No. 6

McDonnell Douglas DC-10-10, N903WA, accident at Licenciado Benito Juárez International Airport, Mexico City, Mexico on 31 October 1979. Report Reference 002.3/1-213 released by the Director General of Civil Aviation, United Mexican States.

## SYNOPSIS

At 0542 h on 31 October 1979, Western Airlines Flight 2605, a DC-10 aircraft, crashed while landing on Runway 23 Left at Licenciado Benito Juárez International Airport, Mexico City. This runway was closed for repairs at the time. Seventy-two persons on board the aircraft and one person on the ground were killed in the accident. The aircraft was destroyed.

## 1. FACTUAL INFORMATION

### 1.1 History of the Flight

1.1.1 Flight No. 2605, a McDonnell Douglas DC-10-10, registration N-903WA, owned by Western Airlines Inc., had taken off from Los Angeles International Airport, California, for Mexico City, D.F. at 0140 h local time on 31 October 1979. The Mexico centre had cleared the crew to approach Mexico City via Tepexpan, subsequently instructing the aircraft crew to change frequency to the control tower. The tower operator informed the crew that the runway in use was 23 Right and provided the crew with information on the weather conditions prevailing at Mexico City International Airport, and landing data. When the aircraft was on final approach, the control tower operator repeated that the runway in use was 23 Right and drew the attention of the pilot to the fact that he was left of the flight path he should be following to land on the runway in use. The pilot acknowledged the information and the fact that he was slightly to the left. The transcription of the magnetic tape which contains the communications between the control tower operator and the crew of aircraft N-903WA reveals that at one point the control tower operator asked the pilot whether he could see the approach lights on his left, to which the pilot replied "negative".

1.1.2 The data obtained from the aircraft's flight recorder shows that the crew was making an instrument approach. The instrument landing procedure authorized in the aeronautical information publication (AIP) for Runway 23 Left with transition to 23 Right specifies that if the pilot does not have the runway in sight at 600 ft during an instrument landing approach, he must break off the approach and climb to 8 500 ft. In this case the crew continued with the landing procedure, ignoring the requirement to call out the altitude values and the decision minimum, and descended until the landing gear touched down off-centre of Runway 23 Left, which was closed to all operations. On the transcription of the cockpit voice recorder the pilot-in-command is heard to have said that he was on the flight path to Runway 23 Left, just before the left landing gear wheels touched down on the grass to the left of Runway 23 Left and the right landing gear wheels on the runway shoulder. The aircraft did not enter the runway until it had travelled some 100 m. According to the flight recorder data and the wheel traces at the site of the accident, the crew re-applied power for the go-around procedure and lifted the aircraft nose by 10°-11°. Now airborne, the aircraft's right landing gear collided with a truck located on the left shoulder of the runway which was closed for repairs. The impact left a distinct mark in the left-hand side of the vehicle's bonnet corresponding exactly to the shape and size of the aircraft's wheel.

1.1.3 The collision with the truck, which was loaded with 10 tonnes of earth, removed the right landing gear leg with part or sections of the main gear beam to which it is attached, bursting three of the four tires. The two front tires came off the wheels, whose hubs disintegrated, scattering pieces away from the aircraft. The horizontal shaft which carries the two front wheels and the associated brake units also broke off and were projected forward over a distance of over 400 m. After breaking off, the right landing gear leg struck the right tailplane and elevator, severing the two almost completely. This caused the landing gear leg complete with the two rear tires, wheels and brake units to be thrown about 70 m beyond the point of collision with the truck. The left side panel of the truck's dumper body, the only part to break off, was thrown to the left of the runway; this panel bore traces of tires about halfway along its top edge. The inner right-hand section of the wing flaps also struck the dumper body, which removed the complete section; this was found to the right of the aircraft's flight path some 40 m beyond the final location of the dumper body. The underside of the flap was full of earth and the fractures in the structure contained earth from the truck. The right-hand side panel of the dumper body also bore evidence of having been struck by a metal object. The truck broke up completely and parts of it were scattered over a considerable distance on and off the runway, the area covered being some 400 m long by 100 m wide.

