Air Accident Investigation Unit Ireland

SYNOPTIC REPORT

ACCIDENT
Van's RV-7A, EI-FAD
Kilrush Airfield
14 January 2014

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

Foreword

This safety investigation is exclusively of a technical nature and the Final Report reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable causes.

In accordance with the provisions of Annex 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

[1] **Annex 13**: International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.
[2] **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.
[3] **Statutory Instrument (SI) No. 460 of 2009**: Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.

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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010 and the provisions of SI 460 of 2009, the Chief Inspector of Air Accidents, on 14 January 2014, appointed Mr Paddy Judge as the Investigator-in-Charge to carry out an Investigation into this Accident and prepare a Report. Mr John Owens, an Inspector of Air Accidents, was appointed to assist with the Investigation.

Aircraft Type and Registration:	**Van's RV-7A, EI-FAD (Homebuilt)**
Number and Type of Engines:	**1 x Lycoming IO-360-A1B6D**
Aircraft Serial Number:	**71464**
Year of Manufacture:	**2012**
Date / Time (UTC):[4]	**14 January 2014 @ 12.45 hrs**
Location:	**Kilrush Airfield (EIKH)**
Type of Operation:	**Private**
Persons on Board:	**Pilot: 1 Other: 1**[5]
Injuries:	**None**
Nature of Damage:	**Substantial**
Commander's Licence:	**Joint Aviation Authorities (JAA) Commercial Pilot Licence (CPL) - Aeroplanes (A) issued by the Irish Aviation Authority (IAA)**
Commander's Details:	**Male, aged 31 years**
Commander's Flying Experience:	**2,444 hours of which 12 were on type**
Notification Source:	**Aircraft Owner**
Information Source:	**AAIU Report Form submitted by Pilot** **AAIU Field Investigation**

[4] **UTC**: Co-ordinated Universal Time. (The same as local time on the day of the accident).
[5] See **Section 1.2.1**.

SYNOPSIS

Following a flight from Abbeyshrule (EIAB) to EIKH, a visual circuit was made for landing on Runway (RWY) 29. The aircraft landed long and due to reduced braking action on the wet grass surface, overran the runway. It entered soft soil, pitched tail over nose and came to rest inverted. Both occupants were uninjured.

1. FACTUAL INFORMATION

1.1 History of Flight

The aircraft with two occupants flew from EIAB to EIKH, where a visual left hand circuit to land on the grass runway (RWY 29) was conducted. The Pilot estimated the wind to be about 230°/8-10 kts. Because of the crosswind, the Pilot said that he increased the approach speed by 3-4 kts, to an indicated airspeed of 67 kts. The Pilot was aware of trees on the approach and the landing was deep. Following initial touchdown, a bounce occurred and power was applied to cushion the subsequent runway contact. Brakes were then applied but had little effect.

The aircraft left the end of the runway, where there was a vertical drop of approximately 8 cm onto tilled soil, which contained a newly sown cereal crop. The soil was broken, loose and wet. This resulted in the nose landing gear digging in on contact, the aircraft overturning nose first and coming to rest inverted, on a magnetic heading of 148° (**Photo No. 1**).

While the aircraft sustained substantial damage, neither occupant was injured and they both evacuated the aircraft unaided.

