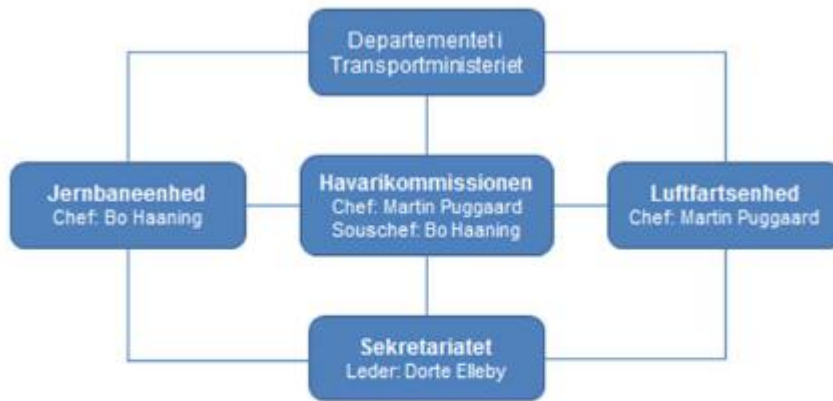
The Accident Investigation Board will continue to:

- ensure that investigative activities keep up with academic and technological developments;
- develop the AIB as an attractive place to work;
- strengthen cooperation and dialogue with relevant national and international partners.

## 2.2. Organisation of the Accident Investigation Board

In 2011 the Accident Investigation Board underwent an organisational change, as reflected in the diagram below.

The organisation of the Accident Investigation Board includes investigation units for both aviation and railways, as well as a director and secretariat.



Enhed:	Ledelsesfunktioner	Medarbejdere
Sekretariatet	1 sekretariatsleder	2 sekretariatmedarbejdere
Jernbane	1 faglig leder/Souschef HCLJ	3 undersagere
Luftfart	1 faglig leder/Chef HCLJ	6 undersagere

Departementet i Transportministeriet	Department in the Ministry of Transport
Jernbaneenhed Chef: Bo Haaning	Railways Unit Director: Bo Haaning
Havarikommisionen Chef Martin Puggaard Sous chef: Bo Haaning	Accident Investigation Board Director: Martin Puggaard Assistant Director: Bo Haaning
Luftfartsenhed Chef : Martin Puggaard	Aviation Unit Director: Martin Puggaard
Sekretariatet Leder: Dorte Elleby	Secretariat Head: Dorte Elleby

Unit:	Management functions	Employees
Secretariat	1 head of secretariat	2 secretariat staff
Railways	1 technical head/Assistant Director AIB	3 investigators
Aviation	1 technical head/Director AIB	6 investigators

The Accident Investigation Board normally has a total of 14 staff, broken down into three employees in the Secretariat, four in the Railways Unit and seven in the Aviation Unit. The Director of the Aviation Unit is also the Director of the Accident Investigation Board, and the Director of the Railways Unit is the Assistant Director of the Accident Investigation Board.

### **3. THE YEAR'S INVESTIGATION ACTIVITIES**

#### **3.1. The aviation sector**

For the aviation sector, the AIB received 160 reports in 2011, in comparison with 215 in 2010.

All the reports were subject to a preliminary investigation and 47 were found to lie outside the AIB's remit for investigation.

The reports in 2011 that led to further investigation may be divided into the following categories: motorised aircraft/helicopters 77%, gliders/motorised gliders 13.3%, ultralight aircraft/gyroplanes 9.7%. No accidents or incidents involving balloons were registered in 2011. Of the reports involving motorised aircraft/helicopters, 38.9% were classified as air traffic incidents. 43.9% of the reports concerned commercial aviation and 56.1% non-commercial aviation.

In 2011, for the aviation sector, 133 reports, statements and § 138 statements were published on accidents and incidents that took place in 2011 or in previous years. The § 138 statements include a brief description of the incident and in some cases an assessment. § 138 refers to § 138 of the Aviation Act.

There can be two considerations behind the Aviation Unit deciding not to investigate an incident further. Either an investigation will not reveal any factors of major importance to flight safety, or the Unit does not have the necessary resources to carry out a further investigation of all reported incidents.

In 2011, the Aviation Unit assisted the accident investigation boards of other countries in nine investigations.

#### **3.2. The railways sector**

In 2011, the Accident Investigation Board received 540 reports of accidents and incidents in the railways sector, compared with 550 in 2010.

After initial assessment, it was decided not to carry out an investigation for 478 of the reports. For the remaining reports in question, a preliminary or full investigation was carried out.

If the results of a preliminary investigation do not indicate that an investigation will lead to results of significance for safety, the preliminary investigation is closed and a brief statement produced – known as a § 21q statement – which provides a brief description of the accident or incident, where applicable supplemented by the assessment of the Accident Investigation Board.

**3.3. Summary of cases in 2011**

The table below provides an overview of opened and closed cases in 2011.

The table first gives the total number of reports received. Some reports are closed following preliminary assessment, while others (referred to in the table as ‘Opened in 2011 after preliminary assessment’) give rise to a preliminary investigation.

The number of cases remaining after preliminary assessment is then divided into accidents and incidents.

The cases closed in 2011 are split according to whether or not they were closed within one year of the incident, in line with the common European objective to close cases within one year wherever possible.

Finally, the table gives the number of unfinished cases at the beginning and end of 2010.

<b>Accident Investigation Board</b>	<b>2011</b>	
	Aviation	Railways
<b>Cases opened in 2011</b>		
Number of reports	160	540
Closed after preliminary assessment	47	478
Opened in 2011 after preliminary assessment	113	62
Reported accidents	33	13
Reported incidents	80	49
<b>Cases closed in 2011</b>		
Published statements and reports < 12 months	123	29
Published statements and reports > 12 months	10	11
<i>Note: Statements and reports include simplified statements - § 138 cases or § 21q cases</i>		
<b>Unfinished cases</b>		
Unfinished cases as at 31/12-2011	36	117
Unfinished cases as at 31/12-2010	48	108

## 4. RECOMMENDATIONS

As a result of the investigations carried out, the Accident Investigation Board can make recommendations intended to prevent future accidents. As an independent investigation body, the Board makes recommendations to the relevant safety authorities, whose task is to determine the necessary measures in conjunction with the organisations concerned and which are authorised to implement measures in the sectors.

In the aviation sector, the Civil Aviation Administration Denmark (CAA-DK) is the Danish safety authority, but because the aviation sector is highly international, more and more recommendations are currently being made to the EASA (European Aviation Safety Agency) at European level or the ICAO (International Civil Aviation Organisation) at international level.

The railways sector is gradually being developed along more common European lines, but still has a primarily national focus, and the recommendations are therefore made to the Danish Transport Authority, which is the national safety authority.

### 4.1. Aviation

The table below summarises the status of recommendations in the aviation sector.

**Recommendations, aviation sector**

Recommendations published		Implementation status of recommendations			
		Implemented		Open/stand-by	
Year	Total		%		%
2006	6	5	83	1	17
2007	5	4	80	1	20
2008	2	1	50	1	50
2009	2	2	100	0	0
2010	8	2	25	6	75
2011	2	0	0	2	100
<b>Total</b>	<b>25</b>	<b>14</b>	<b>56</b>	<b>11</b>	<b>44</b>

An overview of open recommendations and recommendations implemented in 2011 within the aviation sector can be found in Annex 1.



**4.2. Railways**

The table below summarises the status of recommendations in the railways sector.

**Recommendations, railways sector**

<b>Recommendations published</b>		<b>Implementation status of Recommendations</b>			
		<b>Carried out/ closed</b>		<b>Open</b>	
<b>Year</b>	<b>Total</b>		<b>%</b>		<b>%</b>
2004	7	7	100	0	0
2005	10	10	100	0	0
2006	12	12	100	0	0
2007	11	11	100	0	0
2008	20	19	95	1	5
2009	9	7	78	2	22
2010	4	2	50	2	50
2011	0	0	0	0	0
<b>Total</b>	<b>73</b>	<b>68</b>	<b>93</b>	<b>5</b>	<b>7</b>

For the railways sector, the 2010 annual report contained 10 open recommendations, and in 2011 the Accident Investigation Board did not make any recommendations. Of those 10 recommendations, five were implemented or closed in 2011, so that there are now five open recommendations.

An overview of all open recommendations and recommendations implemented or closed in 2011 in the railways sector can be found in Annex 2.

## 5. STATISTICS OF REPORTED INCIDENTS

In the aviation sector, there is a common European database (ECCAIRS) in which all incidents are recorded; there are very extensive requirements on the recording of parameters relating to individual incidents. This makes it easy to extract data for statistical use.

The statistical overviews in this annual report can best be read together with Civil Aviation Administration Denmark's (changed to the Danish Transport Authority in 2011) annual reporting of the incidents reported to it ('BL 8-10 Annual Report 20xx' for the year in question).

The statistical overviews for the aviation sector (see Annex 3) are divided into accidents and incidents, which are in turn broken down into the categories scheduled flights, charter flights, taxi flights, training flights, other commercial flights, private flights, glider flights, ultralight aircraft and balloons.

In the railways sector, a common European database (ERAIL) – corresponding to the one for aviation – is currently being developed. When ERAIL is implemented, it is expected that a series of standardised parameters will be defined and thereafter systematically recorded, which will make more ample statistical information easily accessible.

The statistical overviews for the railways sector (see Annex 4) are limited to dividing accidents and incidents into level of seriousness, i.e. serious accident, accident or incident and dividing accidents/incidents into the categories derailment, fire/smoke formation, collision, level crossing accident, collision with person, signal passed at danger (SPAD) and other.

The statistical overviews for the railways sector can best be read together with the Danish Transport Authority's annual safety report ('Safety report for the railways 20xx'), which is based on annual reports from operators and infrastructure managers in Denmark. These reports also include those accidents and incidents that have been investigated by the Accident Investigation Board. This then provides a broader statistical description of the year's safety-related incidents.

## **6. ANNEXES**

1. Overview of recommendations for the aviation sector
2. Overview of recommendations for the railways sector
3. Statistics for the aviation sector
4. Statistics for the railways sector

## STATUS OF RECOMMENDATIONS IN THE AVIATION SECTOR

The recommendations in the aviation sector had the following status in April 2012.

