



Statens haverikommission
Swedish Accident Investigation Board

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Report RL 2007:07e

**Aircraft accident to HB-CXF
at Ängelholm Helsingborg airport, M county,
Sweden, on 11 December 2004**

Case L-03/06

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Report RL 2007:07e

The Swedish Accident Investigation Board (Statens Haverikommission, SHK) has investigated an aircraft accident that occurred on 11 December 2004 at Ängelholm Helsingborg airport, M county, involving an aircraft registered HB-CXF.

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 7 December 2007 at the latest, particulars of how the recommendation included in this report is being followed up.

Göran Rosvall

Henrik Elinder

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L-03/06
Report finalised 5 June 2007

<i>Aircraft; registration and type</i>	HB-CXF, Cessna 210
<i>Class/airworthiness</i>	Normal, valid Certificate of Airworthiness
<i>Owner/Operator</i>	Luckyair S.A.
<i>Time of occurrence</i>	11 December 2004, at 11:47 in daylight <i>Note:</i> All times are given in Swedish standard time (UTC + 1 hour)
<i>Place</i>	Ängelholm-Helsingborg airport, M county, (posn. 56°17' N 12°52' E; 51 m above sea level)
<i>Type of flight</i>	Private
<i>Weather</i>	METAR ¹ -ESTA at 11.50: Wind 280°/14 knots, visibility 3200 m in mist, cloud 8/8 base 800 feet, temperature/dew point +7/+6 °C, QNH 1023 hPa
<i>Persons on board:</i>	
<i>Crew member</i>	1
<i>Passenger</i>	1
<i>Injuries to persons</i>	None
<i>Damage to aircraft</i>	Substantially damaged
<i>Other damage</i>	Limited
<i>Pilot:</i>	
<i>Gender, age, licence</i>	Male, 62, PPL/ME-SE/IFR licence
<i>Total flying time</i>	1476 hours, of which 273 hours on type
<i>Flying hours previous 90 days</i>	11 hours, all on type
<i>Number of landings previous 90 days</i>	8, all on type

The Swedish Accident Investigation Board (Statens Haverikommission, SHK) was notified on 8 July 2005 that an aircraft with registration HB-CXF had an accident at 11:47 hours on 11 December 2004 at Ängelholm Helsingborg airport, M county.

The accident was investigated by SHK represented by Göran Rosvall, Chairperson and Henrik Elinder, Investigator In Charge.

The investigation was followed by Gun Ström, Swedish Civil Aviation Authority.

Summary

The aircraft landed at Ängelholm Helsingborg airport after a flight of about five hours from Italy. On board were the pilot and one passenger. The weather at the airport was hazy with 2800 m visibility in mist, and the cloudbase was at 500 feet.

After landing, the pilot received instructions from the air traffic control tower to continue taxiing and then turn to the left in to the terminal area via taxiway F (TWY-F). As the aircraft had passed a sign at the left of the runway with the letter F and an arrow pointing 45° to the left the pilot turned in to what he thought to be a taxiway with a high speed turn-off.

¹ METAR – Meteorological Airport Report

When the aircraft left the runway the wheels sank into soft earth, upon which the nose wheel broke and the aircraft came to a sudden stop. Those on board were unhurt and could exit the aircraft without assistance.

At the time of the accident some reconstruction was being performed on the airport runway system and the current status of the taxiway was not stated in published documents. Furthermore, the signage and marking of the taxiway system were not carried out in accordance with the applicable regulations and did not give the correct guidance to the pilot.

The accident was caused by deficiencies in the documentation, signage and markings of the airport runway and taxiway system, due to shortcomings in the airport's system for safety management.

Recommendations

The Swedish Civil Aviation Authority is recommended to:

- Follow up and secure that the requirements determined by safety analysis and safety management at approved airports in accordance with BCL are met (*RL 2007:07e R1*).