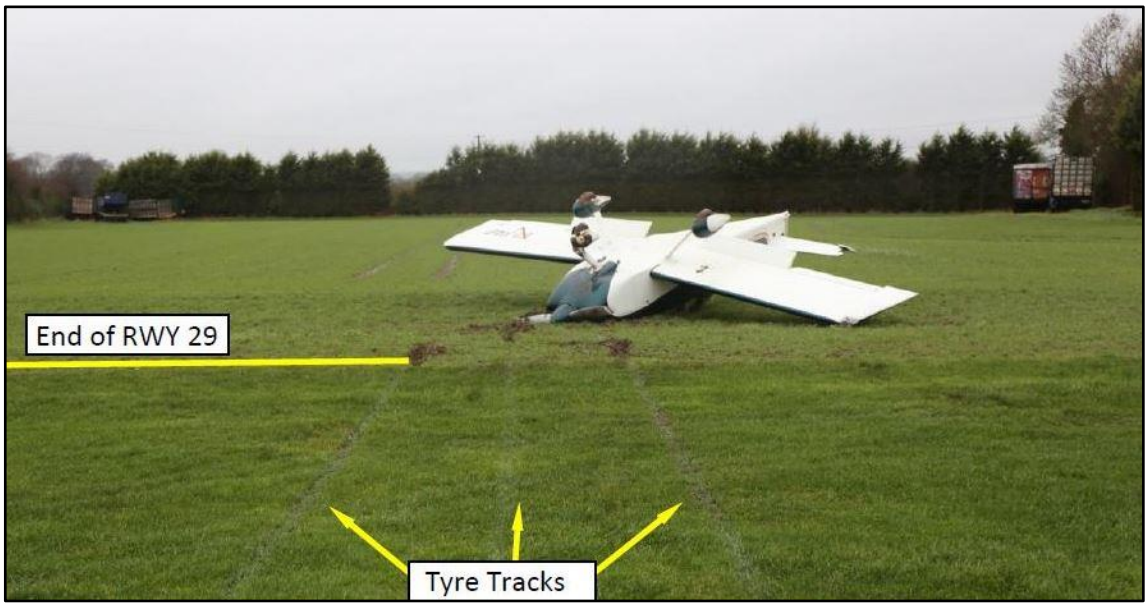

Photo No. 1: Final resting position of EI-FAD, having overran RWY 29

1.2 Interviews

1.2.1 Pilot

The Pilot stated that earlier that day he and another pilot (who was also qualified to fly EI-FAD) flew to EIAB. The Pilot informed the Investigation that this pilot acted as an observer. The Pilot said on returning to EIKH, he flew over the airfield and looked at the wind sock. He stated that he discussed the wind direction with the other pilot and they agreed that it was coming from an approximate direction of 230°. He elected to land on RWY 29 to practise landing on grass. He said that he established on a left downwind leg, went through pre-landing checks, turned onto a base leg and then onto finals and that the wind was coming from the left when he was on the approach. He commented that due to the fact that there was a crosswind and a "*possibility of gusts*", he increased the approach speed by approximately 3-4 kts. He also stated that there were trees on the final approach to RWY 29.

The Pilot said that when he "*rounded out*", he cut the power and the aircraft made contact with the runway, but that there was a slight bounce. Because of this, he "*put on a tiny bit of power to delay the rate of descent of the aircraft actually touching back on*". He stated that the bounce was approximately one to two feet in height. When the aircraft touched back on, he closed the throttle fully but noted, that compared to other landings on that grass runway, "*I wasn't slowing down at all as quickly as I had previously this week when I was flying*". He recalled that as the end of the runway approached, he increased his "*toe-tapping*" on the brakes to decrease the speed and that at approximately 10 to 20 feet from the end of the runway, he realised that he wasn't going to stop within the available distance. The aircraft left the runway "*at a fast walking pace*" and as soon as it entered the level crop surface, "*the nose wheel dug in and the aircraft cartwheeled over and landed on its roof, inverted*".

The Pilot thought that he was "*a little bit long*" when he touched on. He said that when he landed on that runway previously and closed the power, the aircraft decelerated normally, but that this time that didn't happen "*…purely I think because it is a wet runway*".

The Pilot later provided additional information to the Investigation regarding his runway selection. He said that he did not think the runway would have been as wet as it was and that he had landed on that runway approximately four times in the week leading up to the accident. He reported that after the accident occurred, he saw that the runway was "*saturated*".

The Pilot stated that the landing distance for the aircraft was 500 ft. Regarding the aircraft brakes, the Pilot informed the Investigation that they functioned normally earlier that day when landing at EIAB. He later advised that following the accident, he "*tested both sets of brakes separately and individually and they worked as expected*".

1.2.2 Other Pilot

This pilot agreed with the Pilot's recollection of events and thought that the approach speed was about 67 kts but that he "*didn't think it was fast*". He stated that once the aircraft was back on the ground after the initial bounce on landing, "*It just wasn't slowing down*", and that the end of the runway *"just came up so fast*".