<b>REC 06-2006</b>		<b>Open</b>
<p>The Danish Aircraft Accident Board recommends that the Danish Civil Aviation Administration should consider more suitable taxiway designators and more clear taxiways signs.</p>		
<b>Synopsis:</b>		<b>Response to recommendation:</b>
<p><b>Air traffic incident on 8 September 2003 at Copenhagen Airport, Kastrup</b></p> <p>Aircraft A was on a flight plan from Copenhagen (EKCH) to Wick (EGPC). Aircraft B was on a flight plan from EKCH to Kangerlussuaq (BGSF). Aircraft A was parked at the eastern parking area and received a taxi instruction to the holding position at runway 04R via taxiways U, T and V and to hold short of taxiway B. Aircraft B was taxiing to holding position at runway 04R. Aircraft B received instruction to line up and was cleared for take-off. When aircraft A arrived at the intersection between taxiways T, V1, V2 and V there were 3 separate taxiways all starting with the name V (V, V1 and V2). The flight crew in aircraft A chose by mistake taxiway V2 and crossed the holding position marking for runway 22L/04R. Kastrup Ground instructed aircraft A to hold its position. At the same time Kastrup Ground called Kastrup Tower (using the intercom) ordering Tower to stop all aircraft movement on runway 04R. The Tower instructed aircraft B to hold its position. Kastrup Ground guided aircraft A back via taxiway V2 and further on to taxiway V.</p>		<p>In its letter of 15 September 2010, the CAA-DK (now the Danish Transport Authority) informed the AIB of the status of the work on the recommendation.</p> <p>During an inspection, the CAA-DK drafted a report containing a series of measures to be taken by concession holders and air traffic services. The CAA-DK will keep the AIB informed as these initiatives are implemented.</p>
<b>Comments:</b>		
<p>The AIB is awaiting the Danish Transport Authority's further response to the recommendation.</p>		

<b>REC 04-2007</b>		<b>Open</b>
<p>The AIB recommends that the Danish Civil Aviation Administration with a background in the incident undertake a risk assessment of the physical, technical and operative conditions at Copenhagen Airport, Kastrup (EKCH) and assess whether measures need to be taken and arrange for changes to be made where required.</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>Aircraft A landed on runway 22L without permission, while aircraft B was pulling onto runway 22L via taxiway V2 (intersection). As aircraft B passed, the horizontal distance from aircraft A's right wing tip to aircraft B was approx. 10-15 m, and aircraft A's radio altitude (RA) was approx. 16 feet. The traffic load at the time of the incident was low to medium.</p> <p>The incident occurred in the dark and under visual meteorological conditions (VMC).</p>	<p>In its letter of 15 September 2010, the CAA-DK (now the Danish Transport Authority) informed the AIB of the status of the work on the recommendation.</p> <p>During an inspection, the CAA-DK drafted a report containing a series of measures to be taken by concession holders and air traffic services.</p> <p>The CAA-DK will keep the AIB informed as these initiatives are implemented.</p>	
<b>Comments:</b>		
<p>The AIB is awaiting the Danish Transport Authority's further response to the recommendation.</p>		

<b>REC 01-2008</b>		<b>Open</b>
<p>The Accident Investigation Board recommends that the Danish Glider Union introduce a requirement that a radio check be carried out between the glider and the tow-plane prior to take-off if the glider has installed approved radio equipment.</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>The accident occurred in connection with a towed start in an easterly direction. During take-off, the tow-plane pilot noticed that the angle of climb was abnormally low, and saw in his rear-view mirror both that the glider was not positioned correctly for a towed start, and also that the air brakes were not in and locked, but were partly out. After repeated unsuccessful radio calls to say that the air brakes were open, the tow-plane pilot opted to release the cable, which he did at a height of around 30-50 m, after having signalled an abortive start to the glider by moving the tow-plane's rudder from side to side. Immediately after being released, the glider turned to the left. While turning, and taking an approximately northerly course, the angle of bank increased, after which the glider lost height and hit the ground with its left wing-tip. The glider then tipped over on its left wing-tip and hit the ground with its nose in an almost vertical position. The aircraft then bounced back into the air and landed backwards so that the rearmost section of the aircraft hit the earthwork that forms the new approach road to Arnborg Gliding Centre.</p>	<p>The recommendation was discussed at a meeting with the Danish Glider Union on 9 February 2009. The Danish Glider Union does not agree with the Accident Investigation Board's recommendation as written, as it believes it will be impossible to implement it under different conditions.</p> <p>At a meeting with the Danish Glider Union on 7 June 2011, agreement was reached on the implementation of the recommendation, and the Danish Glider Union will update the relevant sections of the Union Manual.</p>	

<b>Comments:</b> The AIB is awaiting the updating promised by the Danish Glider Union before closing the recommendation.	
<b>REC 02-2008</b> <span style="float: right;"><b>Closed</b></span>	
The Accident Investigation Board recommends that the Danish Civil Aviation Administration investigate the possibility of installing meteorological measuring equipment at/near Vagar Airport which is able to provide a better guarantee of a correct determination of the existing (and expected) degree of turbulence and wind shear on flight paths to and from Vagar Airport as well as at/near the airport – and also that it should re-assess the positioning and applicability of the ‘Skeid’ anemometer.	
<b>Synopsis:</b>	<b>Response to recommendation:</b>
<p>The incident occurred in connection with a scheduled flight from Vagar airport (EKVG) to Copenhagen Airport, Kastrup (EKCH). The flight was a Pilot in Command under Supervision (PICUS) flight, with the candidate pilot sitting in the left-hand seat, and the pilot in the right-hand seat. The pilot in the right-hand seat was the Pilot Flying (PF). Owing to the wind conditions at EKVG, the planned departure at 08.15 was put back to 08.55. The passengers boarded the aircraft early, so that the aircraft would be ready for departure once the wind direction was more favourable to take off.</p> <p>When the wind began to turn from south-westerly to westerly, the pilots decided to start the engines and move to the starting position on runway 31. It was the pilots’ experience that when comparable weather systems are passing, the wind direction will back westerly and remain in a westerly direction. At 08.51.26, Vagar AFIS reported the wind conditions to be 250° 19 knots pushing 37 knots. Both pilots understood the wind direction to be 260° and decided to initiate take-off.</p> <p>Take-off was effected with flaps deployed at flap position 30° and maximum take-off thrust. The take-off run and initial climb were perceived to be normal. The landing gear was retracted, the flaps closed to flap position 18°, and the pilots began to establish the aircraft on LLZ (outbound) from runway 13. The turbulence was deemed to be light to moderate.</p> <p>Shortly thereafter, the pilots’ experienced the aircraft flying into an area of heavy turbulence. The aircraft’s cruising speed dropped unintentionally to a speed below V2 for flaps at 18°. The pilots corrected for this by lowering the nose to build up speed. During this manoeuvre the speed increased suddenly and unintentionally to a speed above the maximum speed for flaps open at 18°. The pilots reported the turbulence conditions to Vagar AFIS and then decided to continue the flight to EKCH. The aircraft was inspected at EKCH. The inspection did not give rise to any comments.</p>	<p>In its letter of 30 January 2012, the Danish Transport Authority (formerly Civil Aviation Administration Denmark) informed the AIB that it considered the recommendation closed. In its letter, the Danish Transport Authority referred to the letter of 13 October 2011 informing the AIB of the details of the newly implemented system.</p>

<b>Comments:</b> Following the Danish Transport Authority's response, the AIB has closed the recommendation.	
<b>DENM-2010-001</b> <span style="float: right;"><b>Closed</b></span>	
<p>The Accident Investigation Board, Denmark makes the following recommendations to the European Aviation Safety Agency (EASA):</p> <p>It is recommended to review if an in-line filter to protect the extend port of the Main Landing Gear Retraction/Extension Actuator is necessary. It is also recommended to review the design of the single line Main Landing Gear hydraulic system in order to prevent hydraulic locking of the Main Landing Gear system. The review should include a possible in-line filter blockage.</p>	
<b>Synopsis:</b>	<b>Response to recommendation:</b>
During the approach to EKCH, the flight crew was unable to fully extend the right Main Landing Gear (MLG). After a number of unsuccessful alternate extension attempts, the flight crew declared that the landing would be an emergency landing. The MLG was stuck in an almost up position.	In its letter of 11 April 2012, the EASA informed the AIB as follows: <i>'The Type Certificate Holder (TCH) has introduced an in-service modification; Modification Summary Package No. IS4Q3200033 in November, 2007. This modification introduced an in-line filter/screen, as an in service product improvement to reduce the possibility of foreign object debris being lodged in orifices within the actuator assembly. Along with the position of Transport Canada (TCCA, the primary certification authority of this aircraft type), EASA is of the opinion that the in line filter/screen product improvement introduced by Bombardier has fulfilled the intent of this Safety Recommendation.'</i>
<b>Comments:</b> Following the EASA's response, the AIB has closed the recommendation.	

<b>DENM-2010-002</b> <span style="float: right;"><b>Open</b></span>	
<p>The Accident Investigation Board, Denmark makes the following recommendations to the European Aviation Safety Agency (EASA):</p> <p>It is recommended to review the information that was available to the maintenance personnel in its unified whole to avoid misunderstandings of the definitions of aircraft components and/or aircraft parts as described. The information sources were the aircraft manufacturer serialization list, operator computerized data support system, the IPC, the documentation following the MSV and the identification plate fitted to the MSV.</p>	
<b>Synopsis:</b>	<b>Response to recommendation:</b>
See DENM-2010-001	
<b>Comments:</b> The AIB is awaiting the EASA's response to the recommendation.	

<b>DENM-2010-003</b>		<b>Open</b>
<p>The Accident Investigation Board, Denmark makes the following recommendations to the European Aviation Safety Agency (EASA):</p> <p>It is recommended that the authorities evaluate possible technical solutions for the observation of and warning against migratory birds in darkness and in reduced visibility. This includes the option of installing and using radar equipment for this purpose..</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>Following initial take-off from Runway 04R, the pilots noticed a flock of birds in the beam of the aircraft's searchlights. Immediately thereafter, at an altitude of 256 ft, the aircraft was hit by birds, which resulted in powerful vibrations in the aircraft. The vibrations made it difficult for the pilots to read the engine instruments, but they were nevertheless able to read the level of vibrations in the right engine which were fluctuating around the maximum values. The pilots were not able to tell whether the left engine had been hit which is why, in the first instance, they were hesitant to stop the right engine. Since the vibrations in the right engine only partially ceased when the pilots pulled the throttle grip back, they decided to stop the engine. The left engine functioned normally throughout the flight. The incident was observed from the ground and from the control tower (TWR). EKCH's on-duty Bird and Wildlife Control Unit warden was approximately 800 m east of the intersection between Runway 04R and Taxiway I at the time of the incident. He heard a loud bang from the starting aircraft and then saw shooting flames and sparks come from the right engine as it passed Taxiway I above Runway 04R. The air traffic controller from TWR also saw flames come from the right engine of the aircraft immediately after it was in the air. When TWR was informed of the 'bird strike' incident by the pilots, the air traffic controller gave the pilots their free choice of landing runway. The pilots turned the aircraft round and flew visually in a right tailwind to Runway 04R where they landed at 21.17 UTC without further incident.</p>	<p>In its letter of 30 January 2012, the EASA informed the AIB of its intentions in connection with the recommendation (cf. text below).</p> <p><i>'The Notice of Proposed Amendment (NPA) 201120 (Authority, Organisation and Operations Requirements for Aerodromes) published on 13 December 2011 includes the operational requirements for wildlife management by the aerodrome operators (ADR-OPS.B.020, AMC-ADR-OPS.B.020, as well GM1-ADROPS. B.020 up to GM4-ADR-OPS.B.020). As far as the issue of technical equipment for wildlife monitoring in darkness and in reduced visibility is concerned, the Agency intends to address it through rulemaking task RMT.0161/0162 [requirements for systems, constituents and equipment used in air traffic management (ATM)/air navigation services (ANS) and aerodromes (ADR)] of the Agency's rulemaking programme 2012-2015.</i></p> <p><i>EASA Recommendation status: Open'</i></p>	
<b>Comments:</b>	<p>The AIB has informed the EASA that it is awaiting the result of the future work before closing the recommendation.</p>	