1.1.4 Three seconds before the collision with the truck the engine throttles were opened. The collision occurred under these conditions and in spite of the violence of the impact the aircraft remained airborne and flew on, although lift was precarious due to the loss on the right side of the tailplane complete with elevator and the inner section of the wing flap. The aircraft was banked to the right and this inclination increased so much that when the aircraft was approximately 1 500 m from the threshold of Runway 23 Left, the outer section of the right wing flap struck the cab of an excavator which was parked parallel to the right-hand edge of Runway 23 Left. The impact completely destroyed the cab and parts of the trailing edge of the wing flap were found embedded in the twisted framework of the excavator. The aircraft continued, veering to the right and increasing its bank angle towards that side until the right wing tip was scraping Taxiway "A", leaving a deep score in the pavement, damaging a telephone manhole and destroying some taxiway edge lights. A severed section of the right wing was found deeply embedded in the ground at this point and the first signs of the fire which burned the nearby grass were also in this area.

1.1.5 The distance from the marks left by the landing gear in the grass and on the runway shoulder 167 m from the threshold of Runway 23 Left, to the score made in Taxiway "A" by the right wing tip, is approximately 2 500 m, and over this entire distance the aircraft left no mark or trace on the ground, except a few metres beyond the excavator. From this point a score of constant depth and width had been made in the grass over a distance of about 70 m, possibly by something suspended underneath the aircraft. Small fragments of glass fibre, the material used for the trailing edges of the aircraft's control surfaces, were found along this score. The evidence above proves that the aircraft had remained airborne from the time it collided with the truck until reaching Taxiway "A", as confirmed by the flight recorder data. After the traces left by the right wing tip on Taxiway "A", scores of varying depths were made in Taxiway "P" by the aileron and the outer section of the right flap. A few metres further on the right wing collided with the corner of the PCV repair hangar, knocking down a pillar, a cross tie and part of the roof corner. Various aircraft components were found inside the hangar, e.g. the flap guides and hinges, sections of the leading edge of the right aileron, etc., besides the fuel which was spilled from the fractured wing onto a PCV under repair and on parked cars and vans. The collision of the right wing with the PCV repair hangar hardly interrupted the aircraft along its flight path and it finally crashed against the front of a building, which was demolished by the impact. This was the main impact, during which the tail fin complete

with rudder and engine No. 2, the tail unit and the left tailplane with its elevator broke off, together with what remained of the right tailplane and elevator removed earlier by the right landing gear leg. The left wing was also severed at its attachment to the centre section and was thrown more than 200 m, turning over in the process and falling on a house outside the airport; part of this house was burned out. Engines No. 1 and 3 broke away from the wings and were destroyed by the impact and fire.

1.1.6 Twenty minutes before the accident to aircraft N-903WA, a B-727 aircraft of the Mexicana Airline which was performing Flight No. 111 from Los Angeles, California, landed in accordance with the same procedure which the Western aircraft was instructed to follow, namely approach via Tepexcan-Metro Eco-23 Right, using the VOR as guidance during the final approach. All the radio aids and lighting systems for Runway 23 Right were operating normally.

1.2 Injuries to Persons

1.2.1

| Injuries | Crew | Passengers | Others |
|---|---|---|---|
| Fatal | 11 | 61 | 1 |
| Serious | 0 | 13 | 0 |
| Minor | 2 | 0 | 0 |
| None | 0 | 2 | 0 |

Note: The person with fatal injuries in the column headed "Others" is the driver of the truck with which the aircraft collided.

1.3 Damage to Aircraft

1.3.1 The aircraft was completely destroyed by the series of collisions and subsequent fire.

1.4 Other Damage

1.4.1 During the accident the truck belonging to the firm which was carrying out levelling work on the runway was completely destroyed. The operating cab of an excavator belonging to the same firm was also destroyed. The underground ducts and manholes for the telephone lines and some taxiway edge lights were damaged. The hangar was also damaged and a PCV was partly burned. Several vehicles belonging to the airport administration were damaged or destroyed. An airport building was demolished and all the aircraft servicing and catering equipment, office furniture, aircraft loading gear, etc., belonging to Eastern Airlines and Pan American were destroyed. A large part of the northern perimeter fence was also destroyed. Outside the airport a house was damaged and telephone lines and poles in the area were destroyed.

1.5 Personnel Information

1.5.1 The pilot-in-command was in possession of Airline Transport Pilot (ATP) Licence No. 403816 and had flown a total of 31 500 hours, of which 2 248:38 were in the aircraft type in question. He held a Restricted Radio Operator Licence No. 11E2771 and ratings for instrument flying, multi-engined aircraft (AMEL), commercial aircraft B-707/720, L-188, DC-3, DC-6, DC-7 and DC-10, in addition to a certificate to act as flight engineer issued on 27 February 1971. As pilot-in-command he had made 28 landings at Mexico City International Airport, 11 during September and 4 during October 1979.

