



Statens haverikommission
Swedish Accident Investigation Board

ISSN 1400-5719

Report RL 2007:10e

**Aircraft incident to SE-LPT
at Umeå airport, AC county, Sweden,
on 19 September 2006**

Case L-25/06

SHK investigates accidents and incidents with regard to safety. The sole objective of the investigations is the prevention of similar occurrences in the future. It is not the purpose of this activity to apportion blame or liability.

The material in this report may be reproduced free of charge provided due acknowledgement is made.

Translated by Interpreter Centre, City of Göteborg, from the original Swedish at the request of the Swedish Accident Investigation Board.

This report is also available on our web site: www.havkom.se

Statens haverikommission (SHK) Swedish Accident Investigation Board

Postaddress/Postal address
P.O. Box 12538
SE-102 29 Stockholm Sweden

Besöksadress/Visitors
Teknologgatan 8 C
Stockholm

Telefon/Phone
Nat 08-555 017 70
Int +46 8 555 017 70

Fax/Facsimile
Nat 08 555 017 90
Int +46 8 555 017 90

E-mail Internet
info@havkom.se
www.havkom.se



Swedish Civil Aviation Authority

601 73 NORRKÖPING

Report RL 2007:10e

The Swedish Accident Investigation Board has investigated an incident that occurred on 19 September 2006 at Umeå airport, AC county, to an aircraft registered SE-LPT.

In accordance with section 14 of the Ordinance on the Investigation of Accidents (1990:717) the Board herewith submits a final report on the investigation.

The Board will be grateful to receive, by 20 January 2008 at the latest, particulars of how the recommendations included in this report are being followed up.

Carin Hellner

Stefan Christensen

Report RL 2007:10e	4
1 FACTUAL INFORMATION	6
1.1 History of the flight.....	6
1.1.1 Approach and landing	6
1.1.2 Discovery of the event.....	6
1.2 Injuries to persons	7
1.3 Damage to aircraft	7
1.4 Other damage.....	7
1.5 Personnel information.....	7
1.5.1 Commander	7
1.5.2 Co-pilot.....	8
1.5.3 Cabin crew members	8
1.5.4 The crew members' duty schedule	8
1.6 The aircraft.....	8
1.7 Meteorological information.....	9
1.8 Aids to navigation	9
1.9 Communications.....	9
1.10 Aerodrome information.....	9
1.11 Flight recorders.....	9
1.11.1 Flight Data Recorder (FDR)	9
1.11.2 Cockpit Voice Recorder (CVR)	10
1.12 Incident site.....	11
1.12.1 The aircraft.....	12
1.13 Medical information	12
1.14 Fire.....	12
1.15 Survival aspects.....	12
1.15.1 General	12
1.15.2 Actions by the rescue services	12
1.16 Tests and research	12
1.16.1 Runway inspection.....	12
1.16.2 Runway lighting alarm system	13
1.17 Organisational and management information	13
1.18 Additional information	13
1.18.1 Equal opportunities aspects	13
1.18.2 Environmental aspects	13
1.18.3 Measures taken	14
2 ANALYSIS.....	14
2.1 The landing	14
2.2 Inspection of the runway condition	14
3 CONCLUSIONS	15
3.1 Findings.....	15
3.2 Causes of the incident	15
3.3 Similar events.....	15
4 RECOMMENDATIONS.....	15