<b>DENM-2010-004</b>		<b>Closed</b>
<p>The Accident Investigation Board, Denmark makes the following recommendations to the European Aviation Safety Agency (EASA):</p> <p>The European Aviation Safety Agency (EASA) evaluates the design, and/or possibly introduces a maintenance scheme including wear and tear limitations for the flaps locking device as well as an adjustment procedure for the handle spring, so that unintentional changing of the flaps position is not possible.</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>Upon crossing the beginning of runway 27 at 10-15 metres altitude, the air brake was fully opened. Shortly after - at 5-8 metres altitude - the pilot heard loud rattling noises followed by a loud bang. The glider decelerated drastically as it hit the runway 27 without the pilot regaining control. The glider was substantially damaged.</p>	<p>In its letter of 22 March 2012, the EASA informed the AIB as follows:</p> <p><i>'A maintenance information has been approved by EASA (Ref. minor change 100367696). The Service Bulletin (SB) covers both aspects addressed in the Safety Recommendation.'</i></p>	
<b>Comments:</b>		
Following the EASA's response, the AIB has closed the recommendation.		

<b>DENM-2010-005</b>		<b>Open</b>
<p>The Accident Investigation Board, Denmark makes the following recommendations to the European Aviation Safety Agency (EASA):</p> <p>The Danish Transport Authority evaluates and optimizes the use of stop bar lights and the proximity denotations of runway-holding positions at Danish airports (like H24 use of stop bar lights and enhanced taxi- way centerline markings).</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>Aircraft A inadvertently crossed the stop line to runway 04L on taxiway A7 and entered the runway's safety area while aircraft B was taking off. The minimum horizontal and vertical distances between the aircraft were 19.5 m and 175 ft respectively. The traffic load at the time of the incident was estimated to be medium to high.</p> <p>The incident occurred in the dark, in drifting snow.</p>		
<b>Comments:</b>		
The AIB is awaiting the Danish Transport authority's response to the recommendation.		

<b>DENM-2010-006</b>		<b>Open</b>
<p>The Accident Investigation Board recommends that the Danish Transport Authority and the Danish Ultralight Flying Association (DULFU) amend the retraining requirements so that it is not possible for someone to undergo extended retraining without an instructor.</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>The flight during which the accident took place was a flight planned from Herning airfield to a local airfield near Grønbæk, from where the pilot had come earlier in the day. Before the flight, the pilot had a training flight at Herning airfield, as part of his retraining to fly and be an instructor in Rans S-12 aircraft. He had performed five take-off and landing exercises (touch &amp; go) prior to the return flight to Grønbæk.</p> <p>After taking off from runway 27, the ultralight (UL) aircraft climbed with its nose very high to around 40-50 metres. The engine began to run erratically before stalling. The ultralight aircraft dipped its nose a little, swayed slightly from side to side, then suddenly nose-dived towards the ground in a clockwise spin.</p> <p>The ultralight aircraft hit the ground with its nose in an almost vertical position</p>	<p>A meeting was held on 23 March 2011 with the Danish Transport Authority and the DULFU at which it was discussed how the recommendation could be implemented.</p>	
<b>Comments:</b>		
<p>The AIB is awaiting action and a response to the recommendation from the Danish Transport Authority and the DULFU.</p>		

<b>DENM-2010-007</b>		<b>Open</b>
<p>The Accident Investigation Board recommends that the Danish Transport Authority and the DULFU assess current practice for the maintenance of aircraft and engines with a view to ensuring good maintenance practices.</p>		
<b>Synopsis:</b>	<b>Response to recommendation:</b>	
<p>See DENM-2010-6</p>	<p>A meeting was held on 23 March 2011 with the Danish Transport Authority and the DULFU at which it was discussed how the recommendation could be implemented</p>	
<b>Comments:</b>		
<p>The AIB is awaiting action and a response to the recommendation from the Danish Transport Authority and the DULFU.</p>		

<b>DENM-2010-008</b>		<b>Open</b>
<p>The Accident Investigation Board recommends that the Danish Transport Authority assess and carry out a risk assessment of the general maintenance rules laid down by the DULFU with a view to ensuring effective quality assurance and/or quality control.</p>		
<p><b>Synopsis:</b> See DENM-2010-6</p>	<p><b>Response to recommendation:</b> A meeting was held on 23 March 2011 with the Danish Transport Authority and the DULFU at which it was discussed how the recommendation could be implemented.</p>	
<p><b>Comments:</b> The AIB is awaiting action and a response to the recommendation from the Danish Transport Authority and the DULFU.</p>		

<b>DENM-2011-001</b>		<b>Open</b>
<p>The Danish Accident Investigation Board recommends EASA: To a review of the TAE-125-01 diesel engine design with the emphasis on the fail-safe design principle and how it's been applied to an individual engine component, as well as to the complete power plant system including its electronic failure modes.</p>		
<p><b>Synopsis:</b></p> <p>The one second drop in the fuel rail pressure shown in the downloaded FADEC ECU data strongly suggested that the engine had suffered from an electrical interruption failure of the rail pressure valve or other related parts of the engine FADEC system. However, the investigation has not been able to recreate the electrical failure why evidence was not available to allow the cause of the incident to be determined with any degree of certainty. The investigation found that the FADEC system, in case of an electrical interruption failure in the fuel rail pressure control closed loop system of the FADEC, was not fail safe. In most cases, the FADEC system would fail in the safe direction. However, when an electrical interruption occur in this system the rail pressure drops to a minimum of 130 BAR within one second causing the engine to lose power.</p>	<p><b>Response to recommendation:</b></p>	
<p><b>Comments:</b> The AIB is awaiting the EASA's response to the recommendation.</p>		

<b>DENM-2011-002</b>		<b>Open</b>
<p>The Accident Investigation Board recommends that the Danish Transport Authority draw up a procedure or guide with reference to the checklists used when inspecting aircraft. The procedure should ensure that the flight controls are thoroughly checked when work has been carried out on them or when they have been subject to extensive maintenance.</p>		
<b>Synopsis:</b>		<b>Response to recommendation:</b>
<p>The incident occurred during a local VFR flight from Billund Airport (EKBI).                  The pilot started from runway 09, from where the aircraft – which was equipped with a tail wheel – after a take-off run of around 300 m took off, lifted its nose and continued upwards at a steep angle of climb. The pilot pushed the controls forward to bring the aircraft’s nose down, but this failed to work. He then pulled the throttle back to the idle position. At an altitude of approximately 15-20 m the aircraft stalled and its nose tipped downward at a steep angle of around 30° - 40°. The aircraft continued downward until its nose hit the runway. It continued for around 10 m before coming to a stop in the grass on the northern edge of the runway.</p>		<p>The Danish Transport Authority acknowledged receipt of the recommendation and a meeting was held on 15 March 2012 at which it was discussed how the recommendation could be implemented.</p>
<b>Comments:</b>		
<p>The AIB is awaiting the Danish Transport Authority’s action and response to the recommendation.</p>		

## ANNEX 2

### STATUS OF RECOMMENDATIONS IN THE RAILWAYS SECTOR

**Explanation of the terminology used by the Accident Investigation Board:**

**Open:** All cases where it has not yet been decided whether to implement a measure, or where implementation has been started but not completed.

**Carried out:** All cases where, on the basis of the Danish Transport Authority's feedback on 'compliance', a recommendation is deemed essentially to have been fulfilled.

**Closed:** Cases where the recommendation has not been directly followed, but where initiatives have been implemented and the Danish Transport Authority as safety authority has assessed the initiatives as satisfactory, and will not take any further action.

**Rejected:** the Danish Transport Authority or other authority to which the recommendation was made has refused to comply.

**Published 2004**

<b>Head-on collision at Holstebro on 01.06.2004.</b>	
A departing regional train collided head-on with an IC train that was arriving. In the collision, which occurred at low speed, five people were injured. The regional train had not had the departure signal, but the signal that blocked or allowed access could not be seen from the point of departure due to platform equipment. The signal has since been moved.	
<b>R5 22.12.2004</b>	<b>Carried out</b>
It is recommended that Rail Net Denmark ensures (and the Danish Transport Authority follows up) that the signal commissioning work started after the collision at Kølkeær on 02.03.2000 is completed and that the case be closed with a report on the rectifications performed, which will then be assessed by the Danish Transport Authority.	
Response to recommendation: The Danish Transport Authority has been informed by Rail Net Denmark that the signal commission's work has been completed and that action has been taken regarding identified 'problem signals' and that Rail Net Denmark's signal commission remains active.	Comments:
<b>R7 22.12.2004</b>	<b>Carried out</b>
It is recommended that Rail Net Denmark harmonise safety equipment objectives and the visibility or operational options thereof, and that it sets out guidelines for the circumstances under which and for how long there may be a difference between the actual objectives and visibility or operation.	
Response to recommendation: The Danish Transport Authority explained that in connection with the Herning-Holstebro track reconditioning in 2011 a condition was imposed that Rail Net Denmark create consistency between the display on control media and the design of the equipment, and that the requested guidelines have been laid down as part of the project 'extending the life of DSB 1977 equipment'.	Comments: The recommendation that guidelines be set out for the circumstances under which and for how long there may be a difference between the actual objectives and visibility or operation concerned all safety equipment types, not just DSB type 1977.