1.5.2 The first officer was in possession of Airline Transport Pilot (ATP) Licence No. 1757979. His total flying hours were not available, although it was established that he had flown 354:03 hours in the aircraft type in question. He held a Restricted Radio Operator Licence No. 24F5795 issued on 20 September 1972. He also held ratings for instrument flying, single-engined and multi-engined aircraft and Flight Engineer Licence No. 1839526 issued on 24 April 1968. He had received the prescribed training for his DC-10 rating and the scheduled periodic training during his periods of duty. As first officer (co-pilot) he had made 15 landings at Mexico City International Airport, 11 during August and 4 during October 1979.

1.5.3 The second officer was in possession of Commercial Pilot Licence No. 1679607. He had flown a total of 4 000 hours, of which 1 390:09 were in the aircraft type in question. He held ratings for instrument flying, helicopters, single-engined and multi-engined aircraft and as flying instructor. He had received the prescribed training for his DC-10 rating and the scheduled periodic training during his periods of duty. As second officer he had made 6 landings at Mexico City International Airport during October 1979.

1.6 Aircraft Information

1.6.1 Airframe: McDonnell Douglas, DC-10-10, serial No. 46929, total flying hours 24 614:09 and a total of 7 345 landings. Flying hours since the last "A" overhaul: 93:96 hours; since the last phase "B" overhaul: 9 396 hours and since the last major structural inspection: 5 950:09 hours. Number of landings since the last major structural inspection: 1 937.

Phase "A" overhaul: This servicing is carried out every 300 aircraft flying hours maximum and is included in every phase "B" overhaul and major structural inspection.

Phase "B" overhaul: This servicing is carried out every 1 000 flying hours.

Major structural inspection (MSI): This inspection is carried out every 22 000 flying hours.

1.6.2 Engines: General Electric model No. CF-6-6D. Engine No. 1: serial No. 451-382; engine No. 2: serial No. 451-385; and engine No. 3: serial No. 451-487.

| Engines | No. 1 | No. 2 | No. 3 |
|---|---|---|---|
| Total running hours | 17 821:36 | 17 345:23 | 10 279:11 |
| Total number of cycles | 5 427 | 5 033 | 2 940 |
| Running hours since installation | 1 286:12 | 1 152:26 | 582:59 |
| Number of cycles since installation | 392 | 637 | 157 |
| Hours since boroscope inspection of engine | 93:36 | 399:05 | 93:36 |

| | | | |
|---|---|---|---|
| Number of cycles since boroscope inspection | 24 | 112 | 24 |
| Hours since boroscope inspection of turbine | 93:36 | 399:05 | 93:36 |
| Hours since boroscope inspection of components N1, N2, top and bottom of turbine and engine hub | 424:13 | 399:05 | 582:59 |

Note: All elements and systems were inspected and serviced at the times prescribed in the Airline Maintenance Manual.

1.7 Meteorological Information

1.7.1 The meteorological conditions between 0400 and 0800 h on 31 October 1979 were based on the observations made at Mexico City International Airport, as follows:

Routine report for 0400 h: Partly cloudy, visibility reduced to 6 NM by mist and haze, ambient temperature 9.8°C, dew-point 8.0°C, barometric pressure 1 022.0 mb.

Note: Sky 1/10 occluded by mist and haze, fog to the NW.

Special report No. 1 at 0500 h: Partly cloudy, visibility reduced to 3 NM by haze, mist and fog, ambient temperature 9°C, dew-point 6.5°C, wind 060°/7 kt, barometric pressure 1 022.4 mb.

Note: Sky 2/10 occluded by haze, mist and fog, visibility to the NE 2 NM because of fog.

Special report No. 3 at 0600 h: Indefinite, zero, occluded, visibility reduced to zero NM by fog, pressure reduced to mean sea level, 1 011.8 mb, ambient temperature 9°C, wind 070°/6 kt, barometric pressure 1 022.7 mb.

Note: Sky 10/10 occluded by fog and haze. Crashed aircraft Runway 23 Right.

Extra 0630 h: Indefinite, zero, occluded, visibility reduced to zero NM by fog, ambient temperature 7.5°C, dew-point 6.8°C, wind calm, barometric pressure 1 023.0 mb.

Note: Sky 10/10 occluded by fog.

Extra 0630 h: Indefinite, zero, occluded, visibility reduced to zero NM by fog, ambient temperature 8°C, dew-point 7.8°C, wind calm, barometric pressure 1 023.7 mb.