1 FACTUAL INFORMATION

1.1 History of the flight

The pilot took off, together with one passenger, from Milano/Linate airport in Italy to fly to Ängelholm Helsingborg airport in Sweden. Before the flight he had collected information about the airport via published NOTAM² and approach charts from Jeppesen³ which are based on AIP⁴ Sweden.

When the aircraft, after flying for about five hours, approached the airport, the pilot contacted air traffic control and received a vector for an ILS approach to runway 14. The weather was reported as misty with 2800 m visibility in mist and a cloudbase at 500 feet.

As the aircraft, on the ILS approach, descended to about 2000 feet altitude, the pilot aborted the landing and requested a new approach. During the second approach the air traffic control officer noted that the aircraft was to the left of the approach path and asked the pilot if he intended to abort the approach again this time. Soon afterwards the pilot reported that he had the field in sight and was on short finals.

After landing, the pilot received instructions from the air traffic control tower to continue taxiing and then turn to the left in to the terminal area via taxiway F (TWY-F). As the aircraft neared the end of the runway the pilot saw a sign at the left of the runway with the letter F and an arrow pointing 45° to the left. About 100 metres after the sign he saw what he thought to be a taxiway with a high speed turn-off and associated centre-line, on to which he turned at normal taxiing speed.

When the aircraft left the runway the wheels sank into soft earth, upon which the nosewheel broke and the aircraft came to a sudden stop. Those on board were unhurt and could exit the aircraft without assistance.

The accident occurred at position 56°17' N 12°52' E; 51 m 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	1	1	–	2
Total	1	1	–	2

1.3 Damage to aircraft

Substantially damaged.

1.4 Other damage

Limited.

² NOTAM – Notice To Airmen (Aviation information of a short-term nature)

³ Jeppesen – Airports publication

⁴ AIP – Aeronautical Information Publication

1.5 The crew

1.5.1 Pilot

The pilot, male, was 62 years old at the time and had a valid PPL/ME-SE/IFR Licence.

<i>Flying hours</i>			
<i>previous</i>	<i>24 hours</i>	<i>90 days</i>	<i>Total</i>
All types	-	11	1476
This type	-	11	273

Number of landings this type previous 90 days: 8.

Flight training on type carried out in March 1985.

Latest PFT (Periodic Flight Training) carried out on 12 July 2004 on a Cessna 210.

1.6 Aircraft

Aircraft

<i>Manufacturer</i>	Cessna
<i>Type</i>	CE T210L
<i>Serial number</i>	210-61259
<i>Year of manufacture</i>	1976
<i>Gross mass</i>	Max. authorised take-off mass 1724 kg, actual approx. 1300 kg
<i>Centre of mass</i>	Within permitted limits
<i>Total flying time</i>	3296 hours
<i>Flying time since latest inspection</i>	58 hours
<i>Fuel loaded before event</i>	Avgas LL

Engine

<i>Manufacture</i>	Continental
<i>Model</i>	TSIO-520-H4B-CR
<i>Number of engines</i>	1
<i>Total operating time, hrs</i>	778

Propeller

<i>Propeller manufacturer</i>	Hartzell
<i>Operating time</i>	103 hours

The aircraft had a valid Certificate of Airworthiness

1.7 Meteorological information

ESTA at 11:50: Wind 280°/14 knots, visibility 3200 m in mist, cloud 8/8 base 800 feet, temperature/dew point +7/+6 °C, QNH 1023 hPa.

1.8 Aids to navigation

The aircraft was equipped for instrument flying. Ängelholm Helsingborg airport runway 14 was equipped with an Instrument Landing System (ILS).

