الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

Air Accident Investigation Sector

Accident

- Final Report -

AIFN/0001/2013

Loss of Control – On Ground

Operator: Horizon International Flight Academy

Type: Bell Helicopter-Textron 206-3B

Registration: A6-FTI

Location: Al Ain Training Area Six

Date of Occurrence: January 02, 2013

Air Accident Investigation Sector
General Civil Aviation Authority
The United Arab Emirates

Incident Brief

GCAA AAI Report No:	AIFN/0001/2013
Operator:	Horizon International Flight Academy
Aircraft Type	BHT 206-3B
Registration	A6-FTI
Engine [s]	One Rolls Royce M250
Location	Al Ain Training Area Six
Category	Air Transport
Persons on Board	One Crew
Injuries	None

Investigation Objective

This Investigation is performed pursuant to the United Arab Emirates (UAE) Federal Act 20 of 1991, promulgating the Civil Aviation Law, Chapter VII, Aircraft Accidents and Article 48. It is in compliance with Part VI, Chapter 3 of the UAE Civil Aviation Regulations, in conformity with *Annex 13 to the Convention on International Civil Aviation* and in adherence to the *Air Accidents and Incidents Investigation Manual*.

The sole objective of this Investigation is to prevent aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

Investigation Process

The Accident was notified to the General Civil Aviation Authority (GCAA) Air Accident Duty Investigator on 02 January 2013

An Investigation Team was immediately dispatched to the accident site.

In accordance with ICAO Annex 13, the States of Manufacture were notified and appointed Accredited Representatives to the investigation and nominated Technical Advisors from the manufacturer of the airframe and the engine respectively.

The Air Accident Investigation Sector (AAIS) of the GCAA led the investigation as the United Arab Emirates (UAE) is the State of Occurrence.

ADREP[1] Occurrence Category

Primary - ARC:

Abnormal Runway Contact - Any landing or take-off involving abnormal runway or landing surface contact

Secondary - LOC-G:

Loss of control - ground - Loss of aircraft control while the aircraft is on the ground.

Note: The Accident/Incident Data Reporting (ADREP) system is operated and maintained by ICAO. The ADREP reporting system is based on the use of a common reporting taxonomy, States use this taxonomy in their national reporting to achieve international harmonisation and thereby enable the exchange and aggregation of occurrence information.

[1] The ADREP Occurrence category taxonomy is a set of terms used by ICAO to categorize aircraft accidents and incidents and allow safety trend analysis on these categories. The ADREP Occurrence category taxonomy is part of the ICAO accident reporting system (ADREP)

Contents

Abbreviations and Index

AAIS	Air Accident Investigation Sector
AGL	Above Ground Level
ALSE	Aviation Life Support Equipment
AMC	Acceptable Means of Compliance
ARC	Abnormal Runway Contact
CAAP	Civil Aviation Advisory Publication
CAR	Civil Aviation Regulations
CBR	California Bearing Ration
CG	Center of Gravity
CPL-H	Commercial Pilots Licence/Helicopter
DA	Density Altitude
EASA	European Aviation Safety Agency
ELT	Emergency Locater Transmitter
EOL	Engine Out Landing
ERP	Emergency Response Plan
FOB	Fixed Operating Base
FTO	Flight Training Organisation
GCAA	General Civil Aviation Authority
GPS	Global Positioning System
GST	Gulf Standard Time
HIFA	Horizon International Flight Academy
ICAO	International Civil Aviation Organisation
IHST	International Helicopter Safety Team
LAA	Landing Area Acceptance
LOC-G	Loss of Control - Ground
MIE	Manoeuvre Initiation Envelope
OMAL	Al Ain Airport [ICAO]
ROD	Rate of Descent
SMS	Safety Management System
SOP	Standard Operating Procedure
SP	Student Pilot
STS	Satellite Tracking System
TA6	Training Area Six
TR	Temporary Revision
UAE	United Arab Emirates
UTC/GMT	Coordinated Universal Time

Figures

BHT 206-3B Helicopter

Figure 1: BHT 206-3B

The BHT 206-3B is a single pilot, five place, light helicopter with a two blade semi-rigid main rotor, and a tail rotor that provides directional control.

