

# THE DUTCH SAFETY BOARD

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**Occurrence number:** 2006062

**Classification:** Serious incident

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## FACTUAL INFORMATION

|                        |  |                      |  |
|------------------------|--|----------------------|--|
| Date of occurrence:    | 22-05-2006                                     | Type of operation:   | International/ scheduled/<br>passenger |
| Time of occurrence:    | 20:45 <sup>1</sup> (22:45 local time)          | Phase of operation:  | Approach/landing                       |
| Place of occurrence:   | Amsterdam Airport Schiphol, (EHAM), runway 18R | Damage to aircraft:  | Left wing tip damaged                  |
| Sort of occurrence:    | Wing tip strike during landing                 | Cockpit crew:        | 2                                      |
| Aircraft registration: | I-DATS   | Cabin crew:          | 4                                      |
| Aircraft manufacturer: | Boeing/McDonnell Douglas                       | Passengers:          | 125                                    |
| Aircraft model:        | MD-82  | Injuries:            | None                                   |
| Operator's name:       | Alitalia                                       | Lighting conditions: | Night-dark                             |

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## The flight and the occurrence

The aircraft executed a scheduled passenger flight (flight number AZ120) from Milan Malpensa (LIMC) to Amsterdam Airport Schiphol (EHAM). The flight departed LIMC at 19:15.

The weather forecast for Schiphol (TAF EHAM) valid from 19:00 until 04:00 the next day mentioned a wind from direction 210° with a velocity of 20 kt and gusts with a maximum of 30 kt. Temporarily between 19:00 and 02:00 the wind could blow from a direction of 220° with a velocity of 23 kt and gusts with a maximum of 36 kt. The forecast mentioned a visibility of more than 10 km, a few clouds at 2000 ft and no precipitation.

The observation of the Schiphol weather as published in the meteorological aerodrome report (METAR) at 20:25 mentioned a wind from direction 220°, varying between 190° and 260°, with a velocity of 26 kt and gusts with a maximum of 36 kt. The lowest clouds were at 2.000 ft and the visibility was more than 10 kilometres.

After an uneventful flight an ILS-approach was made for a landing on runway 18R. During the approach at 20:32 the crew acknowledged the reception of ATIS<sup>2</sup>-information Kilo<sup>3</sup> to the Schiphol approach controller. On final approach, at 20:43, the tower controller informed AZ120 of a wind from 220° and a speed of 32 kt. During the flare (3 seconds before touchdown) the aircraft made a sharp roll movement to the left and back.

Post flight inspection of the aircraft by the Alitalia ground technician on the apron revealed that the left wing tip of the MD-80 was damaged.

Inspection of runway 18R by airport staff showed a light damage of the surface of runway 18R slightly left of the centreline. Schiphol decided that it was unnecessary to repair this damage.

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<sup>1</sup> All times in this report are UTC times (local time – 2 hours), unless stated otherwise.

<sup>2</sup> Aerodrome terminal information service

<sup>3</sup> Information "Kilo" mentioned for the wind 220° at 27kt, max 35kt, min 15kt.

During the interview the cockpit crew stated that they remembered the roll movement and the applied correction during the landing flare, but that they had been unaware of the wingtip touching the runway.



*Damage of the left wing tip*

## Investigation & Analysis

Information of the Dutch Aviation Police (LVP), Amsterdam Airport Schiphol (AAS), the Royal Netherlands Meteorological Institute (KNMI) and the Dutch Air Traffic Control Organisation (LVNL) was used for investigation purposes.

Both the digital flight data recorder (DFDR) and the cockpit voice recorder (CVR) were removed from the aircraft shortly after the incident. The data of these recorders and the data of the Quick Access Recorder (QAR) were used for investigation and analysis.

### The operation by Alitalia

#### *The wind*

Investigation led to the conclusion that the following information of the wind conditions at EHAM was available for the cockpit crew:

|        | <u>time</u><br><u>(period)</u> | <u>direction</u> | <u>strength</u>         | <u>time</u><br><u>(period)</u> | <u>directi</u><br><u>on</u> | <u>strength</u> |
|--------|--------------------------------|------------------|-------------------------|--------------------------------|-----------------------------|-----------------|
| TAF    | 19:00-<br>04:00                | 210°             | 20G30kt                 | Tempo<br>19:00-<br>02:00       | 220                         | 23G36kt         |
| ATIS J | 20:18                          | 220°             | 19kt                    |                                |                             |                 |
| ATIS K | 20:30                          | 220°             | 27kt max35kt<br>min15kt |                                |                             |                 |
| ATC    | 20:43                          | 220°             | 32                      |                                |                             |                 |
| ATC    | 20:44:30                       | 220°             | 26gust38                |                                |                             |                 |

The flight crew stated after the flight that the final approach was made with the gear down, flaps in full down position (40°) and the autopilot and auto throttle connected. The autopilot was disconnected between 400 and 500 ft. The captain stated also that the wind information used for the approach preparation was 220° with 19 kt. The first officer mentioned that the wind used in his calculations was 200° with 19 kt. Apparently the crew used the wind information of ATIS Julliet for their calculations. The crew stated also that they used 140 kt as final approach speed (FAS). The calculation of this speed started with an assumed landing weight of 56 tons. According to the Alitalia operations manual this resulted in a threshold speed (V<sub>th</sub>), using flaps 40, of 133 kt. The operations manual states that half the headwind component should be added as speed additive with a maximum of 15 kt. Because 7 kt was added as speed additive, it could be concluded that a headwind component of 14 kt was used by the crew. This corresponds to a wind of 220°/ 19 kt. The corresponding crosswind component was 12 kt.