1.9 Communications

The recorded radio communications have been transcribed. From the transcript it emerged that the approach began normally but the air traffic control officer, on the second approach, asked if the aircraft was stabilised on finals. After landing the following communication took place:

H-XF Where going park please?
 TWR Continue on RWY⁵ and then turn left on TWY-F⁶ in to apron
 H-XF going TWY-F, H-XF
 TWR And H-XF it is TWY-F and then TWY-C in to apron W, park stand W 2 F, C and W2 on the apron

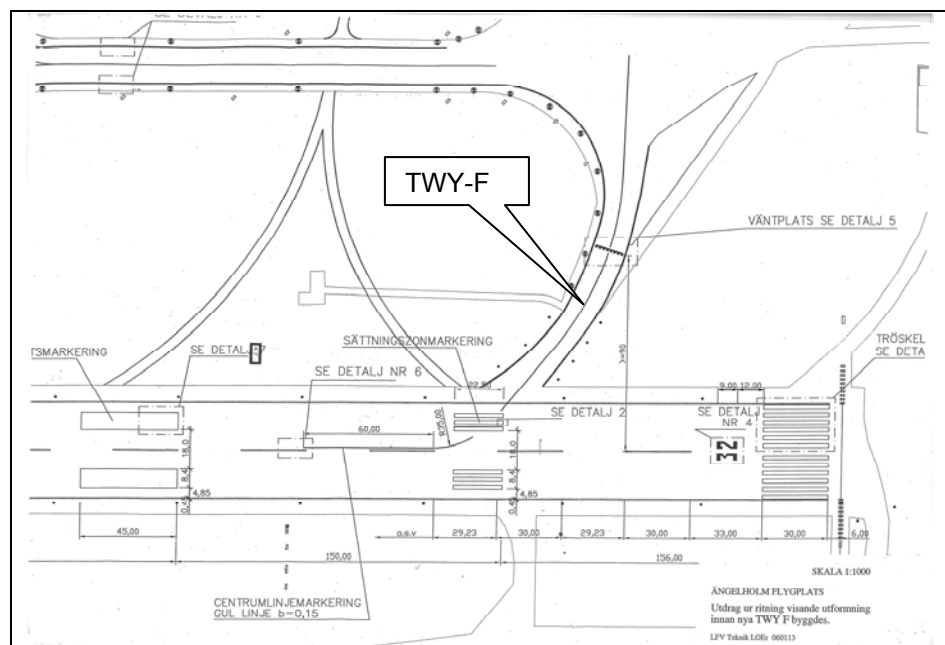
1.10 Aerodrome information

1.10.1 History

The airport was originally used only for military aviation, but was successfully rebuilt and extended to become a completely civilian airport. The rebuilding included, among other things, the closing of one runway and realignment of taxiways. At the time of the accident the airport had current status in accordance with the applicable AIP, except in respect of TWY-F, as below.

1.10.2 Work in progress.

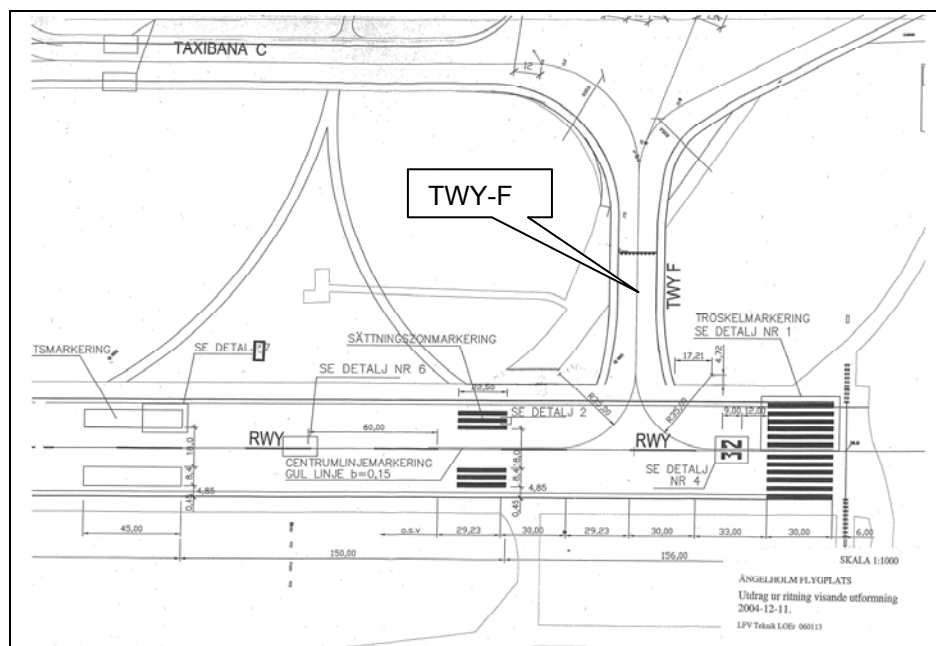
So that commercial aircraft could more easily be able to use the whole length of the runway, during the autumn of 2004 a taxiway called TWY-F was moved about 60 m closer to the threshold of runway 32. The connection angle to the runway was at the same time rebuilt from about 45° to 90°. (See below.)