The airframe is a semi-monocoque fuselage with an aluminium alloy and fiber glass aerodynamic fairings, an aluminium alloy monocoque tail boom supporting the vertical fin, fixed horizontal stabiliser, tail rotor assembly and tail rotor drive train.

The primary load carrying structures are two built in cabin bulkheads, a vertical control tunnel from the floor to the cabin roof and a pair of longitudinal beams in the cabin roof.

The landing gear is tubular aluminium skids mounted laterally.

Accident Synopsis

During a training flight from Al Ain International Airport [OMAL], a Bell Helicopter Textron 206-3B helicopter operating in Training Area Six [TA6], north west of OMAL, lost control while on the ground as the student pilot [SP] attempted to transition to the hover for a solo circuit resulting in a dynamic rollover leading to the helicopter rotor system contacting the terrain causing major structural damage to the aircraft.

The SP was able to evacuate the helicopter.

There was no post-accident fire.

1. Factual Information

1.1 History of the Flight

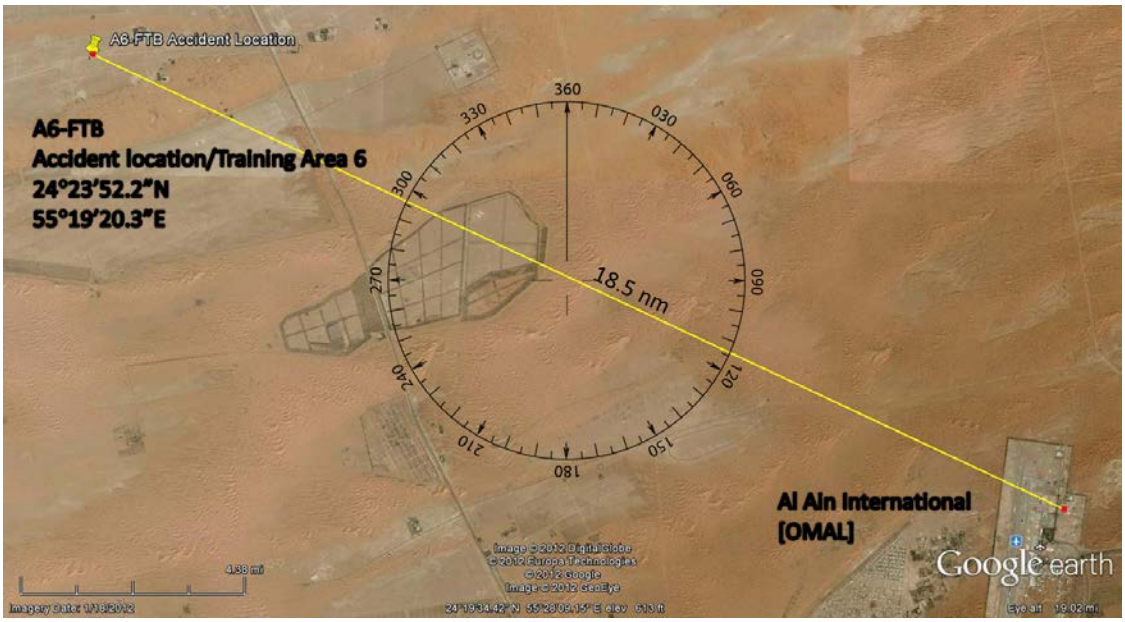

Figure 2 - Google Earth Overview - Accident location/airport proximity

The student was the handling pilot for the departure from Al Ain International Airport [OMAL] to the training area to the north west of the airport designated as Training Area 6 [TA6].

This exercise was briefed as a pre-first solo flight.