In relation to the aircraft turning over, he said that: "*The nose went in and it ended up very precariously, very slowly going over, in that I thought at one stage it was going to go back the other side*".

1.3 Damage to Aircraft

The nose landing gear was damaged during the accident. The propeller, rudder and tail fin were also damaged when the aircraft inverted. The cockpit canopy and wheel spats were destroyed.

1.4 Other Damage

There was localised damage to the crop in the field at the end of RWY 29.

1.5 Personnel Information

The Pilot held a JAA CPL (A) with a Single Engine Piston (SEP) rating. This licence was issued by the IAA and at the time of the accident, was valid until 18 February 2014. His Class two medical certificate was valid until 13 October 2016. The majority of his flying experience was on rotary wing aircraft. His only recent fixed wing experience was 12 hours, all of which was accumulated on EI-FAD.

Total all types:	2,444 hours
Total all types P1:	1,751 hours
Total Fixed Wing	688 hours
Total on type:	12 hours
Last 90 days:	51 hours (12 hours fixed wing)
Last 28 days:	15 hours (12 hours fixed wing)
Last 24 hours:	3 hours

1.6 Aircraft Information

1.6.1 General

The Van's RV-7A is supplied in kit form for the purpose of amateur construction. The first flight recorded in the aircraft's logbook was on 28 December 2013.

The Pilot provided the Investigation with a copy of the aircraft "*Operating Handbook*", which had been developed for EI-FAD. According to Section 5.06, "*Take-off and Landing Performance*", the landing distance required for the aircraft is 500 ft (152 m) when landing on a hard surface. However, it states that "*the following factors need to be applied*:

- *Increase landing distance by a factor of 1.6 on a wet grass surface.*
- *Increase landing distance by a factor of 1.35 on long wet grass surface up to 8 inches long".*

1.6.2 Certification

The aircraft was operating on a valid Certificate of Fitness for Flight which was signed by an Inspector approved by the Irish Light Aviation Society (ILAS). It is stated on the Certificate that it "*is issued strictly for the purpose of maintenance, ferry flights or test flights and passengers must not be carried under any circumstances*".

Two occupants were on board EI-FAD on the accident flight, both of whom were qualified to fly the aircraft.

ILAS subsequently informed the Investigation that it intends to revise the wording on the Certificate of Fitness for Flight to include the statement: "*Aircraft must not carry any passengers other than persons performing duties in the aircraft essential for the flight test*".

Note: in relation to aircraft operating under such certification, S.I. No. 324 of 1996 (Airworthiness of Aircraft) states, *inter alia*, that the following condition shall be complied with: "*The aircraft does not carry any passengers or cargo, other than persons performing duties in the aircraft in connection with the flight"* (Article 7, paragraph (3), section (iv)).

1.7 Meteorological Information

The Pilot provided the following weather details to the Investigation:

- Wind direction and speed: 230°/8-10kts.
- Visibility: Greater than 10 km.
- The Pilot also reported that it was raining when he landed at EIKH.

1.8 Airfield Information

EIKH is listed as a licensed airfield in the IAA's Aeronautical Information Circular (AIC) 11/13. There are two runways at the airfield; a hard surface runway, RWY 01/19, and a grass runway, RWY 11/29. The lengths of both runways are published in the IAA's Aeronautical Information Publication (AIP) for EIKH, dated 02 May 2013, as 606 m and 550 m respectively. The AIP also includes the following additional information in Section 2.23: "*Caution: Trees penetrate the 29 approach and the western 01/19 transitional surfaces*". Additionally, in the privately produced "*VFR Flight Guide, Ireland*", attention is drawn to "*trees on approach to 29*". These trees are on the field boundary fence to the left of and a short distance from the beginning of RWY 29 (**Photo No. 2**).

Following the accident, the Investigation examined RWY 29 and identified tyre tracks for the three landing gear wheels which indicated that the aircraft was positively on the ground for the final 210 m of the runway (**Photo No. 2**). In addition, it was noted that the grass was short and wet.