None open

**Published 2006**

None open

**Published 2007**

<b>Collision between car and train near Rindsholm on 20.04.2006</b>	
Shortly before the train was due to pass over the crossing, a private car drove out in front of the train. A collision could not be avoided, and the car was hit. Several factors either influenced or could have influenced the occurrence of the accident and the sequence of events. A lack of signs and visibility, including the fact that on many occasions the gate was open without being in use, thereby allowing cars to pass over the crossing without stopping. In addition, the escape time had been calculated on the basis of crossings with single tracks and this was a twin-track crossing.	
<b>R1 19.04.2007</b>	<b>Carried out</b>
The AIB recommends that the Danish Transport Authority ensure that the 'Rules for securing railway crossings open to general traffic' are updated and completed.	
Response to recommendation: Rail Net Denmark has secured the specific crossing in accordance with the applicable provisions – including reducing the speed to 75 km/h, straightened out the configuration of the ground, etc., and carried out a risk assessment.	Comments: Regulation No 1142 of 07.12.2011, the Crossing Regulation, 'Guideline on safety at level crossings managed by Rail Net Denmark that are open to general traffic' of 8 February 2012.
<b>R2 19.04.2007</b>	<b>Carried out</b>
The AIB recommends that the Danish Transport Authority assess whether it is justifiable from a safety viewpoint to allow crossings secured with a gate on stretches with a speed in excess of 75 km/h and that measures be taken in line with the results of the assessment.	
Response to recommendation: Rail Net Denmark has secured the specific crossing – including reducing the speed to 75 km/h through Rindsholm. The assessment of speeds at crossings secured with a gate has been undertaken as part of the work on the 'Rules for securing railway crossings open to general traffic', which is expected to be completed by September 2010. The Danish Transport Authority considers the recommendations to have been complied with.	Comments: Regulation No 1142 of 07.12.2011, the Crossing Regulation, 'Guideline on safety at level crossings managed by Rail Net Denmark that are open to general traffic' of 8 February 2012.
<b>R3 19.04.2007</b>	<b>Carried out</b>
The AIB recommends that the Danish Transport Authority assess whether it is justifiable to allow crossings that cross more than one track to be secured with gates, and that measures be taken in line with the results of the assessment.	
Response to recommendation: Rail Net Denmark has secured the specific crossing in accordance with the applicable provisions – including carrying out a satisfactory risk assessment.	Comments: The Crossing Regulation, 'Guideline on safety at level crossings managed by Rail Net Denmark that are open to general traffic' of 8 February 2012

<b>Derailment near Ellebjerg on blocked track on 18.07.2007</b>	
Three sleeper transport wagons were derailed while shunting on blocked track near the old Ellebjerg station on the S-track to Køge. The track (left track Copenhagen H – Åmarken) was being reconditioned.	
<b>R2 17.07.2008</b>	<b>Open</b>
The Danish Transport Authority should ensure compliance with the requirements on the training of personnel involved in reconditioning track (including subcontractors' personnel), including monitoring the rail safety conditions beyond those relating purely to track reconditioning.	
<b>Response to recommendation:</b> The Danish Transport Authority states that in the spring of 2010 four competence rail standards are being approved on an interim basis by the Danish Transport Authority.	<b>Comments:</b> The Accident Investigation Board is awaiting information on final approval of the rail standards

**Published 2009**

<b>Collision with combine harvester at crossing near Borris on 28.07.2008</b>	
A combine harvester was hit at a crossing and was thrown into a field, where it landed on its roof and burst into flames.	
<b>R1 08.01.2009</b>	<b>Open</b>
Together with the Danish Road Directorate, the Danish Transport Authority is to assess the practicalities of driving across railways in high, slow vehicles and the possibilities of creating high visibility road signals on crossings for vehicles with elevated driving positions.	
<b>Response to recommendation:</b> With the assistance of the Road Directorate, the Danish Transport Authority has assessed the specific crossing, but has not yet assessed the general problem	<b>Comments:</b> The Accident Investigation Board is awaiting the assessment.
<b>R2 08.01.2009</b>	<b>Open</b>
In conjunction with the Road Directorate, the Danish Transport Authority should assess the rate which unmanned crossings (crossings secured with warning signalling) are being upgraded to manned crossings (crossings secured with barriers), if necessary with crossings taken out of service, including assessing the rules for equipping railways with unmanned and/or manned crossing facilities.	
<b>Response to recommendation:</b> The Danish Transport Authority has not yet assessed the rate of upgrading or the possibility of closures.	<b>Comments:</b> The Accident Investigation Board is awaiting the assessment.

<b>Train collided with lorry on crossing near Soderup on 19.09.2009</b>	
Shortly after leaving Tølløse, a unit collided with a lorry on a crossing secured with a half-barrier. An engine driver and the lorry driver were killed in the collision, the train was derailed and the lorry burned out completely, and parts of the crossing facilities were destroyed.	
<b>R1 30.06.2010</b>	<b>Open</b>
The Danish Transport Authority – if appropriate in collaboration with the Danish Road Directorate – should assess what further measures can be taken to reduce the risk of collision with heavy road vehicles by reducing the number of times such vehicles use railway crossings.	
Response to recommendation: The Danish Transport Authority states that the recommendation is being discussed in a newly established crossing forum and that it will decide on whether to implement the recommendation on that basis.	Comments:
<b>R2 30.06.2010</b>	<b>Open</b>
The Danish Transport Authority should assess the need for ongoing evaluation of safety conditions by the road authorities on secured railway crossings.	
Response to recommendation: The Danish Transport Authority states that the recommendation is being discussed in a newly established crossing forum and that it will decide on whether to implement the recommendation on that basis. Follow-up is ongoing.	Comments:

**Published 2011**

None



## **ANNEX 3**

### **STATISTICS FOR THE AVIATION SECTOR**

The statistics for aviation accidents and incidents take into account the aviation accidents and incidents reported for 2011 involving Danish and foreign-registered aircraft which the Aviation Unit is obliged to investigate.

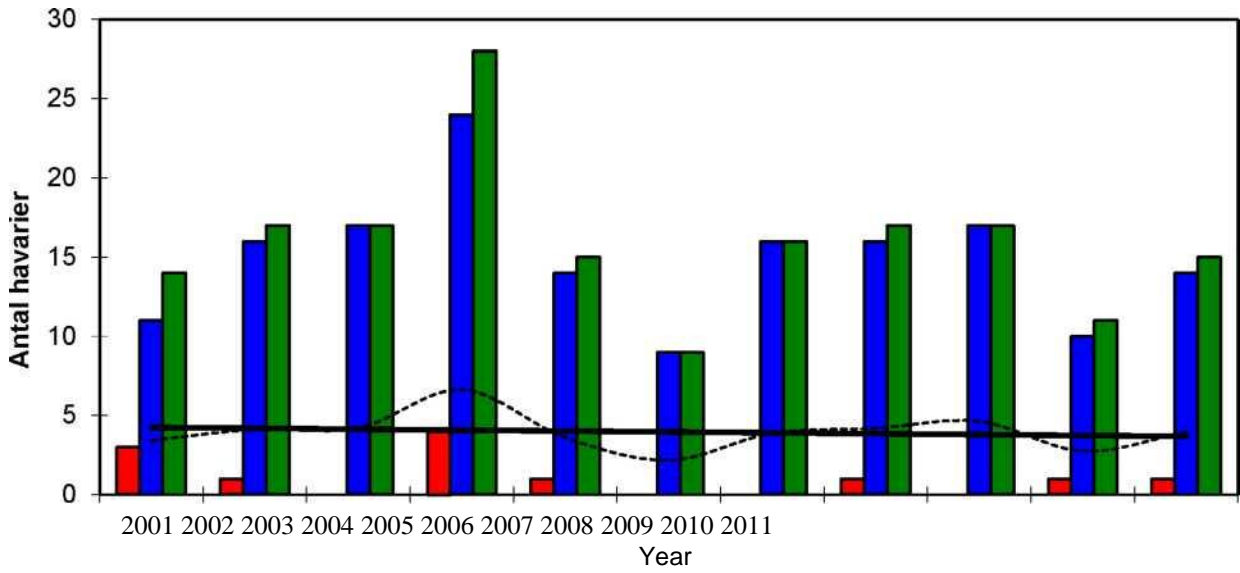
The statistics are produced so as to give an overview of the number of aviation accidents and incidents within Danish aviation as a whole, as well as the number of aviation accidents and incidents within the six main areas into which Danish aviation is divided. These six areas are: scheduled, charter, taxi, training, other commercial and private flights. The recreational aviation areas of glider flights, ultralight and balloon flights are not included in Danish aviation, but are listed in separate statistics for each recreational area.

For 2011, diagrams have also been drawn up for aviation accidents and incidents involving foreign-registered aircraft in Danish territory, where the Accident Investigation Board has been in charge of an investigation. Rate and trend are not calculated for foreign-registered aircraft.

The statistics also show how the rate of aviation accidents and incidents changes from year to year. The rate is calculated as the number of aviation accidents and incidents per 100 000 flying hours. Based on the calculated rate, the trend in aviation accidents and incidents is calculated using the least squares method. Trend gives a picture of a rising or falling occurrence of aviation accidents or incidents on the basis of the number of reported flying hours.

The number of flying hours within Danish aviation is reported to the Civil Aviation Administration Denmark. The statistics on aviation accidents and incidents broken down according to the flight's purpose are drawn up in line with the classification of the ICAO ADREP Manual.

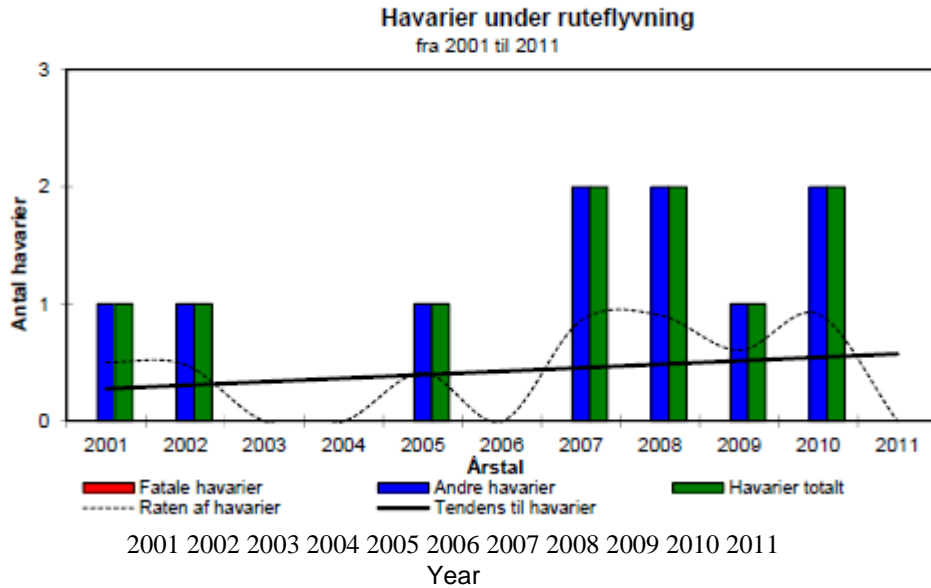
### Accidents in Danish aviation from 2001 to 2011