The flight operated as a dual proficiency check following the New Year cessation of flying activity.

The instructor flew a series of circuits in the training area with the student prior to briefing the student pilot for a first solo flight.

The Instructor, following the briefing to the student, indicated that he [the instructor] would be standing in view of the student at a point off the helipad periphery.

There was no radio contact between the student and the instructor – the instructor indicated via hand signals the all clear above and behind and corrective action requirements if necessary. The Instructor carried the radio; however it was not turned on for the exercise.

Prior to the instructors getting out of the helicopter, the instructors' statement includes a comment concerning the change of the aircraft Center of Gravity [CG] that was made to the student during the pre-solo briefing.

The student was instructed to pull power, pick up to the hover temporarily and then lower the collective until the aircraft had returned to a landed position to judge the lateral control requirements with the change of CG for a solo flight.

The briefing was then to pull power into the hover, then transition into the climb and complete a full circuit.

As the student picked up into the hover, the aircraft started to yaw[2] to the right. The Instructor – using hand signals – attempted to get the student to push the cyclic to the left.

The student applied left pedal to arrest the yaw, the aircraft rolled rapidly to the right, followed by the main rotor blades contacting the terrain as the aircraft rolled 90° onto the right-hand side of the fuselage.

Large outboard sections of the rotor blades separated from the rotor mast.

The student evacuated the aircraft.

There was no post-accident fire.

1.2 Injuries to Persons

The SP was uninjured and the egress from the habitable occupied space in the cockpit was without incident.

Injuries/POB			
Injuries	Crew	Passengers	Others
Fatal	0	0	0
Serious	0	0	0
Minor	0	0	0

Table 1: Injuries to Persons

1.3 Damage to the Aircraft

The aircraft was extensively damaged due to the abnormal contact with the terrain.

Figure 3: Accident Aircraft BHT 206-3B

[2] The yaw axis is defined as perpendicular to the body of the lifting surface with its origin at the center of gravity and directed towards the bottom of the aircraft

1.4 Other Damage

There was no additional damage. The TA6 area is a remote training site.

1.5 Personnel Information

The Instructor held at the time of the accident the following:

- Current GCAA Commercial Pilots Licence – Helicopter [CPL-H] #50505
- Current B206 Type Rating
- Current valid Medical

The student/cadet had a valid medical and permits to operate[3].

1.6 Aircraft Information

Aircraft Data

- Type: Bell Helicopter Textron BHT 206-3B
- Registration: A6-FTI
- S/N: 4064
- Manufactured: 1983
- Engine: One Rolls Royce M250
- State of Design: Canada
- State of Manufacture: Canada

Helicopter Description – Bell Helicopter Textron BHT 206-3B

The BHT 206-3B is a single pilot, five place, light helicopter with a two blade semi-rigid main rotor, and a tail rotor that provides directional control.

The airframe is a semi-monocoque[4] fuselage with an aluminium alloy and fiber glass aerodynamic fairings, an aluminium alloy monocoque tail boom supporting the vertical fin, fixed horizontal stabiliser, tail rotor assembly and tail rotor drive train.

The primary load carrying structures are two built in cabin bulkheads, a vertical control tunnel from the floor to the cabin roof and a pair of longitudinal beams in the cabin roof.

The landing gear is tubular aluminium skids mounted laterally.

Airworthiness

The aircraft was airworthy at the time of the accident. GCAA Airworthiness certificate was revalidated on 29 April 2012

The GCAA Airworthiness certificate was valid until 7th April 2013.

[3] Note: The GCAA does not issue Student Pilot Licenses. The Student is required to have a Class A medical, enrolled in a flight training program and have a valid type rating.
[4] A Semi-monocoque system uses a substructure to which the outer skin is attached. The substructure, which consists of bulkheads and/or formers of various sizes and stringers, reinforces the stressed skin by taking some of the bending stress from the fuselage

Aircraft All Up Weight

Estimated All Up Weight [AUW] at the time of the accident was 1174kg/2589 lb with the single pilot CG within acceptable limits.

