Air Accident Investigation Unit Ireland

PRELIMINARY ACCIDENT REPORT
ATR 72-212, EI-SLM
Shannon Airport, Co. Clare
17 July 2011

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

AAIU Report No: 2011-014

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PRELIMINARY ACCIDENT REPORT

This is preliminary information, subject to change, and may contain errors. Any errors in this Report will be corrected in the Final Report. The sole purpose of this Investigation is the prevention of aviation accidents and incidents. It is not the purpose of the Investigation to apportion blame or liability. This Preliminary Report contains factual information, as known at this time, and does not contain any analysis or conclusions.

AIRCRAFT MANUFACTURER:	AIRCRAFT MANUFACTURER: ATR (Avions de Transport Regional)
Model:	ATR 72-212
State of Registry: Ireland	Ireland
Registration: EI-SLM	EI-SLM
Serial Number:	Serial Number: 413
TYPE OF OPERATION:	Scheduled Public Transport
DATE / TIME:	17 July 2011 at 09.21 hrs UTC[1]
POSITION OF OCCURRENCE:	Shannon Airport, Co. Clare, Ireland
PERSONS ON BOARD:	Crew: 4 Passengers: 21
INJURIES: Crew:	Crew: 0 Passengers: 0
DAMAGE: Substantial	Substantial
INVESTIGATOR-IN-CHARGE:	Graham Liddy

[1] UTC: Co-ordinated Universal Time (local time minus one hour on the day of the event).

1. INTRODUCTION

This Investigation is being conducted in accordance with the requirements of ICAO Annex 13, Regulation (EU) No. 996/2010 and Irish Regulations S.I. No. 460 of 2009. The French Bureau d'Enquetes et d'Analyses (BEA), as the State of Manufacture, appointed a non-travelling Accredited Representative to the Investigation.

2. GENERAL

The aircraft was operating on an international scheduled public transport flight between Manchester Airport (EGCC) and Shannon Airport (EINN).

3. HISTORY OF THE FLIGHT

On the morning of 17 July 2011, the aircraft, operating as Flight No. EI3601 and Call sign REA61MA, departed EGCC with a Shannon-based flight crew. The aircraft arrived at a point 15 nautical miles (nm) northeast of EINN around 09.00 hrs and self-positioned for an Instrument Landing System (ILS) approach to Runway (RWY) 24. The Shannon Approach Charts include a caution which states; *"Caution: Turbulence and/or windshear may be experienced on approach to RWY 24 when wind direction lies in the sector from 260° - 320° (clockwise) with wind speeds > 15 kts"*. This caution was applicable given the prevailing weather conditions as detailed in paragraph 6.

After the aircraft was transferred from EINN Approach to EINN Tower, the Tower cautioned the aircraft regarding turbulence in accordance with Air Traffic Control (ATC) Standard Operating Procedures (SOPs). The Captain, who was the handling pilot or Pilot Flying (PF) elected to aim for a touch-down at the end of the RWY 24 Touch-down Zone. This was to avoid possible turbulence during the final stages of the approach/landing. The PF considered, given the length of RWY 24
(10,000 ft) and the landing performance of the ATR 72, that the remaining runway length available was sufficient to achieve a safe landing.

The Flight Data Recorder (FDR) data[2] indicates that the aircraft experienced an extended landing flare. Engine torque was increased during the initial flare and then progressively reduced in stages. The PF subsequently stated that difficulty was experienced in getting the aircraft to settle on the runway during this time. The PF became increasingly concerned about the remaining length of runway available and decided to positively land the aircraft by applying a forward input on the control column. This is confirmed by the FDR. At the same time engine torque reduced. This was followed by a nose-wheel contact with the runway, at an FDR-recorded pitch angle of 8° nose-down. An airport security camera recording (CCTV[3]) confirmed a touch-down with a significant nose-down attitude. The FDR recorded a G-spike (normal acceleration) of 1.7 G. The aircraft immediately bounced back into the air. The PF applied power and initiated a go-around. During the go-around the undercarriage was retracted and normal cockpit indications were observed by the flight crew.
No warning tones sounded during this landing and go-around.

The aircraft was then vectored by ATC for another ILS approach to RWY 24. The aircraft was established on this approach at the 6 mile point.

[2] The FDR data used in this report is based on the initial down-load of the FDR and may be subject to revision.
[3] **CCTV:** Closed Circuit Television – The Investigation utilised a number of different cameras located within the confines of the airport.

This time the PF elected to aim for the middle of the Touch-down Zone. The FDR indicates a number of bounces which are also visible on poor quality CCTV. The final touch-down occurred at a pitch angle of 8° nose down and a G-spike of 2.3G. At this point the Blue hydraulic system lost pressure.

The final touch-down was not discernible on good quality CCTV, as it occurred at an earlier point along the runway than the first approach. However, the landing run just after touch-down was clearly recorded. This showed the aircraft with the nose wheel collapsed and the nose scraping along the runway. Smoke/steam was observed emanating from the nose area. The aircraft continued along the runway, initially on the centreline. It gradually veered to the left and exited the runway surface onto the grass to the left of the runway, as it approached Taxiway Alpha. The left propeller struck a runway sign, demolishing it and damaging one propeller blade. The aircraft continued to turn to the left and came to a stop at the left edge of Taxiway Alpha, in line with the taxiway heading. The final stopping point was 1,200 metres from the initial impact marks on the runway.