Number of accidents

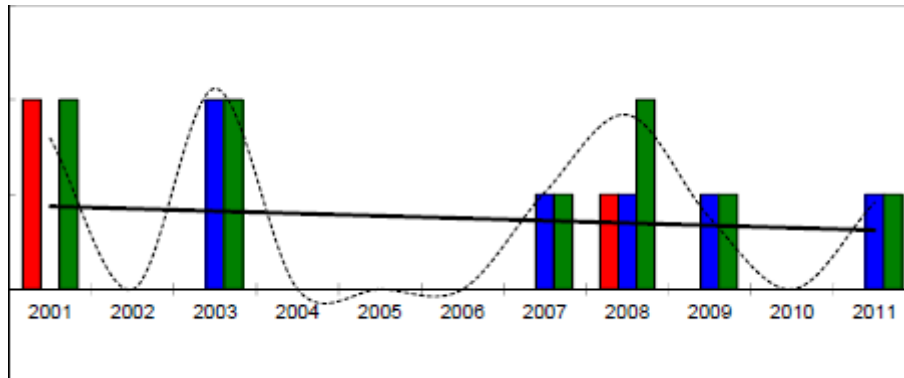
Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

### Accidents on scheduled flights from 2001 to 2011



Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

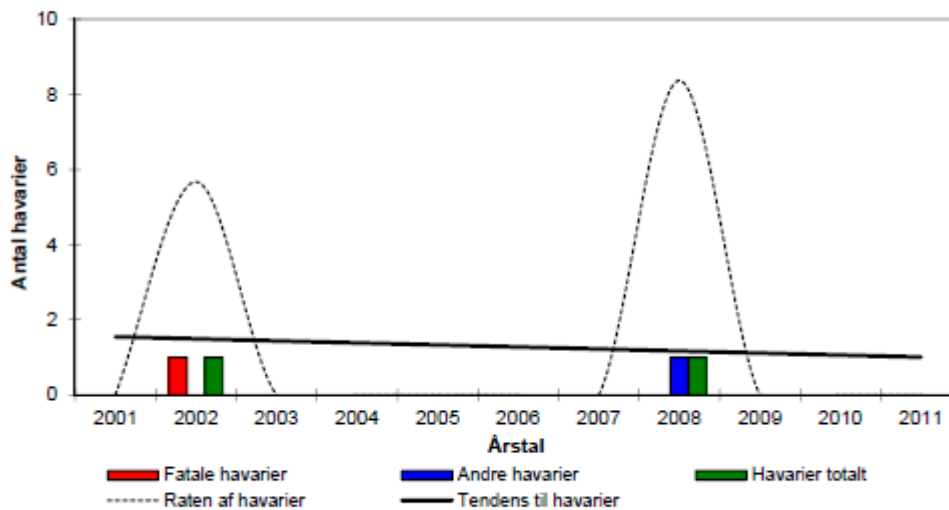
### Accidents on charter flights from 2001 to 2011



**Number of accidents YEAR**

Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

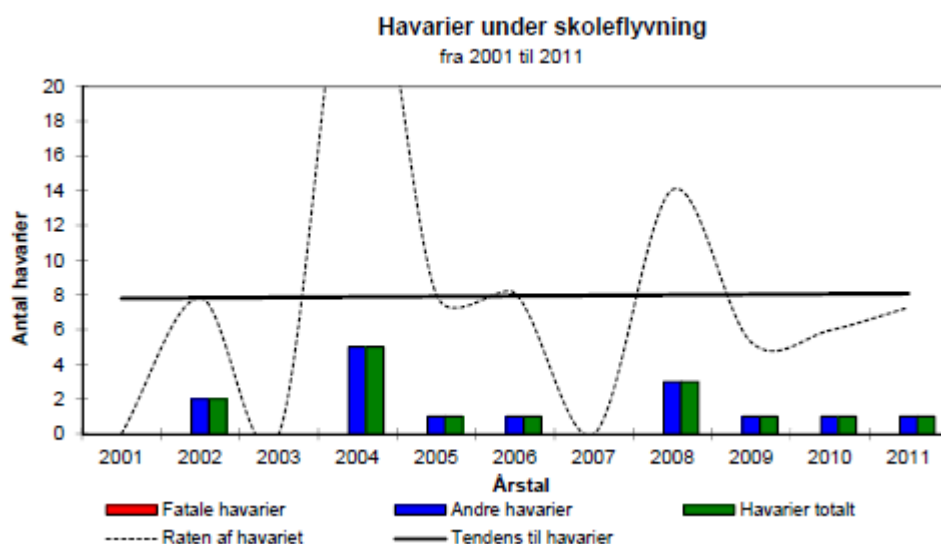
### Havarier under taxaflyvning fra 2001 til 2011



### Accidents on taxi flights from 2001 to 2011

**Number of accidents YEAR**

Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

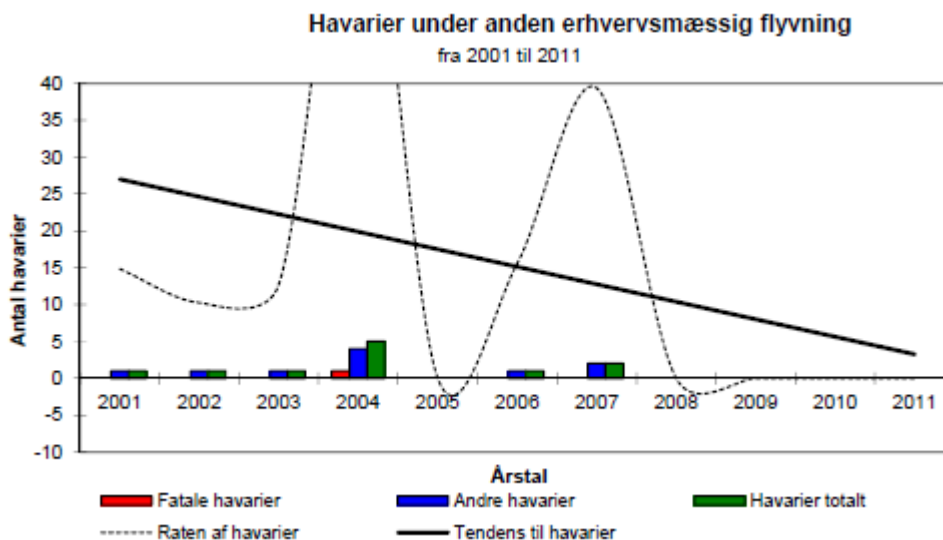


### Accidents on training flights from 2001 to 2011

#### Number of accidents YEAR

Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

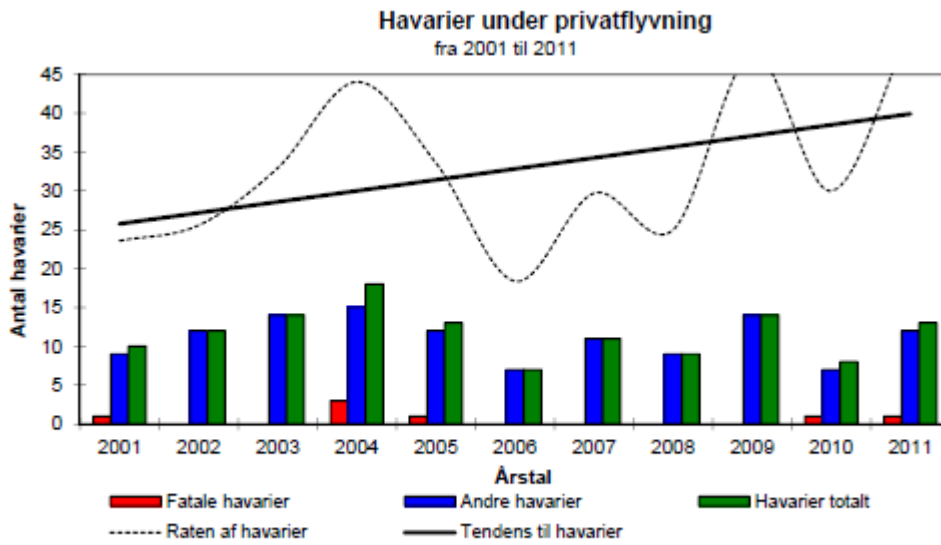
### Accidents on other commercial flights from 2001 to 2011



#### Number of accidents YEAR

Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

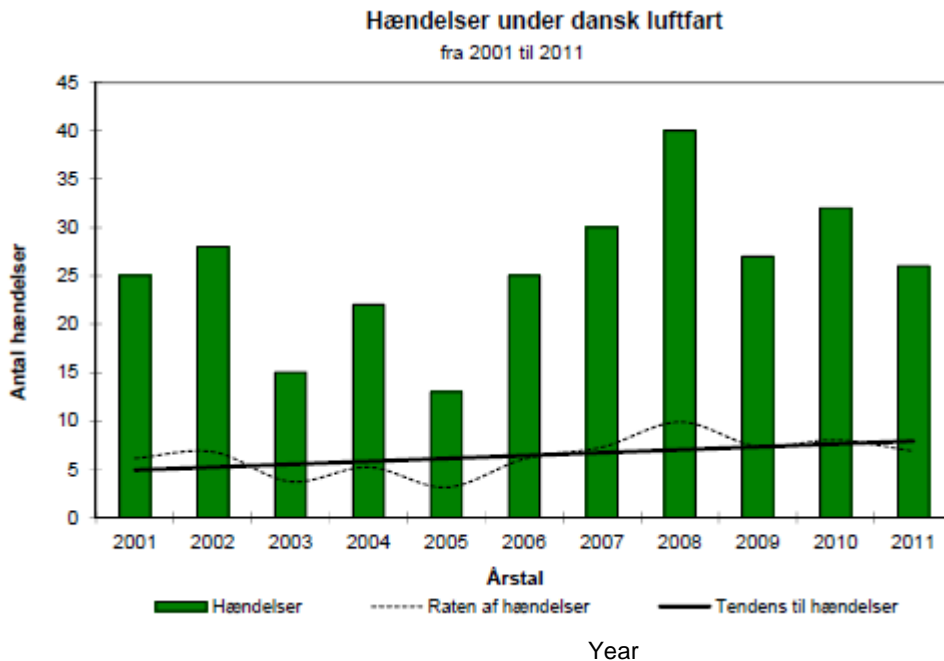
### Accidents on private flights from 2001 to 2011