Aircraft Center of Gravity [CG] Management

The Center of Gravity reference coordinates are calculated with the lateral and longitudinal moments predicted on the inputs into the flight planning software typically for fuel, crew load and passenger loads.

The flight planning software used by the operator for the training exercise planning will indicate to the planner if the CG is out of limits and prevent the flight planning from progressing until a correction is made inside the allowable limits.

1.7 Meteorological Information

Meteorological data for Al Ain International Airport [OMAL] 02 January 2013 was as follows.

In summary: light variable winds, no significant clouds, good visibility.

METAR/Al Ain/OMAL/02 JAN 2013
METAR OMAL 020400Z 10007KT CAVOK 16/04 Q1020 A3013
METAR OMAL 020500Z 11006KT CAVOK 18/05 Q1021 A3014
METAR OMAL 020600Z 18009KT CAVOK 20/07 Q1021 A3017
METAR OMAL 020700Z 16007KT CAVOK 22/07 Q1021 A3016
METAR OMAL 020800Z 17005KT CAVOK 23/06 Q1020 A3013
METAR OMAL 020900Z 23004KT 190V290 CAVOK 24/06 Q1019 A3010
METAR OMAL 021000Z 29003KT 220V360 CAVOK 25/06 Q1018 A3007
METAR OMAL 021100Z 23004KT 170V290 CAVOK 25/05 Q1018 A3006
METAR OMAL 021200Z 31003KT CAVOK 25/05 Q1018 A3006
METAR OMAL 021300Z 31006KT CAVOK 25/05 Q1018 A3007
METAR OMAL 021400Z 30005KT CAVOK 24/05 Q1018 A3008
METAR OMAL 021500Z 29005KT CAVOK 21/04 Q1019 A3009
METAR OMAL 021600Z 32007KT CAVOK 20/03 Q1019 A3011
TAF OMAL 020500Z 0206/0312 24006KT CAVOK
BECMG 0208/0210 30008KT
BECMG 0216/0218 36006KT
BECMG 0220/0222 11006KT
BECMG 0306/0308 32012KT=
TAF OMAL 021100Z 0212/0318 04006KT CAVOK
BECMG 0212/0214 34012KT
BECMG 0220/0222 11006KT
BECMG 0306/0308 32012KT=

Table 2: METAR/Al Ain/OMAL/02 JAN 2013

Fixed Base Meteorological Station [FBMS]

There is no portable or fixed meteorological station at the unmonitored training areas[5], subsequently the wind strength and direction is determined by the handling pilot for each operation.

There are no Wind Direction Indictors [WDI] or other visual aids to indicate to the pilot the local areas conditions.

1.8 Aids to Navigation

Not required

1.9 Communications

Verbal: The student is briefed prior to the instructor's departure

Non-Verbal: There was no radio communication between the instructor and the student when the instructor was out of the aircraft. The Standard Operating Procedure [SOP] is to carry a VHF radio for communication with the student. The radio was available but not turned on.

Communication between the student and the instructor when the instructor is outside of the aircraft was non-verbal. Hand signals were used to indicate the preferred corrective actions and to signal positive and negative intent.

There are no definitive or fixed definition of standardised hand signal usage to identify the specific and exact action or event that is being indicated by the instructor.

How the instructor shall communicate when there is a reasonable percentage of sand suspended in the ambient environment resulting from the additional airflow prior to take off was not satisfactorily clarified during the investigation.

1.10 Aerodrome Information

OMAL AD 2.2 AERODROME GEOGRAPHICAL AND ADMINISTRATIVE DATA

1	ARP coordinates and site at AD	241542N 0553633E, Mid - point of RWY, on CL
2	Direction and distance from (city)	8 NM WNW of Al Ain
3	Elevation/Reference temperature	866 FT / 39˚ C
4	Geoid undulation at AD ELEV PSN	-104 FT

Table 3: Aerodrome Geographical Data

The training area is a remote heliport used for training purposes only.