Report RL 2007:10e

L-25/06
Report finalised 19 July 2007

<i>Aircraft; registration and type</i>	SE-LPT, BAe Systems ATP
<i>Class/airworthiness</i>	Standard
<i>Registered owner/Operator</i>	Gladshiem Aviation Finance AB/West Air Sweden AB
<i>Time of occurrence</i>	19 September 2006, at 02:07 hours, in darkness <i>Note:</i> All times are given in Swedish daylight saving time (UTC + 2 hours)
<i>Place</i>	Umeå airport, AC county, (posn. N63° 47.6' E020° 16.8'), 6 metres above sea level
<i>Type of flight</i>	Commercial air transport
<i>Weather</i>	According to the SMHI (Swedish Meteorological and Hydrological Institute) METAR at 01:50: Wind variable/1 knot, visibility 100 m in fog, RVR runway 14: 600 m, vertical visibility 100 feet, temperature/dew point +09/+08 °C, QNH 1003 hPa
<i>Persons on board:</i>	
<i>crew members</i>	2
<i>Injuries to persons</i>	None
<i>Damage to aircraft</i>	Limited
<i>Other damage</i>	One runway edge light damaged
<i>Commander:</i>	
<i>Sex, age, licence</i>	Male, 56 years, ATPL
<i>Total flying time</i>	4412 hours
<i>Flying hours previous 90 days</i>	76, all on type
<i>Number of landings previous 90 days</i>	47
<i>Co-pilot:</i>	
<i>Sex, age, licence</i>	Male, 33 years, CPL
<i>Total flying time</i>	525 hours
<i>Flying hours previous 90 days</i>	90, all on type
<i>Number of landings previous 90 days</i>	74

The Swedish Accident Investigation Board (SHK) was notified on 25 September 2006 that an aircraft with registration SE-LPT had an incident at 02:07 hours on 19 September at Umeå airport, AC county.

The incident has been investigated by SHK represented by Carin Hellner, Chairperson, Stefan Christensen, investigator in charge, and Henrik Elinder, technical investigator.

The investigation was followed by Ulrika Svensson, Swedish Civil Aviation Authority.

Summary

The aircraft was making an instrument approach to land at Umeå runway 14 in fog. As it landed the aircraft veered towards the left and one wheel struck a runway edge light. According to the commander the aircraft was not properly trimmed in yaw, which contributed to it veering to the left on landing. The crew did not notice that they had hit a runway edge light. The incident was first discovered during a routine technical inspection after the next flight. Despite a runway check, there were two take-offs that morning from Umeå airport while there were glass splinters on the runway, before an aircraft that was taxiing out reported the damage.

The incident was caused by poor monitoring of the aircraft heading while landing. Contributory factors were incorrectly set rudder trim, and the lack of centreline lighting on the runway.

Recommendations

It is recommended that the Swedish Civil Aviation Authority introduces a regulation that runway edge lighting is lit during runway inspections in darkness and/or conditions with limited visibility. (*RL 2007:10e R1*).

1 FACTUAL INFORMATION

1.1 History of the flight

1.1.1 *Approach and landing*

The aircraft departed from Stockholm/Arlanda airport for a freight flight with mail to Umeå airport. The first part of the flight proceeded normally, with the commander as PF (pilot flying). During the evening and night Umeå airport experienced thick fog, which caused some traffic disruption. However the fog thinned out somewhat during the early morning hours, and landings could then take place using the ILS¹ on runway 14. The minimum permitted runway visual range, RVR², is 550 metres, and the actual value when this landing commenced was 600 metres.

The approach took place as normal, with the autopilot activated. According to the commander, contact with the approach lights was made at about minimum height, and then at about 100 feet height the engine power was reduced. Just before touchdown the commander noticed that the aircraft was veering to the left. Despite immediate application of right rudder, the commander could not prevent the aircraft moving far to the left towards the left edge of the runway. He noticed that the aircraft was on the left side of the runway, but not that the main landing gear was outside the edge of the runway.

According to the commander, the aircraft had not been trimmed to obtain neutral rudder forces during take-off and landing. This is normally done earlier in the approach, but in the case of this approach the correct trim was not set before landing. This could have contributed to the aircraft veering to the left when the engine power was reduced.

1.1.2 *Discovery of the event*

After landing, the aircraft taxied in to the cargo apron to unload the mail and refuel. The crew went off duty and a new crew arrived to take over the aircraft ready for its next flight. A routine check of the runway was carried out by airport staff in a runway inspection vehicle at 05:20. The inspection discovered nothing out of the ordinary, except that the fog was lying thick on the runway.