#### Number of accidents YEAR

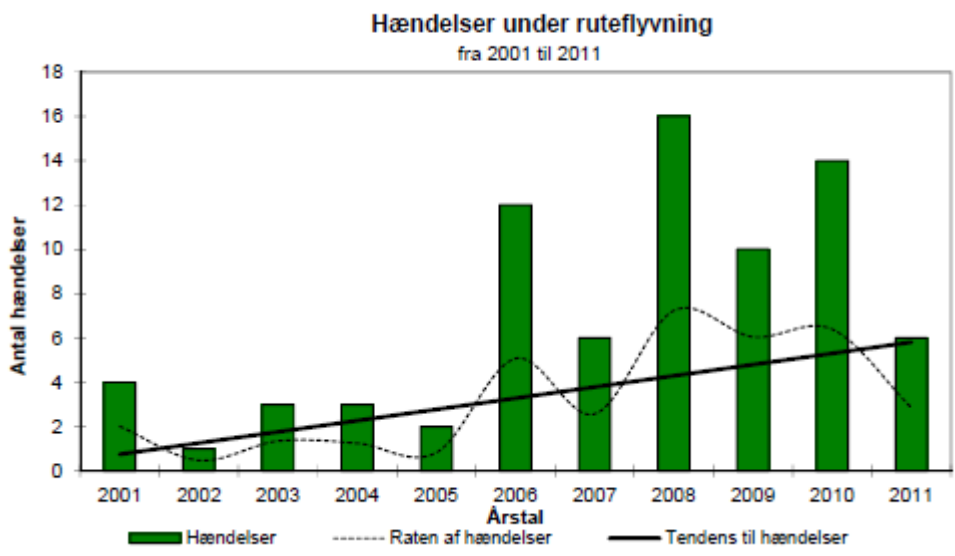
Fatal accidents	Other accidents	Total accidents
Rate of accidents	Accident trend	

### Incidents in Danish aviation from 2001 to 2011



Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

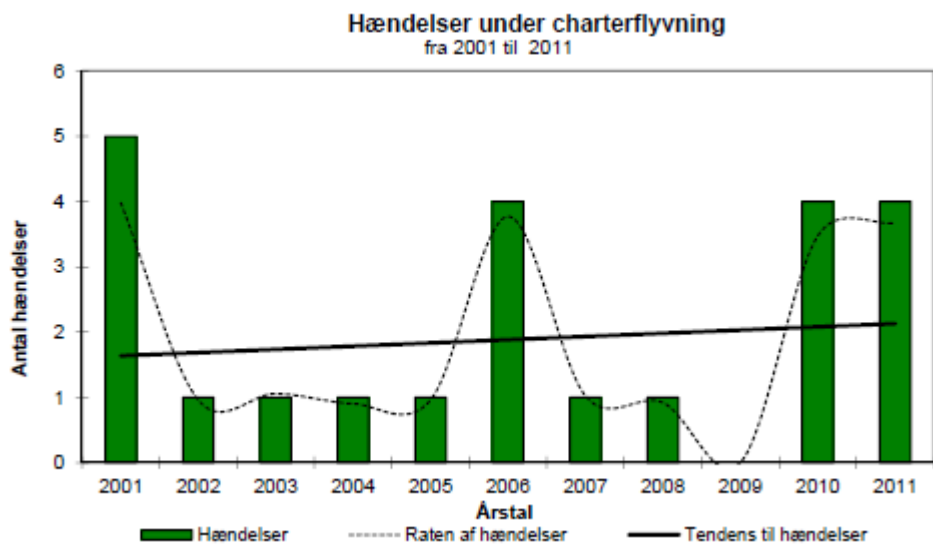
Number of incidents



Incidents on scheduled flights  
from 2001 to 2011  
Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

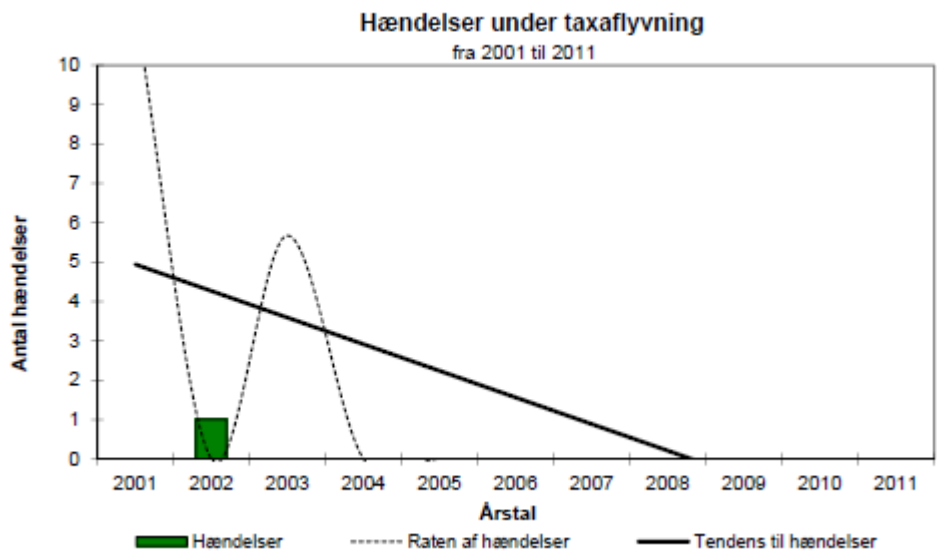
Number of incidents



Incidents on charter flights  
from 2001 to 2011  
Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

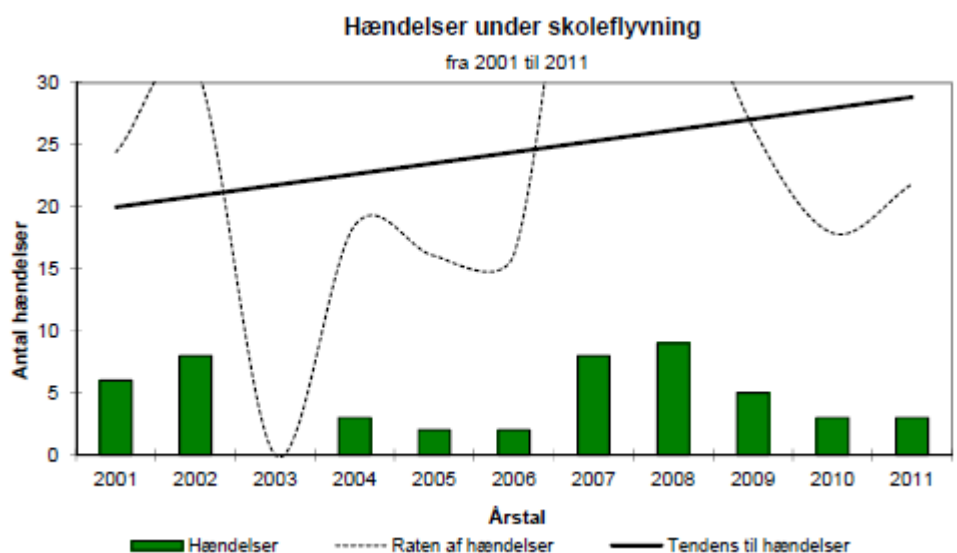
Number of incidents



Incidents on taxi flights  
 from 2001 to 2011  
 Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

Number of incidents



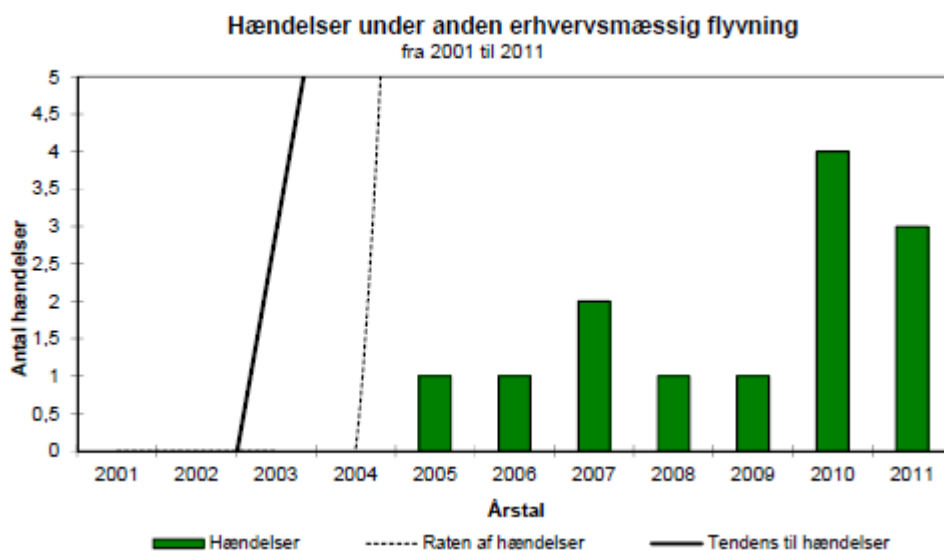
Incidents on training flights  
 from 2001 to 2011  
 Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

Number of incidents



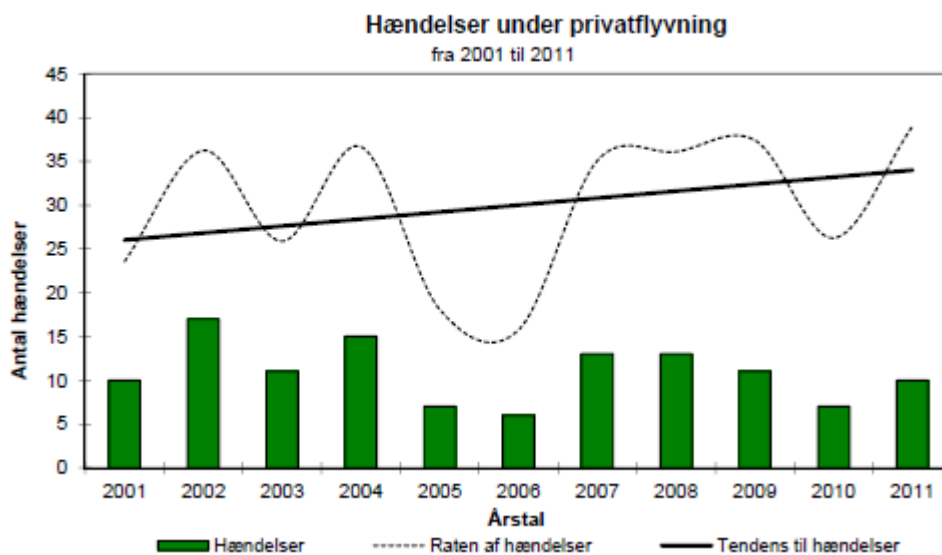




Incidents on other commercial flights  
from 2001 to 2011  
Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