The training area is defined by a circle of tyres and there are no fixed visual aids or fire fight/rescue facilities available

- The accident location is in a defined training area 18.25nm north west of the aerodrome
- The Global Positioning System [GPS] location for the accident in OMAL Training Area 6 [TA6]:
- LAT 24° 23' 52.2" N/ LONG 55° 19' 20.3" E
- TA6 is 500 ft. above sea level

[5] There is no GCAA requirement for a fixed meteorological station

1.11 Flight Recorders

For this category of transport aircraft flight data recorders and cockpit voice recorders are not mandatory.

The aircraft do not carry GPS tracking devices with a real time tracking facility.

The requirement for cockpit cameras under current international regulations also do not require video recording of the crew area.

1.12 Wreckage and Impact Information

The GPS location for the accident in TA6 was:

LAT 24° 23’ 54.73” N
LONG 55° 19’ 17.71” E

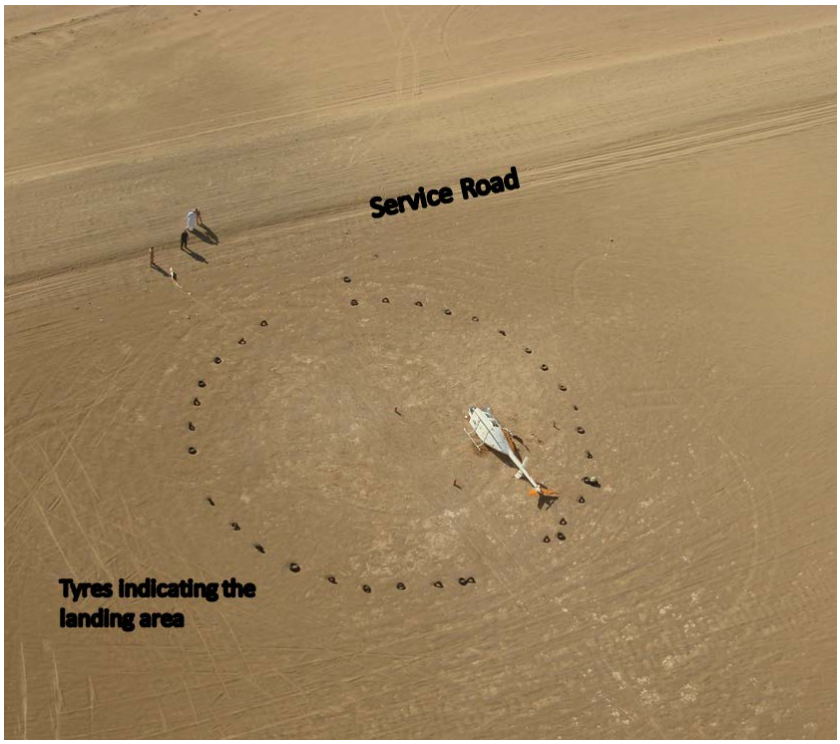

Figure 4: Accident Site Overview

- The location of the accident was in Training Area Six.
- The accident site was 18.25nm from OMAL on a radial of 295° from the operators fixed base.
- The accident site surface is level compacted sand, with an estimated CBR[6] of 3-4, with blown and drift sand accumulations scattered locally.
- The wreckage is localised to the immediate area. Various structural parts and components were found up to 125 meters from the accident site; the majority of the wreckage is localised in one location.

[6] California bearing ratio (CBR) is a test for evaluation of the compressive/mechanical properties of terrain substrata material.