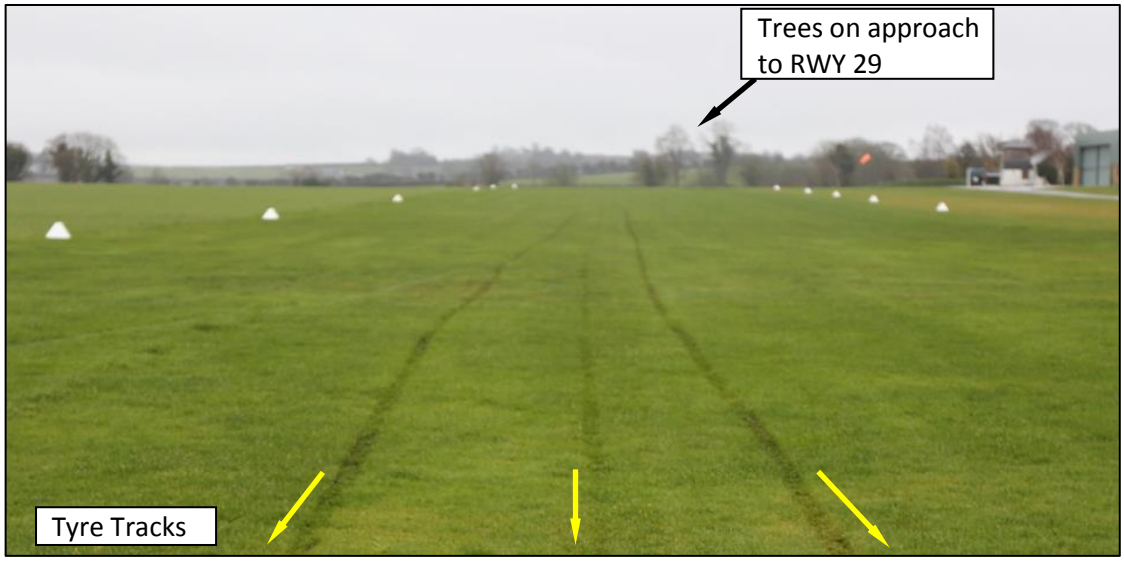

Photo No. 2: Trees on the approach to RWY 29 and tyre tracks on runway

1.9 Additional Information

1.9.1 IAA General Advisory Memorandum – General Aviation Winter Flying

The IAA published a General Advisory Memorandum, entitled "*General Aviation Winter Flying*" (No. 02/09, dated 21 August 2009) which is available on the IAA's website. Section 4.3 of this document relates to "*Grass runways in winter*". Regarding landing runs on such runways, it states that they can "*be much longer….. Tyre friction reduces as does the amount of braking possible. Very short wet grass with a firm subsoil will be slippery and can give a 60% stopping distance increase. When landing on grass, the pilot cannot see or always know whether the grass is wet or covered in dew. Make sure you factor adequate safety margin as per the Flight Manual/Flight Operation Manual. Ensure there is adequate take-off distance and landing distance for your aircraft weight and prevailing runway and weather conditions*".

1.9.2 General Aviation Safety Council of Ireland Safety Information Leaflet

The General Aviation Safety Council of Ireland (GASCI) produced a Safety Information Leaflet entitled "*Strip Operations*". This leaflet highlights that "*a high proportion of the accidents and incidents that occur to light aircraft in Ireland happen during the take-off or landing phase from short or unlicensed airstrips*".

In the "*Landing Notes*" section of the leaflet, it states that *"a touchdown speed of only 10% above normal will increase ground roll by over 20%*" and to "*beware of wet or slippery surfaces; these not only result in poor retardation but also poor directional control*".