Before reconstruction

⁵ RWY – Runway

⁶ TWY-F – Taxiway F



After reconstruction

1.10.3 NOTAM - AIP

Before the reconstruction started, the airport published a class 1 NOTAM containing information about the work on TWY-F, to start on 29 October 2004 and end on 30 November 2004. At the same time, a revision of the applicable AIP page was ordered from the Swedish Civil Aviation Administration, in respect of the new layout of TWY-F, with publication planned for 25 November 2004.

However publication of the revised AIP was delayed and did not take place until January 2005.

1.10.4 Reconstruction of TWY-F

The reconstruction was carried out as follows:

1. A new TWY-F was constructed about 60 metres closer to the runway threshold.
2. A yellow centreline was painted to the new TWY-F.
3. The yellow centreline to the old TWY-F was overpainted with gray paint.
4. Lighting for the old TWY-F was removed.
5. Since delivery of the new sign for the new TWY-F (with a 90° arrow) was delayed, replacement of the old sign (with a 45° arrow) was delayed.
6. Because the unused taxiway was thought to be able to create confusion, a section of the asphalt layer of the old TWY-F was removed and the ground surface covered with earth seeded for grass. This action had been recommended by the Swedish CAA.
7. Cones were placed temporarily across the end of the removed taxiway, but these were later removed because there was a risk that they could be blown on to the runway.

The delay in supply of the new sign was so short that the airport management did not see any reason to extend the period of the issued NOTAM nor to take any further measures concerning the runway.

After the accident the edge of the runway at the location of the removed taxiway was marked by fluorescent poles and tape until the new sign could

be erected and the old sign removed, and that grass had grown on the prepared ground.

1.11 Flight recorders

None. Not required.

1.12 Accident site and aircraft wreckage

1.12.1 Accident site

At the time of the accident, about seven metres of the black asphalt layer of the old TWY-F had been removed and replaced by dark-coloured earth. The old centreline had been overpainted with gray paint, but was still clearly visible. (See photograph below.)



About 100 metres before the old TWY-F, on the left side of the runway was a yellow sign with black text in accordance with the following sketch.



1.12.2 Aircraft

Extensive damage was caused, including damage to the nose, nose landing gear and to the propeller.

1.13 Medical information

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

1.14 Fire

There was no fire.

1.15 Survival aspects

1.15.1 General

The retardation was relatively gentle and the emergency transmitter was not activated.

1.15.2 Actions by the rescue services

Not applicable.

1.16 Radar plot

The radar plot from the two approaches shows that the aircraft was not stabilised laterally on finals before the pilot made visual contact with the runway.

1.17 Organisational and management information

Not applicable.

1.18 Other

1.18.1 Equal opportunities aspects

Not applicable.

1.18.2 Environmental aspects

The accident had no harmful effect on the environment.