1.13 Medical and Pathological Information

- The student pilot was conscious and mobile following the accident with minor injuries.
- GCAA Car Ops CAR, Part IV, CAR-OPS1/1,085 Crew Responsibilities, prohibits the use of alcohol or drugs.
- All crew following and incident or accidents are required to provide an alcohol and drug test following an accident or incident.
- Both crew where screened and the results where negative for (i) alcohol and (ii) drugs.

1.14 Fire

There was no fire

1.15 Survival Aspects

- The available living space in the cockpit remained intact
- There was limited deformation of the floor structure, seat retention fasteners, overhead console, seat structure and overhead panel.
- The crew seats remained intact as did the crew restraints/harnesses and support fittings.
- The SP was not wearing an Aviation Life Support Equipment [ALSE] helmet such as a combined communications systems and cranial protective helmet.

1.16 Test and Research

No additional testing was requested.

1.17 Organizational and Management Information

1.17.1 Horizon International Flight Academy

Horizon International Flight Academy [HIFA] is an approved flying training school in accordance with CAR Part IV/Section A – Approved Flying Schools.

The operator is based at Al Ain International Airport [OMAL] in the United Arab Emirates. The organization provides both fixed wing and rotary wing training utilizing a fixed wing fleet of Cessna 172SP, Diamond DA42, and a rotary Bell 206 and Bell 407 aircraft.

The training courses cover the scope of flight crew licensing[7] from Private Pilot to Airline Transport Pilot License and Flight Instructor Ratings. The academy also provides training to the military and police sectors. Since its establishment the academy has trained more than 800 pilot and instructor graduates.

The training programs follow the European Aviation Safety Agency (EASA) syllabus. The training courses for both fixed wing and rotary wing are approved by the UAE General Civil Aviation Authority (GCAA), and the fixed wing training courses are also approved by EASA.

At the time of the accident HIFA had a complex organizational structure involved in training both civilian and military cadet pilots in rotary and fixed wing flying utilizing four different aircraft types.

[7] Per CAR Part IV/SUB-SECTION 1.0 – GENERAL/1.4

1.17.2 HIFA Safety Management System

1.17.2.1 Safety Manual Review

The HIFA Safety Manual was accepted by the GCAA in 2011 and it formed the basis for the Safety Management System. Based on the documentary evidence a gap analysis was not undertaken by HIFA's accountable managers prior to producing the Safety Manual. The manual was not complete at the time of its acceptance by the GCAA as the safety management procedures had not been included in the initial version and these were to be developed and implemented gradually by the organization.

1.17.2.2 Emergency Response Plan Review

The HIFA Emergency Response Plan (ERP), sent to the GCAA in January 2013, but issued prior to its approval, is a generic ERP designed to an Occupational Health and Safety instruction manual standard, and not an integrated ERP plan as defined by ICAO.

1.17.3 GCAA Oversight of the Operator

Regulatory oversight by the GCAA is conducted by Safety Affairs.

As of December 31st 2011, a UAE based flight training organisation which is certified under CAR PART IV, Special Purpose operations, Section "A" shall show a complete compliance with this regulation by establishing a safety management system that is acceptable to the GCAA, maintaining it and completing its implementation by establishing and complying with the requirements of this Part.

The operator is required under CAR Part X to have a functioning and proficient Safety Management System. See below

Safety Management Systems

CAR Part X SAFETY MANAGEMENT SYSTEM REQUIREMENTS

(d) An Air Operator/Private Operator that holds a certificate issued under CAR OPS 1 or CAR OPS 3, or a flight training organisation certificate and at the same time holds a Maintenance Organisation Approval issued under CAR 145 shall establish an integrated Safety Management System.

The operator is required under CAR Part X/Section 8 to develop and maintain an Emergency Response Plan [ERP].