At 06:50 and 07:00 respectively, two aircraft took off from runway 14. At 07:45 a further aircraft taxied out to take off from runway 14, and then reported that there were splinters of glass on the runway, and that it appeared that a runway edge light had been run over.

A further runway inspection was carried out and all the glass shards were removed from the runway before next take off. Inspection of the electrical department log revealed that a fault had occurred in a runway edge light at 02:07, i.e. at the same time that the aircraft in question had landed. Tracks in the sand off the edge of the runway, which could be associated with the event, showed that the left main landing gear wheel pair had been about 2.5 metres beyond the edge of the runway before returning to the runway. While rolling outside the runway, the wheels struck one of the runway edge lights.

¹ ILS = Instrument Landing System

² RVR = Runway Visual Range, meaning the visibility along the runway's high intensity lighting.

The new crew who later began their duty at Umeå performed an external inspection of the aircraft in accordance with company procedures. At this time no damage to the aircraft was discovered.

In connection with the next landing, at Luleå, a routine technical inspection was performed. The technician discovered at this time that brake no. 2 (left inner) looked abnormal. The aircraft was raised for a more detailed examination, during which it was discovered that the tyre had also suffered damage. The tyre had notches and cuts that could not be attributed to normal wear. The duty technician considered that the damage was been caused by contact with a foreign object.

The incident occurred at position N63° 47.6' E020° 16.8', 6 metres above sea level.

1.2 Injuries to persons

	<i>Crew members</i>	<i>Passengers</i>	<i>Others</i>	<i>Total</i>
Fatal	–	–	–	–
Serious	–	–	–	–
Minor	–	–	–	–
None	2	–	–	2
Total	2	–	–	2

1.3 Damage to aircraft

Limited.

1.4 Other damage

One edge light fixture at the left side of runway 14 was damaged by collision with the aircraft wheel.

1.5 Personnel information

1.5.1 Commander

The commander, male, was 56 years old at the time and had a valid Airline Transport Pilot Licence.

<i>Flying hours</i>			
<i>previous</i>	<i>24 hours</i>	<i>90 days</i>	<i>Total</i>
All types	1.5	76	4412
This type	1.5	76	126

Number of landings this type previous 90 days: 47.

Flight training on type carried out on 2 April 2006.

Latest PC (Proficiency Check) carried out on 2 April 2006 on ATP.

1.5.2 Co-pilot

The co-pilot, male, was 33 years old at the time and had a valid CPL Licence.

<i>Flying hours</i>			
<i>previous</i>	<i>24 hours</i>	<i>90 days</i>	<i>Total</i>
All types	1.5	90	525
This type	1.5	90	90

Number of landings this type previous 90 days: 74.
 Flight training on type carried out on 7 July 2006.
 Latest PC (Proficiency Check) carried out on 7 July 2006 on ATP.

1.5.3 Cabin crew members

Not applicable.

1.5.4 The crew members' duty schedule

For both pilots this was the first flight in their duty day, which itself was the first of a five day roster. The actual and planned duties had been within the permitted limits.

1.6 The aircraft

AIRCRAFT

<i>Manufacturer</i>	BAe Systems	
<i>Type</i>	ATP	
<i>Serial number</i>	2058	
<i>Year of manufacture</i>	1993	
<i>Flight mass</i>	Max. authorised take-off/landing mass 23,680 kg, actual 21,900 kg	
<i>Centre of mass</i>	Index 63, within the permitted range of 55-84.	
<i>Total flying time</i>	5777.9 hours	
<i>Number of cycles</i>	6048	
<i>Flying time since latest inspection</i>	2855.1 hours	
<i>Fuel loaded before event</i>	1,180 l	

ENGINES

<i>Manufacture</i>	Pratt and Whitney	
<i>Model</i>	126 A	
<i>Number of engines</i>	2	
<i>Engines</i>	<i>No. 1</i>	<i>No. 2</i>
<i>Total operating time, hrs</i>	16367	17538
<i>Operating time since overhaul</i>	5460	7311
<i>Cycles since overhaul:</i>	6268	8731

PROPELLERS

<i>Propellers</i>	Hamilton-Sundstrand 6/5500/F1	
<i>Propeller 1, operating hours since overhaul</i>	4603 hours	
<i>Propeller 2, operating hours since overhaul</i>	5778 hours	

The aircraft had a valid Certificate of Airworthiness.