At 20:32 (13 minutes before landing) the crew announced to air traffic control to have received information Kilo. Just after having received this information, the PNF stated to the PF that he copied a wind from 220° with 15 kt. On final approach when the PF asked the PNF to confirm the wind, he asked "...headwind 32 kt?". The PNF answered "from 230° at 28 kt" and then the PF stated "in any case its frontal". Approximately 30 seconds before the landing of AZ120, ATC informed another aircraft, which reported the beginning of the approach, the wind on runway 18R was 220° with 26 kt gust 38 kt.

It remained unclear why the mentioned wind from 220° was considered as frontal while the relative wind was 40° to the runway (18R).

All this information concerning the wind was available for the crew which means that they had the opportunity to take the consequences of the wind velocity and direction into account during the arrival preparation.

According to the Alitalia operations manual the wind information "K" would have called for a maximum correction to the V<sub>th</sub> of 15 kt. Using this correction the FAS should have been 148 kt instead of the 140 kt the crew eventually used. Based on the wind reported by the tower on final one minute before landing the correction to the V<sub>th</sub> should have been 13 kt.

The data of the FDR confirmed that IAS during the approach varied between approximately 136 and 155 kt. At a radio altitude of 81 ft with a IAS of 155 kt a "sink rate" warning of the ground proximity warning system occurred. This could be explained because the recorded flight data showed that the aircraft had a vertical speed of 1350 and 1380 ft/min during two seconds. In relation with the altitude these speeds will result in a warning.

During the flare manoeuvre the IAS decreased to 132 kt and the pitch angle increased from approximately 3° to approximately 5° ANU<sup>4</sup>. Just before touchdown additional thrust was applied probably as a reaction on the decreasing speed.

The PF stated after the flight that during the landing manoeuvre "the aircraft shifted to the left" and that he "corrected with the ailerons as the right wing rose". The PNF stated that they approached the runway with a crab angle and that the aircraft "was aligned by applying rudder". He also said that the aircraft was "rolled a little into the wind".

During crosswind landings three landing techniques could be used; "side slip", "crab" and "de-crab during the flare". Boeing recommends in the Flight Training Manual to use the side slip technique. According to the Basic Operations Manual of Alitalia, the pilots should use the side slip technique. Using the side slip technique during a landing with crosswind from the right the pilot flying has to align the aircraft with the runway centreline by applying left rudder. Simultaneously right aileron have to be applied to compensate for the roll movement associated with rudder input and to correct for the drift.

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<sup>4</sup> aircraft nose up

The data of the FDR confirmed the statement of the PF. During the last 20 seconds of the approach the aircraft flew with a side slip and had a roll angle between approximately 1° and 6° to the right and a corresponding aileron and rudder position (left aileron down, left rudder). The data showed also that during the landing manoeuvre (3 seconds before touchdown) left rudder input increased and left aileron went to neutral. As a result the aircraft rolled to the left. Left rudder input was probably applied to align the aircraft with the runway direction. Such an alignment introduces a positive sideslip angle to the right and corresponding rolling moment to the left which results in a roll acceleration and roll angle to the left if not adequately compensated for through an aileron deflection. The tendency to roll to the left may have been amplified by a wind gust from the right, increasing the side slip angle and the rolling moment to the left. The maximum left roll angle reached was 10,6°. At the same time during the landing flare the pitch angle reached a maximum value of 5° ANU attitude. The FDR data show that the left roll attitude was corrected by a right deflection of the ailerons. Flight manual data confirmed that this combination of pitch and bank angles during the landing flare will lead to wingtip contact with the runway.

#### *Crew resource management*

The flight crew stated after the flight that they discussed the possible use of flaps 28° setting for the approach and landing, but actually flaps 40° was used. The crew discussion on this issue (39 minutes before landing) made it clear that the first officer (being the pilot flying) had a preference for an approach with flaps 28°. He used as arguments a strong wind and availability of a runway long enough (3800m). In case the runway would be wet he preferred a landing with flaps 40°.

During the descent into Schiphol at 20:23 the PF asked the PNF to confirm the wind and the PNF answered that he copied a wind of 200° with 19 kt. At that moment the PF mentioned: ".....well, 200.....180 it is almost frontal.....I will try to land with 28".

At 20:42 flaps 28° were selected when the aircraft left 2000 ft on final approach. One minute later the PF asked the selection of flaps 40° and the PNF responded accordingly. The flap setting of 40° was contrary to the initial intention to land with flaps 28°. It has not become clear why the PF changed his decision to land with flaps 40 in stead of flaps 28. He did not explain this to the PNF nor did the PNF ask for the reason for this change.

Also the determination of the wind components was not discussed thoroughly and did probably not lead to a full understanding of the conditions that could be expected during final approach and landing.

#### *Conclusion*

The investigation revealed that the handling of the aircraft was not optimal during the landing phase. This and the probable influence of the wind was a factor in this serious incident. Because the flight crew did not use the latest information of the direction, the strength and the gustiness of the wind during the final approach, they were not sufficient prepared for the actual circumstances during the landing phase. Together with the human interaction during the process of selecting and setting landing flaps this could be an indication of non effective cockpit resource management.