Number of incidents

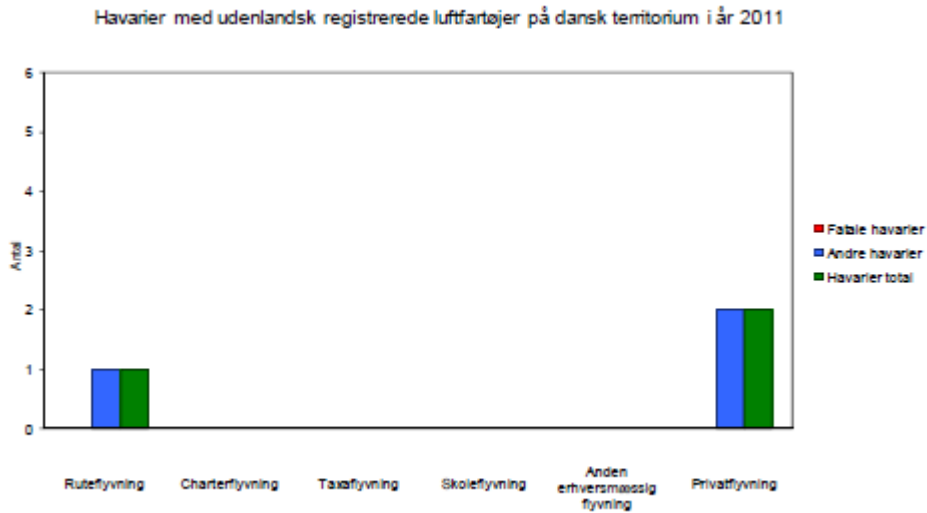


Incidents on private flights  
from 2001 to 2011  
Year

Hændelser	Raten af hændelser	•Tendens til hændelser
Incidents	Rate of incidents	•Incident trend

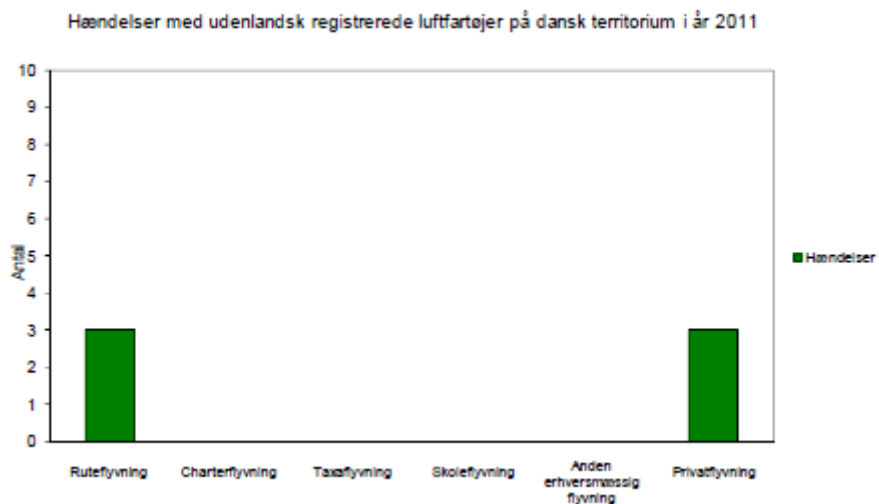
Number of incidents

Accidents involving foreign-registered aircraft on Danish territory in 2011



Ruteflyvning	Charterflyvning	Taxaflyvning	Skoleflyvning	Anden erhvervmæssig flyvning	Privatflyvning
Scheduled flights	Charter flights	Taxi flights	Training flights	Other commercial flights	Private flights
Fatale havarier		Andre havarier		Havarier total	
Fatal accidents		Other accidents		Total accidents	

Incidents involving foreign-registered aircraft on Danish territory in 2011



Incidents

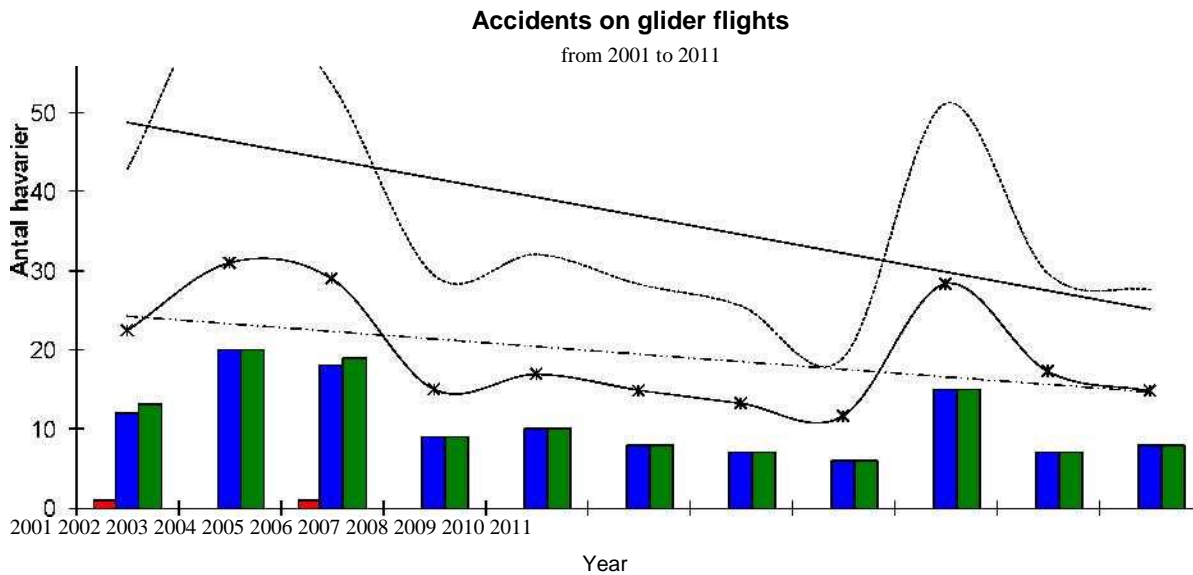
Ruteflyvning	Charterflyvning	Taxaflyvning	Skoleflyvning	Anden erhvervmæssig flyvning	Privatflyvning

Scheduled flights	Charter flights	Taxi flights	Training flights	Other commercial flights	Private flights
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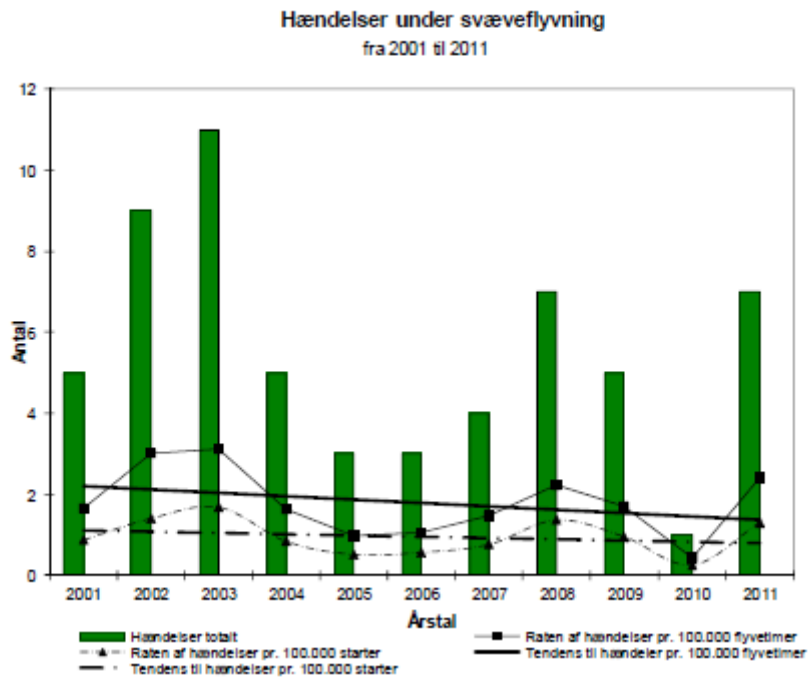
## Gliding

For glider flights, the rate of accidents and incidents is calculated as the number of accidents and incidents per 100 000 flying hours and per 100 000 take-offs. On the basis of the calculated rate, the accidents and incidents trend is calculated using the least squares method.

The trend shows whether aviation accidents or incidents are increasing or decreasing in number from the perspective of the number of flying hours reported to the Civil Aviation Administration Denmark (changed to the Danish Transport Authority in 2011).



Fatale havarier	Fatal accidents	Andre havarier	Other accidents
Havarier totalt	Total accidents	Raten af havarier pr. 100.000 flyvetimer	Rate of accidents per 100 000 flying hours
Raten af havarier pr. 100.000 starter	Rate of accidents per 100 000 take-offs	Tendens til havarier ud fra flyvetimer	Accident trend based on flying hours
Accident trend ud fra starter	Accident trend based on take-offs		



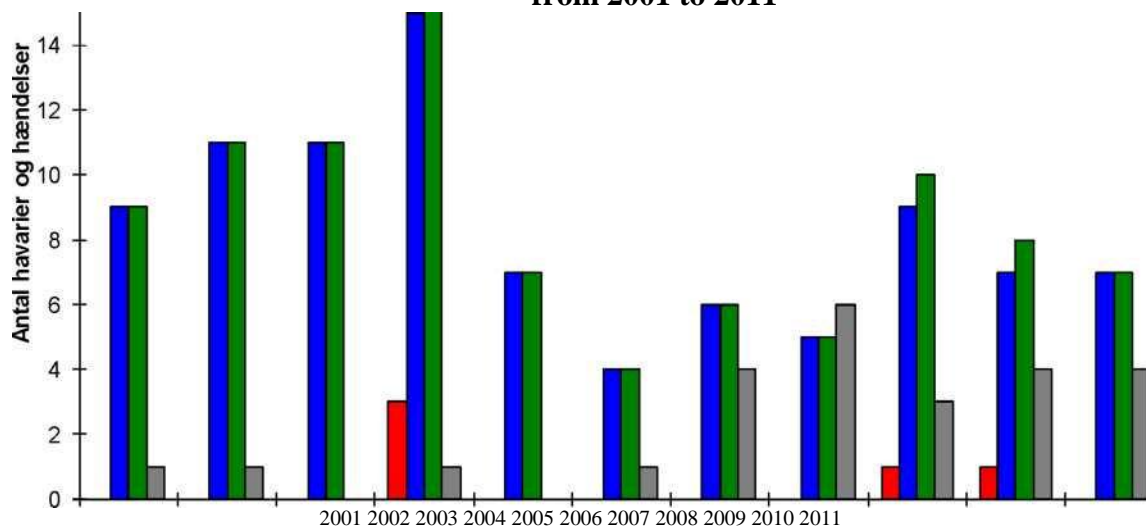
**Incidents on glider flights  
 from 2001 to 2011**

Årstal		Year	
Hændelser totalt	Total incidents	Raten af hændelser pr. 100.000 flyvetimer	Rate of incidents per 100 000 flying hours
Raten af hændelser pr. 100.000 starter	Rate of incidents per 100 000 take-offs	Tendens til hændelser pr. 100.000 flyvetimer	Incident trend per 100 000 flying hours
Tendens til hændelser pr. 100.000 starter	Incident trend per 100 000 take-offs		

## Ultralight flights

The number of accidents and incidents is also recorded for ultralight aircraft. The number of flying hours has not previously been recorded, but the Danish Ultralight Flying Association has begun collating flying hours in connection with the renewal of ultralight flight flying permits. The Accident Investigation Board will begin to include rates and trends once there are sufficient data for accurate statistics.