1.7 Meteorological information

According to the SMHI (Swedish Meteorological and Hydrological Institute) METAR at 01:50:

Wind variable/1 knot, visibility 100 m in fog, vertical visibility 100 feet, RVR runway 14 600 metres, temperature/dew point +09/+08 °C, QNH 1003 hPa.

1.8 Aids to navigation

The aircraft performed a normal ILS approach to runway 14. No faults or abnormalities could be established concerning the ground equipment or the aircraft's navigational equipment.

1.9 Communications

Not applicable.

1.10 Aerodrome information

The airport status was in accordance with AIP³Sweden. Runway 14 dimensions are 2302 x 45 metres, laid with asphalt. The lighting consisted of controllable low and high intensity lamps on the approach and along the edges of the runway. The runway had a painted centreline without centreline lighting. The ground beyond the edges of the runway consisted of gravel and sand, of variable loading capacity.

At the time of the incident the runway was damp but not wet. There was no record of the braking friction being reduced.

1.11 Flight recorders

1.11.1 Flight Data Recorder (FDR)

The Fairchild type FDR (Flight Data Recorder) on the aircraft was retrieved after the incident. Relevant parameters were printed out and are shown as fig. 1 below.

³ AIP – Aeronautical Information Publication (Aeronautical information of a long term nature)