2. ANALYSIS

The Pilot stated that he increased the approach speed of the aircraft to compensate for a crosswind landing. He also landed deep and it is likely that this was partially due to ensuring that he maintained adequate clearance over the trees situated near the threshold of RWY 29. In addition, he reported that he increased engine power slightly during the landing to control an initial bounce. However, this increase in power resulted in the aircraft travelling even further down the runway before positive touchdown occurred and braking commenced. This was confirmed by a post-accident examination of the runway which established that the aircraft's three landing gears were only in positive contact with the ground for the final 210 m of the 550 m runway.

It was raining at EIKH when the aircraft overran the runway and the Pilot reported that after the accident, he saw that the runway was "*saturated*". The Operating Handbook for EI-FAD supplied by the Pilot states that the required landing distance was 500 feet (152 m). It also states that a factor of 1.35 should be used for "*long wet grass*" up to eight inches long and a factor of 1.60 for a "*wet grass surface*". When a factor of 1.35 is applied, the resultant landing distance is 205 m (152 m x 1.35). However, when a factor of 1.60 is used, this distance increases to over 243 m. It is likely that when braking finally commenced on the wet runway, the remaining distance was insufficient to allow the aircraft to be brought to a stop before the end of the runway.

A large proportion of the Pilot's flying experience was on rotary wing aircraft and his fixed wing flying in the 12 months prior to the accident was all in EI-FAD, which first flew on 28 December 2013. Consequently, the Pilot had less than 12 hours flying experience on the aircraft to allow him to become familiar with its performance and handling characteristics. It should be noted however, that the landing distance requirements and the calculation factors that must be used for wet grass runways are contained in the aircraft operating manual.

There have been several similar overrun occurrences investigated by the AAIU in recent years. Common causes in these events include; landing deep, landing fast, inadequate evaluation of landing field performance and a lack of factoring for runway surface conditions. General Aviation pilots must make themselves familiar with and implement the guidance contained in the IAA's General Advisory Memorandum No. 02/09 and the GASCI Safety Information Leaflet - Strip Operations (**Section 1.9**), both of which highlight the potential for poor retardation performance when landing on wet grass runways.

Whereas this Investigation focussed on the accident flight itself, the Investigation notes that the aircraft was operating under a Certificate of Fitness for Flight. This Certificate was issued as a precursor to the granting of a Flight Permit. Legislation regarding such a certificate prohibits the carriage of any passengers, other than persons performing duties in the aircraft in connection with the flight. The Pilot informed the Investigation that the other occupant, a qualified pilot, was acting as an observer on the flight and he did not consider that he was a passenger. ILAS has notified the Investigation of its intention to amend the wording on the Certificate of Fitness for Flight regarding the carriage of other persons on board.

3. CONCLUSIONS

(a) Findings

1. The Pilot was properly licensed and qualified to carry out the flight.
2. The aircraft was operating on a Certificate of Fitness for Flight.
3. The aircraft landed deep and fast which reduced the available runway stopping distance.
4. The increase in engine power following a bounce on initial contact further reduced the runway distance available to stop the aircraft.
5. The expected braking action was not achieved due to the grass surface of the runway being wet.
6. The Pilot had limited experience on the aircraft type. His recent fixed wing experience was also limited.
7. When braking commenced, there was insufficient runway distance remaining to stop.
8. The Pilot reported that the braking system functioned normally on previous landings and that they worked correctly when checked following the accident.

(b) Probable Cause

Poor braking action during the landing roll due to wet grass surface conditions.

(c) Contributory Cause(s)

1. Landing deep and fast.
2. Engine power was increased to control a bounce following the initial touchdown.
3. Lack of familiarity with the performance characteristics of the aircraft in the prevailing conditions.

4. SAFETY RECOMMENDATIONS

This Investigation does not sustain any Safety Recommendations.

- END -

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

AAIU Reports are available on the Unit website at www.aaiu.ie

An Roinn Iompair
Turasóireachta agus Spóirt

Department of Transport,
Tourism and Sport

Air Accident Investigation Unit,
Department of Transport Tourism and Sport,
2nd Floor, Leeson Lane,
Dublin 2, Ireland.
Telephone: +353 1 604 1293 (24x7): or
+353 1 241 1777
Fax: +353 1 604 1514
Email: info@aaiu.ie
Web: www.aaiu.ie