

The Dutch Safety Board

Occurrence #: 2005159 **Classification:** Serious incident

FACTUAL INFORMATION

Date of occurrence:	09-12-2005	Cockpit crew:	2
Place of occurrence:	Rotterdam Airport (EHRD)	Cabin crew:	0
Aircraft registration:	EC-HZH	Passengers:	0
Aircraft model:	Fairchild SA227-AC Metro III		
Airline company:	Aeronova	Injuries:	None
Type of aircraft:	Passenger/cargo aircraft		
Type of flight:	Ferry flight		
Phase of operation:	Landing		
Damage to aircraft:	None	Lighting conditions:	Daylight

The flight and the occurrence

The aircraft with registration EC-HZH and call sign OVAT42, operated by the Spanish operator Aeronova, is used for both passenger and cargo flights. The aircraft had been at Odense Airport (EKOD) for a maintenance job (repainting). During the incident flight the aircraft was configured for cargo but no cargo was present as the aircraft was ferried from Odense to Rotterdam Airport (EHRD), the Netherlands. On board were a captain and a first officer.

The wind at the time of the occurrence was 050 degrees with 6 knots, visibility 6,000 meters with some haze. Control of four aircraft coming from the northeast with destination Rotterdam was handed over from Amsterdam Area Control Centre to Rotterdam Approach. Initially runway 06 was in use for landing. On request of the crew of at least one incoming aircraft and because of the light wind, Rotterdam Approach changed the landing runway to runway 24 to enable a straight-in approach. OVAT42 was the first in sequence and was cleared with heading and descend instructions to 2,000 feet for an instrument landing system (ILS) approach. The first officer was pilot flying (PF). The air traffic controller got concerned about the (high) approach altitude the aircraft was flying. At four nautical miles from touchdown the altitude was approximately 1,600 feet (derived from radar data) while it should be around 1,200 feet. The air traffic controller asked the crew if they could manage the approach, which was confirmed. The captain took over the controls of the aircraft when they were flying near the outer marker. The aircraft touched down at about one third of the available runway length. At the end of the runway the aircraft veered to the right and came to rest in the grass near the threshold of runway 06. Both occupants left the aircraft without injuries. The aircraft was not structurally damaged.



EC-HZH near threshold runway 06 (source: Airport Authorities Rotterdam Airport)

Investigation & Analysis

The investigation by the Dutch Safety Board (DSB) was focussed on the final approach and the brake system.

The flight data recorder (FDR) and cockpit voice recorder (CVR) were removed from the aircraft and taken to the Bureau d'Enquêtes et d'Analyses (BEA) in Paris, where they were read out. The event was recorded by the FDR. The data on the CVR however was from the previous flight to Odense and could not be used. The transcript that was used during the investigation was derived from tapes supplied by Air Traffic Control The Netherlands. Why the CVR did not record the last flight was not investigated.

FDR data analysis

A total of thirteen flights were recorded on the FDR. Generally the quality of the data was good with only a few time lapses and failures. Due to the limited number of recorded parameters on this type of recorder only indicated airspeed, altitude and heading were used for the analysis. The average indicated airspeed at touchdown of the preceding twelve flights was 127 knots. Indicated airspeed at touchdown of the incident flight was 171 knots. Note: due to the limited number of recorded parameters no cross check or validation of the numbers could be performed.

Technical investigation

Three days after the occurrence a taxi test was performed with the incident aircraft. Attention was paid to the nose wheel steering, engine thrust, engine reverse thrust and main landing gear (MLG) brake systems. No anomalies were detected in the nose wheel steering, engine thrust and reverse thrust systems. There were some concerns about the effectiveness of the MLG brakes and it was decided to remove the four brake units and send them to the National Aerospace Laboratory (NLR) for investigation.

The following conclusions were drawn by the NLR:

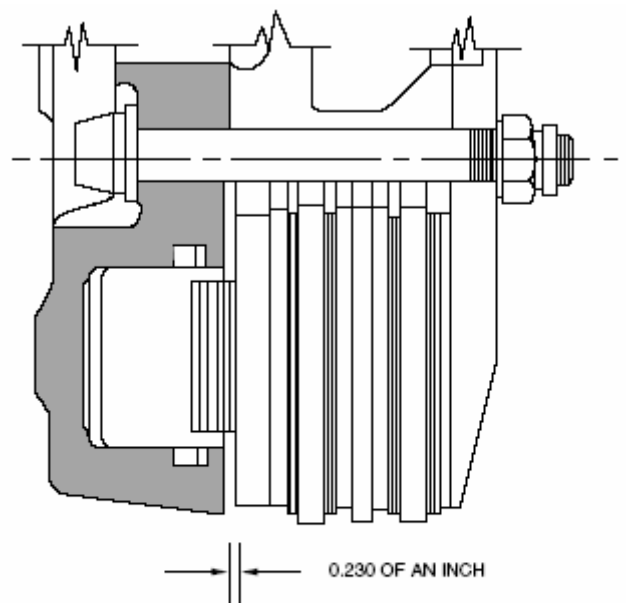
- No hydraulic failures were detected.
- All brake units showed normal wear and tear marks.
- All brake units had been subject to overheating.
- Two brake units were worn beyond inspection limits. The units were respectively 0.1 and 0.3 mm beyond the maximum wear limit of 5.8 mm (0.230 inch).
- None of the brake units showed signs of glazing.

It is unknown when the overheating occurred but it is not unlikely that it happened during the incident flight. The result of overheated brakes is brake fade, the same amount of force at the pedal no longer provides the same amount of deceleration. The excessive heat decreases the relative coefficient of friction between the friction material and the disks.

Although two of the four brake units were worn slightly beyond limits, it is unlikely that the braking action was significantly affected by this.