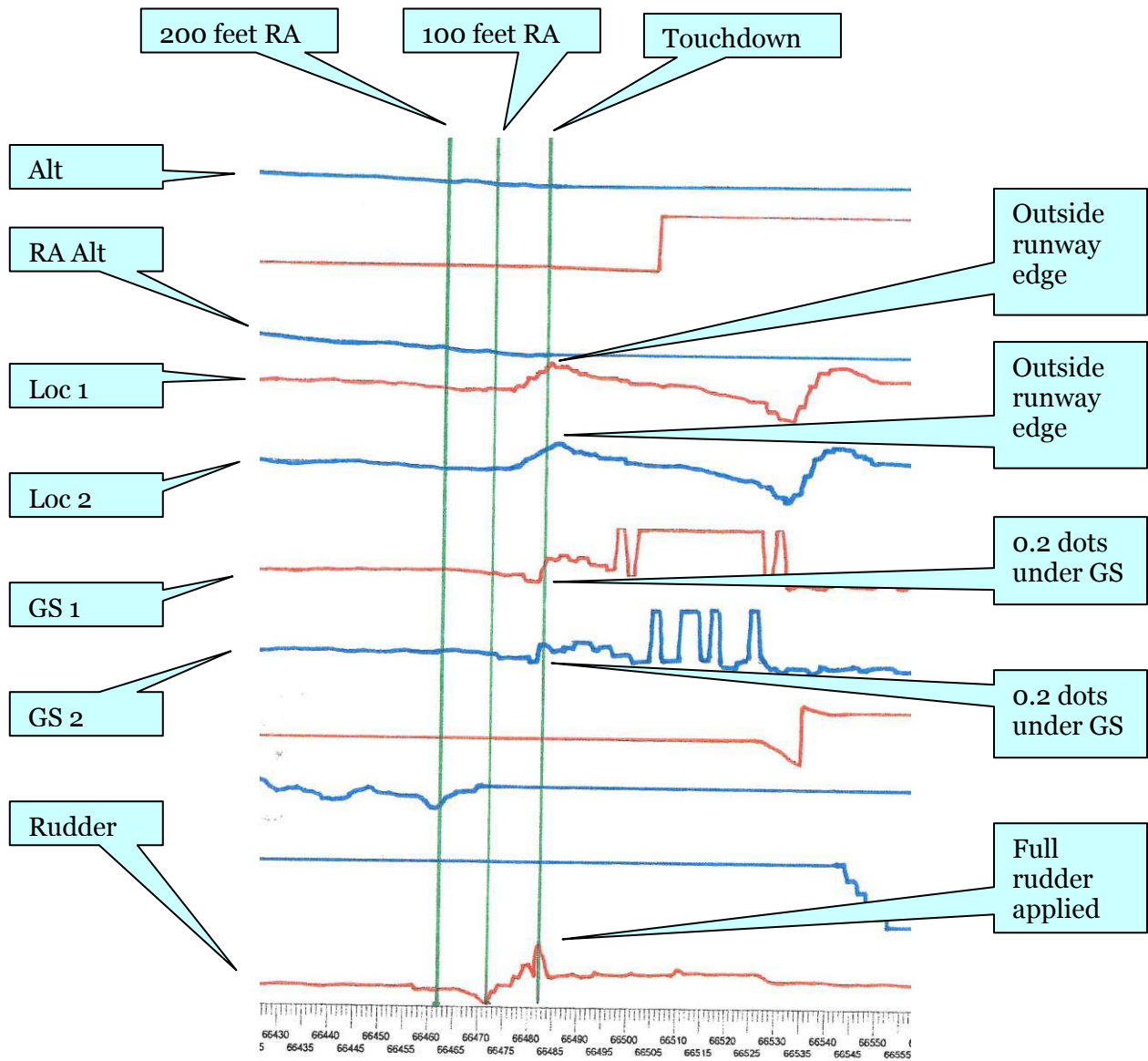


Fig 1.

Alt: Barometric height
 RA: Radar height above the underlying terrain
 Loc: Instrument Landing System (ILS) localizer signal
 GS: Instrument Landing System (ILS) glidepath

The printout reveals that the aircraft began to veer to the left at about 75 feet radar height, and that touchdown was at the left edge of the runway. After touchdown the aircraft continued further out to the left, but the heading was later corrected so that it came back on to the runway. Very large rudder deflections took place just before and in connection with touchdown.

1.11.2 Cockpit Voice Recorder (CVR)

The CVR (Cockpit Voice Recorder) was not removed from the aircraft immediately after the incident, so that the internal communication on board during the incident was overwritten before the incident report reached SHK.