**Accidents and incidents with ultralight aircraft  
from 2001 to 2011**



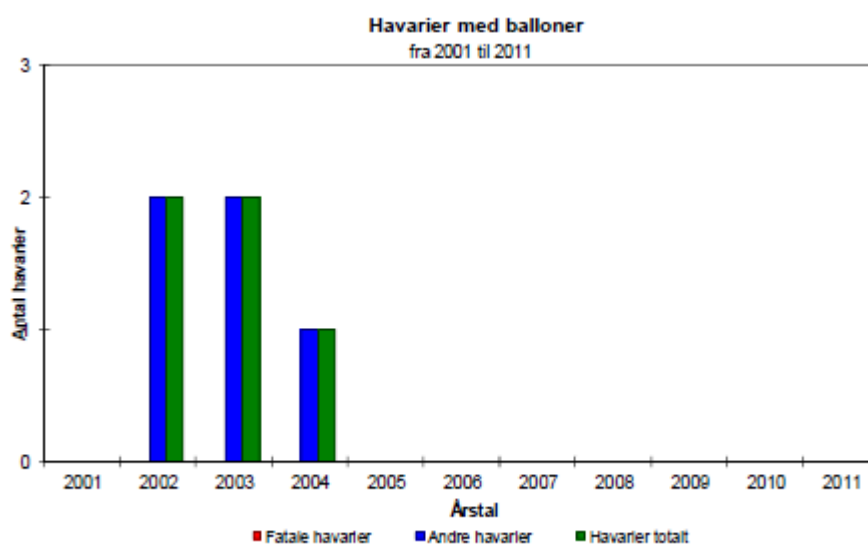
Årstal	Year
Antal havarier og hændelser	Number of accidents and incidents

Fatale havarier	Fatal accidents
Andre havarier	Other accidents
Havarier totalt	Total accidents
Hændelser	Incidents

## Balloon flights

For balloons, the number of accidents is recorded. The number of incidents and the flying hours are not recorded.

### Accidents with balloons from 2001 to 2011



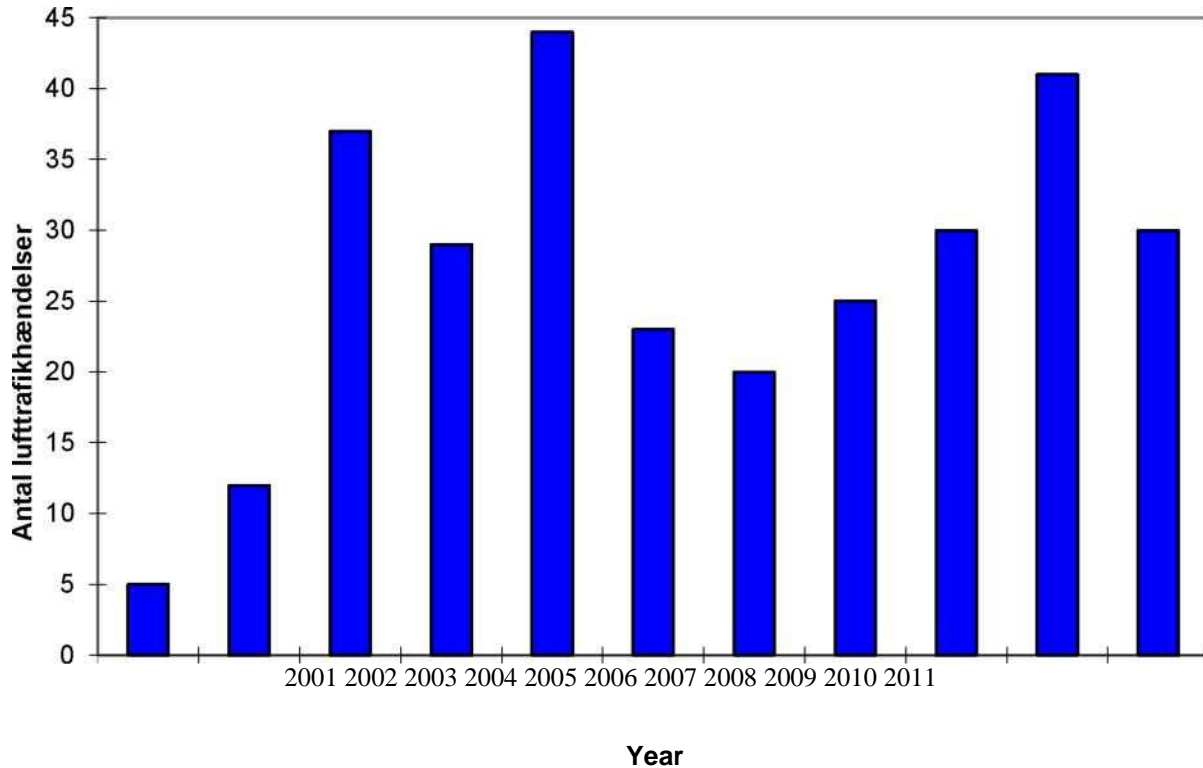
Year  
 Fatal accidents     Other accidents     Total accidents



### Danish Flight Information Region (FIR)

Air traffic incidents in Danish FIR cover both Danish and foreign-registered aircraft. The number of air traffic incidents is shown as the number of incidents handled each year. The rate and trend are not included under air traffic incidents.

**Air traffic incidents in Danish FIR**  
from 2001 to 2011



### Number of air traffic incidents

## ANNEX 4

### STATISTICS FOR THE RAILWAYS SECTOR

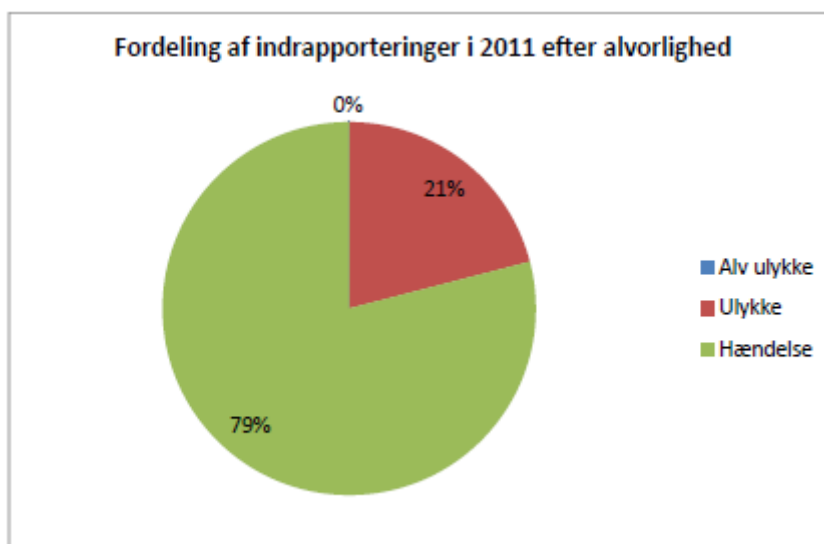
The statistical overviews for the railways sector are currently limited to presenting data from 2011 in relation to

- the breakdown of accidents and incidents by level of seriousness, and
- the breakdown of accidents/incidents by category.

In the railways sector, a common European database (ERAIL) is currently being developed. With ERAIL's implementation, it is expected that a series of standardised parameters will be defined and thereafter systematically recorded, which will make more complete statistical information easily accessible.

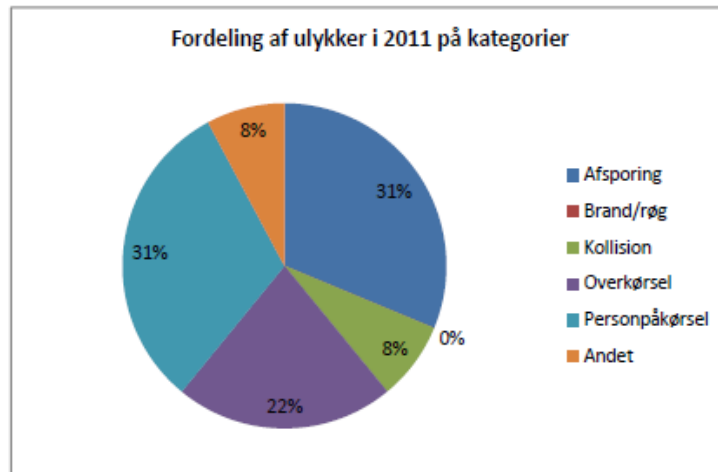
Each year, the Danish Transport Authority produces a safety report, which is based on annual reports from operators and infrastructure managers in Denmark. These reports also include those accidents and incidents that have been investigated by the Accident Investigation Board and discuss accident trends over a period of years. The accidents are looked at in relation to the amount of traffic on the railways (million train-km).

#### Breakdown of reports in 2011 by seriousness



Alv ulykke	Serious accident
Ulykke	Accident
Hændelse	Incident

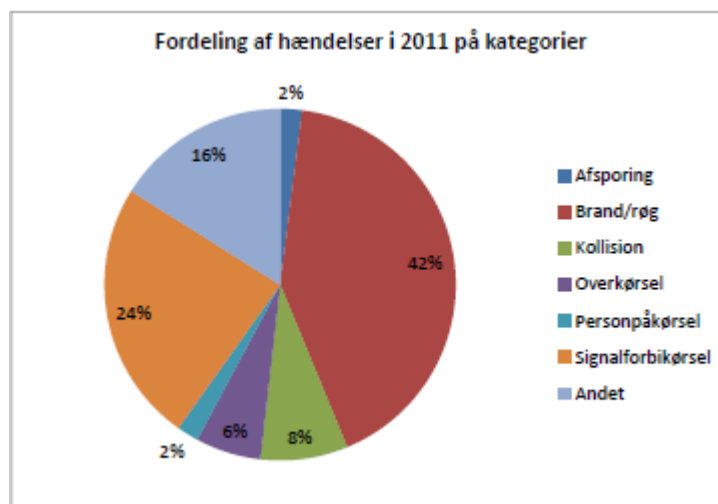
In 2011, 13 accidents were reported to the Accident Investigation Board, and these fell into five categories – derailments, collisions, level-crossing accidents, collisions with persons and other.



**Breakdown of accidents in 2011 by category**

Afsporing	Derailment
Brand/røg	Fire/smoke
Kollision	Collision
Overkørsel	Level crossing
Personpåkørsel	Collision with person
Andet	Other

In 2010, 60 incidents were reported to the Accident Investigation Board, and these were spread across all seven categories used by the Accident Investigation Board when recording incidents, with fire/smoke formation as the most represented single category.



**Breakdown of incidents in 2011 by category**

Afsporing	Derailment
Brand/røg	Fire/smoke
Kollision	Collision
Overkørsel	Level crossing
Personpåkørsel	Collision with person

Signalforbikørsel	Signal passed at danger (SPAD)
Andet	Other