> *8. EMERGENCY RESPONSE PLAN The Organisation shall develop and maintain, or coordinate, as appropriate, an emergency response plan (ERP) that outlines what actions are to be taken following an accident or an emergency situation. The overall objective of Emergency response Plans is the safe continuation of operations or the return to normal operations as soon as possible. Where it is not reasonably practical for an Organisation to establish an ERP, the GCAA may accept removal of this requirement on a case by case basis.*

1.18 Additional Information

CAAP 70 - HELIPORTS: AIR SERVICE AND PRIVATE USE/ (NOT AIR SERVICE): STANDARDS, GUIDANCE AND INFORMATION REGARDING HELIPORTS

CAAP 70 – Heliports (Issued June 2014), was published as a result of the ICAO adoption of Amendment 6 to Annex 14 Volume II. This amendment was effective on 14th July 2014 and will become applicable on 13th November 2014.

CAAP 70 makes reference to guidance and information regarding helicopter operations, in particular reference should be made to Landing Area Acceptance [LAA] and the self-assessment risk matrix referred to in CAAP 70.

Accidents and Incidents

Over the period from October 2011 to January 2013 there was an increase in the accident and incident rates.

The operator had an increasing number of incidents/accidents during the period from 2010 to 2013. Below is a summary of the incidents/accidents

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The operator had an increasing number of incidents/accidents during the period from 2010 to 2013. Below is a summary of the incidents/accidents

1.18.2 Horizon Accidents and Incidents from 2010 - 2013

The time interval between the occurrence of this accident and the publication of the report was delayed as the operator was in the process of implementing various organisational and safety initiatives.

The aircraft used by the training school are not equipped with GPS location devices

Note: Time Reference – UTC to GMT

International civil aviation convention for occurrence reporting uses Greenwich Mean Time (GMT), also referred to as Coordinated Universal Time (UTC)

To convert to Gulf Standard Time add plus 4 hours to the UTC time: UTC +4 = GST

1.19 Useful or Effective Investigation Techniques

Standard investigative techniques where used.

The GCAA completed an organisational audit of the operator to determine the safety standards and accepted best practice.

2. Analysis

Accident Sequence Analysis

- The aircraft departed OMAL.
- The Student was briefed by the instructor to complete a solo circuit.
- The instructor gets out of the aircraft and positions himself in the line of sight of the student.
- Student picks up to the hover, corrects a slight drift with to the right by the application of LH pedal.
- RH Skid contacts the surface and the aircraft rapidly rolls to the right.
- The blades contact the terrain.
- The student evacuates the aircraft.

Landing Site Density Altitude [DA][8]

Elevation/Reference temperatures 866ft/39°C[9], with the Geoid undulation at -104ft, at 1003 hPa, gives a corrected value of 1062ft. Based on the observed actual temperatures at the time of the accident [39°C], the DA for the T6 area elevation was approximately 4000ft.