Note: Sky 10/10 occluded by fog.

Special report No. 4 at 0700 h: Partly cloudy, visibility reduced to 1/5 NM by fog, haze and mist, ambient temperature 9.5°C, dew-point 7.2°C, wind calm, barometric pressure 1 023.7 mb.

Note: Sky 6/10 occluded by fog, mist and haze.

1.7.2 Synthesis of the Meteorological Information

Information gathered and analysed by the weather group revealed that the fog which was affecting the northern part of the airport before the observation of 0600 h was the leading edge of a fairly thin layer. The thickness of the fog varied from place to place so that, at any one time, simultaneous observations made from different points produced different values of vertical and horizontal visibility.

In addition, the movement of the fog bank and its fluidity produced wider variations in visibility than those resulting from the above-mentioned changes in thickness.

1.8 Aids to Navigation

1.8.1 During the flight, the crew of aircraft N-903WA made use of the Queretaro, Otumba and Mexico VORs. To check the efficiency and serviceability of the radio aids, they were tested immediately after the accident and found to be operating normally. The localizer and glide path of Runway 23 Left were also checked and they too were found to be operating normally. The file on this accident contains the report sheets for the ground tests of all these facilities.

1.8.2 It was established that the high-intensity runway lights, the approach lights and the VASIS of the runway closed to traffic (23 Left) were inoperative, the first because they were disconnected and the lamps had been removed, the last two because the systems were disconnected; all the lights for the runway in use (23 Right) were operating.

1.9 Communications

1.9.1 The crew of aircraft N-903WA, Flight No. 2605, was in contact with the Mazatlán centre and afterwards with the Mexico centre and the control tower of Mexico City International Airport.

1.10 Aerodrome Information

1.10.1 Licenciado Benito Juárez International Airport of Mexico City, D.F., has three paved runways, the longest (05 Right/23 Left) being the one which was closed to all operations from 19 October 1979. Runway 05 Left/23 Right was in use at the time and is equipped with all the facilities and lighting systems needed for the operation of all types of aircraft, irrespective of mass. This runway is 3 420 m long by 40 m wide and makes use of the instrument approach procedures based on the NDB, VOR/DME and ILS of Runway 23 Left with change-over to 23 Right. The airport also has primary/secondary terminal radar services with alphanumeric display.

1.11 Digital Flight Data and Cockpit Voice Recorders

1.11.1 Aircraft N-902WA was equipped with a Sunstrand flight data recorder, model 563 A, serial No. 2567, which was installed on 6 August 1979; on the date of the accident it had totalled 759:49 operating hours. The cockpit voice recorder was a Fairchild model A-100, serial No. 728, which was installed in the aircraft on 16 January 1979 and on the date of the accident had totalled 2 660:16 operating hours. The two units sustained some damage during the accident, but the tapes were in good condition and provided the required information.

1.11.2 The parameters contained in the data flight recorder were interpreted by a computer and subsequently plotted for analysis. This analysis concentrated on interpreting the last four minutes of the aircraft's flight, i.e. when it was in the final approach to Mexico City International Airport. The approach flight path of aircraft N-903WA, from about the point at which it intercepted the extension of the centre line of Runway 23 Right, agreed with the information provided by the cockpit voice recorder. The two recorders revealed that the aircraft's crew had received and acknowledged the approach and landing data for Runway 23 Right; this information is included in the relevant file. The diagram of the approach and landing flight path shows that the crew of Flight 2605 made corrections when the controller drew attention to the fact they were left of the flight path, which the co-pilot acknowledged with "a little". Yet 21 seconds afterwards the flight path was changed to the left and now led directly to the threshold of Runway 23 Left. It was also established that during the last moments of the final approach and when the aircraft had already touched down, the crew realized that they were on the approach to Runway 23 Left, which had been closed for all operations since 19 October 1979.

1.12 Wreckage and Impact Information

1.12.1 The wreckage of the aircraft was scattered, as explained in section 1.1.

1.13 Medical and Pathological Information

1.13.1 ICAO Note: Information not reported.

1.14 Fire

1.14.1 The fire which destroyed most of the aircraft at the point of the main impact started when the right wing tip scraped along Taxiway "A" and fractured the structure, causing fuel to spill. Further on, when the right wing struck the corner of the PCV repair hangar, the spilled fuel also caught fire and spread to the entire aircraft when the main impact occurred against the building. The main impact was only 100 m from the fire station of Mexico City International Airport and the brigade immediately went to fight the fire, soon afterwards joined by the firemen of the central station of Mexico City.