The flight crew had no directional control of the aircraft from the initial runway impact to the final stopping point, as the nose wheel steering was inoperative due to the collapsed nose wheel and the rudder was jammed in the mid position. The flight crew were also unable to shut down the engines by retarding the condition levers, as the levers would not retard to the aft position. The flight crew therefore decided to stop the engines by pulling the fire handles.

The flight crew decided not to perform an emergency evacuation as they had not detected any evidence of fire or smoke. However the cabin crew subsequently detected a smell of burning and initiated an evacuation. Four passengers evacuated the aircraft via the rear (left) air-stairs before the airport fire services arrived on scene approximately 1 min 40 sec after the aircraft came to a stop.

4. ACCIDENT REPONSE

Shannon Tower was concerned by the initial landing and bounce and during the go-around they alerted the fire station watch that there may be a problem. When the nose made ground contact on the second approach the crash alarm was sounded immediately. The fire crews arrived on scene and assisted the passengers to exit the aircraft by the rear air-stairs, apart from four passengers who had already exited the aircraft.

5. INSPECTION OF THE AIRCRAFT

Inspection of the aircraft found that the nose undercarriage leg had retracted forcibly rearwards into the fuselage behind the undercarriage bay. The nose leg normally retracts in the forward direction.
When the leg was forced into the fuselage, significant structural damage was suffered in the undercockpit area. This resulted in a total restriction of rudder pedal movement and a restriction of the engine condition levers which prevented them from being retarded into the engine shut-down position. The axle of the right nose wheel had failed, resulting in the departure of this wheel. The wheel was subsequently located in the grass to the left of RWY 24 Touch-down Zone. Part of the right rear nose undercarriage door was found embedded in the RH composite wing root fairing. Other debris impact damage was noted on the RH side of the fuselage. One blade of the RH propeller was damaged, consistent with contacting debris while under power.

The attachment eye of the nose undercarriage drag brace, which connected the drag brace to the front of the nose undercarriage leg, was found to have suffered plastic deformation, in that the lower web of the eye attachment had failed and the eye then opened up completely.

The fracture surfaces on both sides of this failure were subsequently ground down as the drag brace abraded against the runway surface.

Both nose tyres burst and the rim of the separated wheel hub had been flattened at one point on its circumference. Initial examination of the failed RH nose wheel axle indicated that it failed in single event overload mode. Further investigation of the fracture is on-going.

The hydraulic pipelines attached to the nose landing gear leg, powering nose wheel steering and the retraction/lowering system, ruptured when the nose leg retracted rearwards. The under-surface of the nose of the aircraft suffered significant abrasion damage, in addition to the damage caused by the rearwards retraction of the nose leg.

6. WEATHER

Initial Automatic Terminal Information Service (ATIS) *"Golf"* for Shannon received by the flight crew was RWY 24, damp, wind 300°/20 kts, visibility 10 km, few clouds at 1,000 ft, broken cloud at 1,300 ft, temperature 14°C, dew point 12°C and moderate turbulence for RWY 24. The subsequent ATIS *"Hotel"* was identical except the wind was given as 310°/23 kts, gusting 32 kts.

During the final approach Shannon ATC passed wind information to the aircraft four times. The caution *"occasional moderate turbulence observed and forecast in touch-down zone RWY 24"* was included with the first wind report. The four wind reports were very similar and the strongest winds given were on the third report: *"310°/24 kts gusting maximum 32 minimum 14".*

7. CROSSWIND LIMITATIONS

The ATR 72-212 has a demonstrated maximum crosswind component of 35 kts on a dry runway. At the time of the accident, the Operator was using a cross-wind limit of 30 kts on a dry or damp runway and 25 kts on a wet runway. The Operator's procedures also stated that gusts may be disregarded when calculating crosswind components. As RWY 24 was classified as "damp" at the time of the accident, the 30 kts limit was applied. Wind gusts of 32 kts, 70º off the runway heading, were reported by ATC during the approach. However the maximum mean wind speed during the approach was 24 kts. The crosswind component of this wind was 22.5 kts.

8. Previous Events

The Investigation learned that on the previous evening, the same aircraft, but different flight crew, reported difficult conditions during approach to RWY 24 on two separate flights. In both cases the wind strength, gusts and direction were very similar to those prevailing at the time of the accident. The flight crew in question reported this to ATC immediately after landing.

9. ADDITONAL INFORMATION

The FDR and CVR were both recovered on the day of the accident. Data from these devices was downloaded the following day; work on analysis of the FDR data is continuing. At this time the Investigation has not identified any failures of the airframe, systems or either powerplant prior to the final landing.

10. DISCUSSION

The Investigation notes that the Operator's procedures did not require that the gust component of crosswinds be considered when calculating landing limits and forecast turbulence was not factored into cross-wind limitations for approaches to RWY 24 at EINN.

The Investigation is on-going and a Final Report will be published in due course.

11. SAFETY RECOMMENDATION

Pending further investigation, the following interim safety recommendation is made:

Aer Arann should review the maximum crosswind limitations for approaches onto RWY 24 at Shannon in conditions where the wind direction lies in the sector from 260° - 320° and the wind speed is more than 15 kts, i.e. when turbulence on the landing/approach may be expected.

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Response: *Aer Arann has informed the Investigation that it has addressed the content of this Safety Recommendation through the issue of Flight Crew Instruction FCI No. ATR 11/13.*

- END -

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