1.18.3 Regulations for approved airports

The Swedish authorities have decided to follow the international regulations for civil aviation that have been determined by the International Civil Aviation Organization (ICAO). ICAO Directive Annex 14 contains the international regulations for the infrastructure and operation of approved airports. Equivalent regulations are laid down in the Bestämmelser för Civil Luftfart (BCL)-F (Civil Aviation Regulations) that are determined by the Swedish Civil Aviation Authority.

BCL-F is presently being revised as a part of the Swedish Civil Aviation Authority project no LS 2006-3408.

The Management responsible for an approved airport must be approved by the Swedish Civil Aviation Authority in accordance with BCL-F 3.1. Where necessary the Swedish Civil Aviation Authority may require supplementary training to be given before such approval can be granted.

1.18.4 Safety management at approved airports

BCL-F 1.3 states, among other things:

Concerning safety management at airports:

- The airport shall have a developed and documented system for safety management.
- Those responsible for safety management of operations at the airport and the follow-up system for safety management shall be included in the airport management.
- The airport management shall ensure that staff have the necessary competence for the tasks they perform and for which they are responsible.

Concerning safety analysis:

- System safety analysis and evaluation shall be implemented when the intention is to place a new system in operation, to introduce changes into an existing system or to replace a system.
- Before system safety analysis and evaluation begin, the airport must contact the Swedish Civil Aviation Authority to confirm the level and scope of the system safety analysis and evaluation.
- A report on the agreement concerning safety requirements, by means of evidence of safety, for all affected systems in the operation of the airport must be presented to the Swedish Civil Aviation Authority by the airport management.
- Before a new system, changes to an existing system or the replacement of a system may be brought into operation as the result of an implemented system safety analysis and evaluation, the new system, altered existing system or replacement system must be approved by the Swedish Civil Aviation Authority for operation.

Concerning administration

- All changes concerning the airport and its equipment, and changes in the airport vicinity that considerably change the conditions for approval of the airport, must be reported immediately to the Swedish Civil Aviation Authority.
- It is the responsibility of the airport manager to report serious accidents, incidents and operational deviations that present a danger or could present a danger to aircraft, those travelling on board, other persons or flight safety. The report shall be sent without delay to the Swedish Civil Aviation Authority and contain all known information that can contribute to clarifying the conditions that were existing.

1.18.5 Visual aids

BCL-F 2.2 states, among other things:

Marking of non-bearing surfaces:

- The shoulders of taxiways, turning areas and parking areas that are not suitable for normal use and that cannot be clearly distinguished from fully weight-bearing surfaces shall have their borders marked. This also applies to other surfaces that are not suitable for normal use.
- Where edge markings as above are applied, they shall be placed along the edge of the weight-bearing surface with the outer line along the edge of the weight-bearing surface.
- Edge markings shall consist of two continuous parallel lines of 0.15 m width. The distance between the lines shall be 0.15 m. The colour is to be yellow.

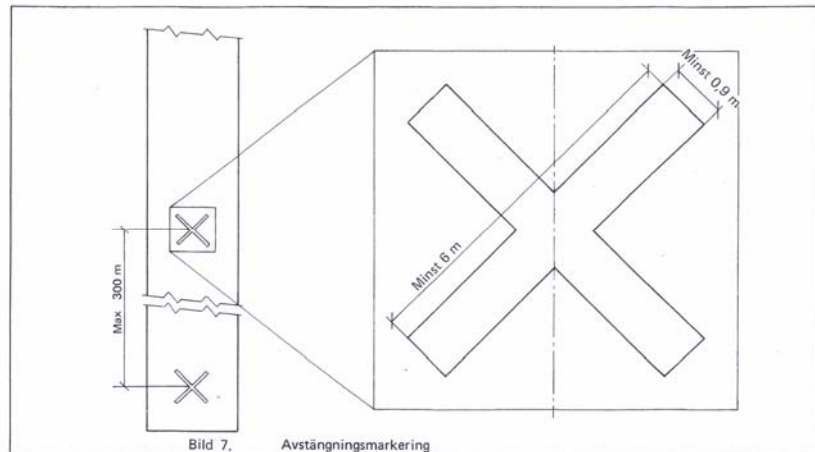
Marking of un-surfaced taxiways:

- If a taxiway is not clearly defined against the surrounding area, distinguishing markings are to be placed along the edges of the taxiway. Such distinguishing markings may consist of cones or marking poles in accordance with BCL-F 3.2.
- Any trench or cavity within 23 meters of the runway (Zon 1) shall be filled and compacted as soon as possible.