1.15 Survival Aspects

1.15.1 The crew and passengers received immediate assistance from the rescue and fire fighting service on duty at the airport at all times and from several units of the Red Cross which operate in Mexico City. The injured were quickly transported to emergency hospitals for medical attention and immediately afterwards work was started on recovering the bodies of the victims.

1.16 Tests and Research

1.16.1 The state of the cockpit made it impossible to trust any of the readings of the few instruments which were not completely destroyed by the impact and fire, or the settings of the controls in the switchboards and pedestals. All the other aircraft systems were completely destroyed so that their operation could not be checked in any way. Nevertheless, the accident was obviously not caused by a failure of the engines or any of the aircraft's systems.

## 2. ANALYSIS

2.1 Aircraft N-903WA was performing Flight No. 2605 from Los Angeles, California, United States, to Mexico City, D.F.

2.2 On 19 October 1979 NOTAM No. 2841 was issued, informing all airlines, both domestic and foreign, operating into or out of Mexico City International Airport, that with effect from that date, Runway 05 Right/23 Left was closed to all operations because of resurfacing work.

2.3 The flight from Los Angeles to the final approach to Mexico City International Airport was normal.

2.4 When close to Mexico City, the Mexico centre cleared aircraft N-903WA for an approach to Licenciado Benito Juárez International Airport via Tepexpan and in due course the crew were given instructions to change over to tower control.

2.5 The crew received landing instructions from the operator on duty in the control tower, who assigned Runway 23 Right for the landing.

2.6 When the tower operator realized that the aircraft was to the left of its approach to Runway 23 Right he drew the attention of the pilot to this fact.

2.7 As shown by the flight recorder trace, the aircraft stayed on the correct flight path to Runway 23 Right for most of the time between the outer marker "Metro Eco" and Mexico City International Airport, and only deviated to the runway closed to traffic (23 Left) when at a height of 600 ft above the ground during its final approach.

2.8 During its final approach the aircraft flew into a bank of fog so that it could no longer be seen by the control tower.

2.9 The aircraft touched down on the left-hand side of the threshold of the runway closed to traffic (23 Left) travelling some 100 m off-centre along the runway.

2.10 After covering 224 m and again airborne, the aircraft's right landing gear collided with a truck loaded with earth which at the time was on the shoulder of the runway closed to traffic.

## 3. CONCLUSIONS

3.1 The aircraft's crew was in possession of licences issued by the aviation authorities of the United States and, according to the records provided by the airline, had received the appropriate training to fly the aircraft in question.

3.2 Western Airlines, owner of the aircraft, had brought to the attention of all crews flying on services to Mexico, NOTAM No. 2841 issued on 19 October 1979, i.e. that Runway 05 Right/23 Left would be closed for all operations for resurfacing work from the date of the NOTAM.

3.3 During the Los Angeles-Mexico flight the aircraft's crew had not reported any difficulties to any control centre within the national territory of Mexico.

3.4 When the aircraft's crew contacted the control tower of Mexico City International Airport, it was given the relevant instructions for landing and was cleared to Runway 23 Right. This was acknowledged by the crew.

3.5 The control tower reminded the crew of aircraft N-903WA that the runway allocated for the landing was 23 Right.

3.6 During the final approach to the runway assigned and having reached a height of 800 ft above the ground, the aircraft flew into a fog bank which concealed it from the control tower operator.

3.7 The aircraft's crew did not comply with the procedural minima for the approach for which it had been cleared, in that the crew descended below the minima without reporting the runway in sight or initiating a go-around procedure.

3.8 The crew never reported to the control tower operator that the runway was in sight and no landing clearance was therefore given.

3.9 The data obtained from the cockpit voice recorder revealed that the crew did not comply with the operational procedures laid down in the relevant manuals, in particular the requirement to call out the altimeter readings during the final approach phase.

3.10 Before colliding with the truck, the aircraft's crew applied maximum engine power (according to the flight data recorder) and the engines responded normally. Although airborne, the aircraft was in an uncontrolled bank to the right, so that eventually the right wing scraped along Taxiway "A". The aircraft then collided with an airport building, where it caught fire and was completely destroyed.

3.11 Probable cause: Non-compliance with the meteorological minima for the approach procedure, as cleared; failure to comply with the aircraft's operating procedures during the approach phase, and landing on a runway closed to traffic.

ICAO Note: The transcription of communications originally contained in 1.9.1 was not reproduced.

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