According to the operator the brakes are checked every 75 flying hours during a service check inspection. The inspection of the brakes consists of a visual check for hydraulic leaks and a dimensional check of the gap between the housing and the pressure plate. If a brake fails the dimensional check it must be removed for maintenance. The last time this inspection was performed was on 13 November 2005, less than a month and about 15 flying hours before the incident flight. During the last inspection the brakes were signed off as serviceable.

Note: During one of the taxi tests the left-hand MLG went off the taxi track into the grass. According to the aircraft mechanic involved in taxiing, he most likely blocked the left-hand MLG brake.



REMOVE BRAKE FOR MAINTENANCE WHEN
DIMENSION FROM HOUSING TO THE PRESSURE
PLATE IS 0.230 OF AN INCH OR GRATER,
Brake Unit (copy of maintenance manual)

Operational analysis

In a post-incident interview, the captain acknowledged that the approach was not stabilized¹ and he had to nose dive the aircraft to loose altitude. Witnesses stated that the aircraft touched down at approximately one third of the available runway length with a considerable speed. According to the captain he attempted to stop the aircraft by applying wheel brakes but he had difficulties keeping the aircraft on the centreline. Thrust reverse was applied but this could not prevent that the aircraft ran off the runway with a gentle turn. The captain could not recall approach altitudes nor speeds. According to the first officer the flaps were fully extended during the landing. The aircraft was not equipped with an anti-skid system.

Summary

- The aircraft was empty (ferry flight).
- The approach was made with a tailwind of approximately 6 knots.
- The approach was not stabilized.
- The average indicated airspeed at touchdown of the preceding twelve flights was 127 knots. The indicated airspeed at touchdown of the incident flight was approximately 171 knots, an increase of 44 knots or 34%.
- The aircraft touched the runway with a groundspeed of approximately 177 knots (171 knots indicated airspeed + 6 knots wind speed).
- The incident aircraft over flew more than 700 meters of the runway, a third of the available runway length, before the wheels contacted the runway.
- The PF had difficulties keeping the aircraft on the centreline during braking;
- Besides signs of overheating, the brake units showed normal wear and tear. Two brake units were worn slightly beyond inspection limits.
- The difficulties the PF observed to keep the aircraft on the centreline were probably the result of uneven brake forces caused by brake overheat during the deceleration.

The Dutch Safety Board emphasises that conducting a go-around is of crucial importance when the criteria for a stabilized approach cannot be met upon reaching the applicable minimum stabilization height.

¹ An approach is stabilized only if all the criteria in company standard operating procedures (SOP's) are met before or when reaching the applicable minimum stabilization height.

ATC Transcript

Abbreviations

ATC Rotterdam Approach 127.02 MHz
CM Voice of either the captain or the first officer

(...) (---) Not understood

(¿XXX?) Not fully understood; possible word but not positively identified

Times in UTC (local time minus one hour)

14:13:55	CM	Rotterdam good afternoon OVAT42 is on course to romeo romeo descending 23(...) (---).
14:14:04	ATC	Buenos dias aeronova T42 proceed to romeo romeo 3,000 standby for possible landing on runway 24. The wind at the moment is 050 at 6.
14:14:15	CM	OK continue romeo romeo 3,000 feet OVT42 gracias thank you.
14:15:12	ATC	Aeronova T42 we do have the ILS runway 24 available. Fly heading 250 to pick up the localizer descend 2,000 feet 1038 cleared ILS approach.
14:15:25	CM	Right 220 cleared ILS runway 25 and 2,000 feet 1038 OT42.
14:15:36	ATC	Make the heading 255 to intercept the localizer, heading 255.
14:15:41	CM	255 until eh localizer eh 25 aeronova T42.
14:17:56	CM	Are we cleared for ILS runway 24 aeronova T42?
14:18:00	ATC	Confirm aeronova T42 you are niner miles from touchdown and right (...) (---) slightly north of the final track. Cleared for the ILS approach.
14:18:09	CM	Cleared ILS approach runway 24 aeronova T42.
14:18:17	ATC	Eh 42 report established.
14:18:19	CM	Call you T42.
14:19:12	ATC	Aeronova T42 you are approaching the outer marker, are you established on the localizer?
14:19:22	CM	Eh we are established on the localizer eh T42.
14:19:28	ATC	You are four miles from touchdown, altitude should be around 1,200, can you manage this approach, confirm?
14:19:35	CM	Yeah confirmed T42.
14:19:37	ATC	Runway in sight?

14:19:40	CM	(...) (---)
14:19:50	ATC	Aeronova T42 you are cleared to land runway 24 the wind is at this moment 050 at 6.
14:20:02	ATC	Aeronova T42 two miles from touchdown cleared to land runway 24 the wind 050 at 6.
14:20:08	CM	Eh we are we are rejected rejecting..... we have the traffic we have the field in sight. Are we cleared to land 0 eh 24?
14:20:18	ATC	Affirm cleared to land runway 24 aeronova T42.
14:20:21	CM	Cleared to land 24 aeronova 42.
14:21:28	CM	Rotterdam AT42?
14:22:18	ATC	Aeronova T42 on this frequency?
14:22:22	CM	Yes eh weh (¿XXX?)
14:22:25	ATC	Aeronova T42 are you on this frequency?
14:22:27	CM	Yes we are in the seventies (¿XXX?) T42
14:22:30	ATC	What is the amount of persons on board, pob's please?
14:22:32	CM	We are two on board we just need to get out of this we are OK.
14:22:37	ATC	(...) (---) on board. Fire brigades are on the way sir, fire brigades are on the way.
14:22:42	CM	We see that thank you very much.
14:23:05	ATC	Aeronova T42 switch off your engines, switch off your engines.