BCL-F 23.3 states, among other things:

Concerning closed runways and taxiways

- Runways and taxiways or parts thereof that are permanently closed to the use of aircraft shall be marked in the manner stated below.
- A closed marking shall be displayed on a runway or taxiway, or portion thereof, which is temporarily closed to the use of all aircraft. If the closure is of brief duration, such markings need not be applied, on condition that the air traffic control organisation is able to satisfactorily inform traffic that may be affected.
- Closed markings must be located at both ends of runways or both ends of the part that is closed. Further markings shall be applied in between, so that the distance between them does not exceed 300 m. Closure markings on taxiways must be located at least at each end of the taxiway or portion thereof that is closed.
- The closure marking shall be in the form of a cross. In the case of marking a closed runway the cross shall where it is physically possible have the dimensions and location shown in figure below. The cross shall be white or yellow.



Closure marking

- When a runway, taxiway or portion thereof is permanently closed, all markings on the runway and taxiway shall be obliterated.
- In cases where a closed runway, taxiway or portion thereof that is closed crosses a usable runway or taxiway there shall, during night use, be arranged lighting that defines the border between the usable and closed areas.
- The lighting shall be placed across the entrance to the closed area at intervals not exceeding 3 m. The regulations for the design of the lighting are contained in paragraph 9.2.2.7.

Concerning unserviceable areas

- Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely.
- Unserviceability markers and lights shall be placed at intervals along the edge of the areas sufficiently close so as to delineate the unserviceable area.
- Unserviceability markers shall consist of devices such as flags, cones or marker boards. On a movement area used at night, unserviceability lights shall be used.
- Cones that mark an unserviceable area shall be at least 0.5 metres high. They must be coloured red, orange or yellow, or combine one of these colours with white.
- Flags that mark an unserviceable area shall be square, with sides of at least 0.6 metres. They must be coloured red, orange or yellow, or combine one of these colours with white.
- Lights indicating unserviceable or closed areas must exhibit a steady red or orange light. The light shall have an intensity sufficient to dominate the intensity of other adjacent lights and the general level of illumination against which it would normally be viewed. In no case shall the intensity be less than 10 cd of red or orange light.

1.18.6 *Reporting of the accident*

The accident was reported by the airport management via an ANS DA⁷ and a Deviation report, which was received by the Swedish Civil Aviation Authority 10 days after the accident. The following description of the sequence of events was submitted:

“HB-CXF, a C210 landed on runway 14 at 1047Z received instructions to taxi in via taxiway F. Turned off at the “old” taxiway F that is now closed. Stuck in mud.”

respectively:

”..... Missed taxi centreline to F. Chose the old over-painted line to Old F then stopped abruptly in the soft ground. ...”

The SHK first became aware of this event on 8 July 2005. It was deemed that the accident did not fulfil the criteria for an accident investigation. After supplementary information arrived concerning the accident a re-evaluation was made of the original decision, upon which it was decided that the event should be investigated.

2 ANALYSIS

2.1 The landing

After landing the pilot was cleared to turn left into taxiway TWY-F. There was no warning given that the run-off to TWY-F had been moved forward and that the original run-off was closed. Nor could this information be read in the published airport documentation.

⁷ DA – Operation Report

Both the sign that indicated the original run-off to the taxiway and its centreline were still there. The old centreline had certainly been over-painted with gray paint, but was still clearly visible. The asphalt surface for the original run-off had been replaced by earth, which had approximately the same colour as the asphalt on the runway and taxi system. There was no suitable edge marking or other visual warning to show the pilot that the original run-off was unusable.