1.12 Incident site

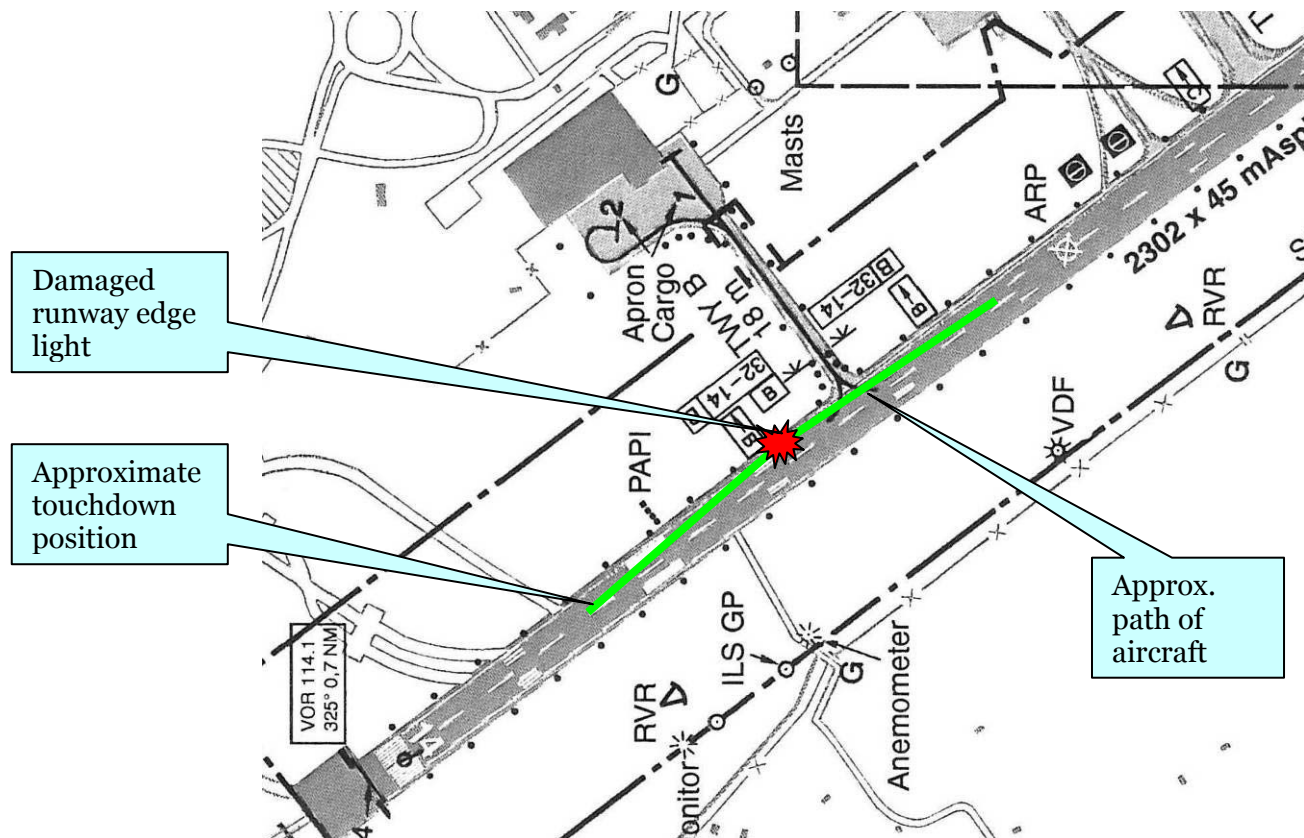


Fig 2. Runway 14 at Umeå airport.

The damaged runway edge light

Wheel tracks from the aircraft



Fig 3. Location of the incident. Left side of runway 14.

1.12.1 The aircraft



Fig 4. The damaged tyre.

The left main landing gear tyre when inspected at Luleå airport. No other damage was found to the aircraft in connection with the incident.

1.13 Medical information

Nothing indicates that the mental and physical condition of the pilot was impaired before or during the flight.

1.14 Fire

There was no fire.

1.15 Survival aspects

1.15.1 General

The Emergency Locator Transmitter (ELT) of type Artex was not activated in the incident.

1.15.2 Actions by the rescue services

Not applicable.

1.16 Tests and research

1.16.1 Runway inspection

Before the first take-off each morning the runway and taxiways are inspected. This is done using one of the Swedish Civil Aviation Administra-

tion vehicles. The instructions for this inspection state that the vehicle is to be driven along both sides of the runway, with the intention of finding any foreign objects that may be on it, or damage to the surface or any associated equipment. These inspections are also carried out at other times when visibility is so reduced that the airport needs to change over to LVP (Low Visibility Procedures). Apart from additional runway inspections, LVP also requires that the entrances to the runway are closed, the airport doors are locked and a number of other measures are taken to prevent runway incursions by either foreign objects or unauthorised vehicles.

On that particular morning a runway inspection was carried out at 05:20. Foreign objects (shards of glass) were not seen during the inspection. Nor was the run over and damaged runway edge light seen. The inspection, carried out on this occasion in the dark and in dense fog, was performed in accordance with applicable procedures, without the runway lights being lit.

Two take-offs took place after this, without the glass shards or the damaged runway edge light being detected. When the fog began to lift (at about 07:45) an aircraft that was taxiing out to take off from runway 14 reported that there were glass shards on one side of the runway and that an edge light appeared to have been hit. A further runway inspection took place and the damage was confirmed, with the runway cleared of glass shards before the next take-off was performed.

1.16.2 *Runway lighting alarm system*

In order to ensure that the runway lighting met the operational requirements in accordance with BCL, in certain conditions it is required that no more than 15% of the lamps used for lighting may be out of service. An alarm signal is activated in the control tower if this percentage is reached. If 10% of the lamps are faulty an alarm is activated at the technical operations department of the airport. In the case of faults affecting less than 10%, and/or faults in individual lamps, no alarm is generated but the lighting functionality can be seen in the department log.

On that particular morning the log was checked after an aircraft about to take off reported that an edge light had been run over and damaged. This check revealed that a lamp had indicated a fault at a time that matched the arrival of the mail-carrying aircraft.

1.17 **Organisational and management information**

The company's head office is located in Gothenburg. The technical and operational departments are localised at Lidköping. The business is mainly concerned with flying mail as an entrepreneur, along trunk routes in Sweden and Norway. As a complement to the mail flights, extensive *ad hoc* operations are carried out in the form of freight charter flights.

1.18 **Additional information**

1.18.1 *Equal opportunities aspects*

Not applicable.

1.18.2 *Environmental aspects*

No known environmental effects.

1.18.3 Measures taken

The commander received additional training. The company rules for crew composition were tightened after the incident.

After the incident the company informed the pilots about the importance of using rudder trim correctly, particularly in connection with landing in marginal visibility. The proficiency checks/operator's proficiency checks have been complemented by an element containing approaches and landings on runways without centreline lighting in minimum visibility conditions.

2 ANALYSIS

2.1 The landing

The FDR printouts show that the last part of the approach was not stabilised and that large rudder deflections were required to control the aircraft. The commander had also stated that the aircraft had not been trimmed correctly so as to minimise the lateral drift in connection with landing.

Incorrect trimming may have contributed to the aircraft veering to the left in connection with landing. The poor visibility, together with the fact that there were no centreline lights on the runway, probably contributed to the pilots realising too late that the aircraft was far out to the left of the runway centreline.

The poor control of the aircraft at the most critical stage of the approach could, in the opinion of SHK, indicate that the company's concept of a "stabilised approach" had not been practised/applied to the necessary extent in variable weather conditions.

Both pilots were also relatively new to this type of aircraft. The commander had flown just over five months since being checked out, and the co-pilot just over two months. The limited experience on type of the pilots may have contributed to making their ability to manage the aircraft's characteristics in changing circumstances too low.

2.2 Inspection of the runway condition

On that particular morning the runway inspection was carried out in accordance with the applicable regulations. The vehicle was driven along both edges of the runway and along its centre. Neither the glass shards nor the damaged edge light were detected during the inspection.

In darkness and visibility of about 100 metres it is probably very difficult for a vehicle driver to detect a damaged edge light unless the runway lighting was lit. Detection of the damaged light would probably have also led to discovery of the glass shards.

It is well known that foreign objects on runways can lead to catastrophic consequences when for example they are struck by an aircraft wheel. The procedures for inspecting runways, in both normal and extreme weather conditions, should therefore be formulated so that all possible aids are employed during the inspection.

3 CONCLUSIONS

3.1 Findings

- a) The pilots were qualified to perform the flight.
- b) The aircraft had a valid Certificate of Airworthiness
- c) The aircraft was not trimmed correctly.
- d) The pilots had limited experience of the aircraft type.
- e) The damaged edge light and glass shards were not detected during the runway inspection.
- f) The runway inspection was carried out with the runway edge lights switched off.

3.2 Causes of the incident

The incident was caused by poor monitoring of the aircraft heading while landing. Contributory factors were incorrectly set rudder trim, and the lack of centreline lighting on the runway.

3.3 Similar events

A similar incident occurred on 13 October 2006 at Luleå/Kallax airport to an aircraft of the same type, operated by the same company. Refer to the SHK Report RL 2007:11.

4 RECOMMENDATIONS

It is recommended that the Swedish Civil Aviation Authority introduces a regulation that runway edge lighting is lit during runway inspections in darkness and/or conditions of limited visibility. (*RL 2007:10e R1*).