As stated in the sequence of events, before landing the pilot had carried out a long sector flight and two demanding approaches before landing took place, and one can assume that he was tired.

In these circumstances it is therefore understandable that the pilot, after passing the incorrectly marked sign to TWY-F perceived the original run-off as the correct one and turned into it. He did not notice until it was too late that the run-off surface had been partly replaced by earth, and that its centreline had a different colour.

In this case it was a small aircraft that left the runway at low speed, and the accident only resulted in material damage to the aircraft. If it had been a commercial aircraft that had left the runway, at a higher speed, there could have been serious consequences.

2.2 Safety management

Before the accident TWY-F had been reconstructed and moved forward about 60 metres, which was a considerable change to the existing taxiway system. The sign for the original taxiway was still in place, and there was no visual warning that this turn-off was unusable.

A correct analysis of the visual experience from the cockpit of a landing aircraft should have shown that the risk of mistaking the run-off must have been fairly obvious, which means that the airport management had not analysed the consequences of the incomplete reconstruction in sufficient depth.

In addition the airport management did not see any reason via a NOTAM to inform that the taxiway status was unfinished or to tell the air traffic controller to notify landing aircraft of the situation.

As stated in 1.18.5, there are several regulations in BCL-F 2.2 and BCL-F 2.3 that apply in this particular situation. These describe measures that must be taken to avoid the risk of incorrect taxiing. Such measures had not been applied in a sufficient way.

The management of the reconstruction shows that the airport system safety analysis in accordance with BCL-F 1.3 did not function satisfactorily.

2.3 Reporting of deviations

The requirement that the airport management must report accidents and serious incidents is clearly formulated in the applicable regulations. In the airport management report on the accident is stated, among other things:

*"... "Turned off at the "old" taxiway F that is now closed." and
".. "Missed taxi centreline to F. Chose the old over-painted line to Old F then stopped abruptly in the soft ground." ..."*

SHK does not consider that this report correctly reflects the sequence of events and the circumstances at the time. It does not touch upon the deficiencies in the airport runway and taxi system and in its documentation, instead insinuating that the accident was caused by pilot error.

The way that the airport management handled this accident therefore gives the impression that they did not fully understand the importance of dealing with and learning from this kind of event in the correct way. Correct and complete documentation concerning known deviations, deficiencies and human error is one of the conditions for effective flight safety work.

In this case the incomplete report of the accident contributed to neither the Swedish Civil Aviation Authority nor SHK realising the full dimensions of the accident until it was too late.

2.4 Summarised conclusions

Deficiencies in the airport system safety analysis resulted in this case only in damage to a small aircraft, but in other circumstances could have led to serious consequences, which in itself makes this a serious event.

The handling by the airport management of the taxiway system reconstruction and of this particular accident can be interpreted as those responsible for decisions at the airport not fully realising their responsibility and their capability of securing and developing flight safety at the airport, and possibly not having full knowledge of the applicable regulations.

There is therefore reason for the Swedish Civil Aviation Authority to follow up the demands for safety analysis and the safety management procedures at approved airports, to ensure that these are fulfilled in accordance with BCL.

3 CONCLUSIONS

3.1 Findings

- a) The pilot was qualified to perform the flight.
- b) The aircraft had a valid Certificate of Airworthiness.
- c) The unfinished state of the taxiway was not stated in published documents.
- d) Signage and marking of the taxiway system were not carried out in accordance with the applicable regulations and did not give the correct guidance to the pilot.

3.2 Causes

The accident was caused by deficiencies in the documentation, signage and markings of the airport runway and taxiway system, due to shortcomings in the airport's system for safety management.

4 RECOMMENDATIONS

The Swedish Civil Aviation Authority is recommended to:

- Follow up and secure that the requirements determined by safety analysis and safety management at approved airports in accordance with BCL are met (*RL 2007:07e R1*).