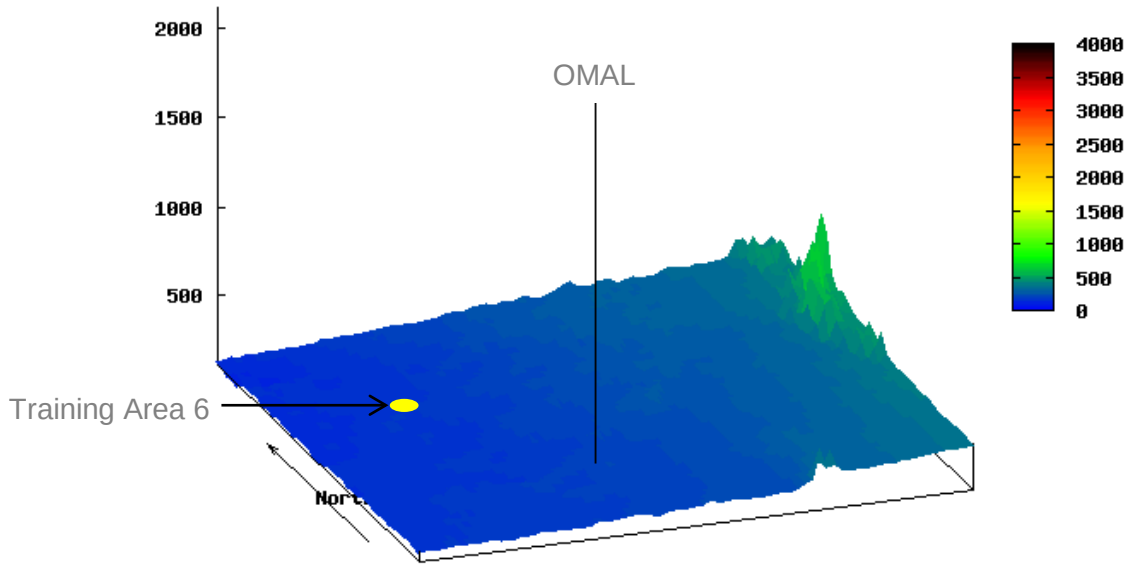

Figure 5: OMAL Aerodrome Elevation and High Ground

[8] Density Altitude
Density altitude represents the combined effect of pressure altitude and temperature. It is defined as the height in the standard atmosphere that has a density corresponding to the density at the particular location (on the ground or in the air) at which the density altitude is being measured

[9] AERODROME REFERENCE TEMPERATURE
An aerodrome reference temperature shall be determined for an aerodrome in degrees Celsius.
The aerodrome reference temperature should be the monthly mean of the daily maximum temperatures for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature). This temperature should be averaged over a period of 2 years.

Training Area Six Location and Elevation/Obstacle Clearance

The training area is a remote training area, North West of OMAL.

The area is level, with firm impacted sand with a California Bearing Ration CBR[10] of 3 to 4 dependent on the ambient rainfall, drainage and sustained exposure to wind and solar radiation. The designated landing area is a circular arrangement of tyres indicating the landing area and there are no wind socks or other obstacles present

Wind direction and speed judgement is at the discretion of the handling pilot.

Flight Planning

The flight was planned in accordance with the operators SOP, the CG limitation and actual CG are derived automatically through the flight planning software.

The center of gravity displacements along the Longitudinal and Lateral axis are computed prior to dispatch for the two pilot operation, not the single pilot phase.

For this accident flight, both crew had similar weights.

Performance Management

Stability and Control: The stability and control of a helicopter depends on the net effect of all the forces and moments applied to the helicopter from control inputs, helicopter motion, or external sources, which can include moments generated around fixed points of the helicopter such as the landing skids in contact with the ground.

Control Methods

To control the helicopter in flight, the forces, loads and moments about all three axes of the helicopter must be controlled. This involves controlling three forces and three moments.

As with most conventional rotary winged aircraft, the pilot has control available around all three axes. A typical helicopter has three separate flight control inputs. These are:

- Cyclic stick
- Collective lever
- Anti-torque pedals

Critical Roll Angle – Ground

If a roll rate is permitted to develop while part of the landing assembly is on the ground, a Critical Bank Angle (the angle between the helicopter and the horizon) may be reached where roll cannot be corrected, even with full lateral cyclic, and the helicopter will roll over onto its side.

As the roll rate increases, the angle at which recovery is still possible significantly reduces as a function of the angular declination from the horizontal, the combination of rotational inertia and the moment generated around the fixed point, in conjunction with the inability of the lateral control to reduce or arrest the onset or developing roll rate.

[10] The California bearing ratio (CBR) is a penetration test for evaluation of the mechanical strength of road subgrades and base courses.

The critical rollover angle is further reduced under the following conditions:

- Right Side Skid Down Condition
- Crosswinds
- Lateral Center Of Gravity (CG) Offset to the right in an anticlockwise turning rotor
- Main Rotor Thrust Almost Equal to the Helicopter Weight
- Left Yaw Inputs

If the condition is permitted to develop beyond the critical roll angle, a combination of rotational inertia and coupling moments can lead to a recognised accident causal factor described as Dynamic Roll Over.

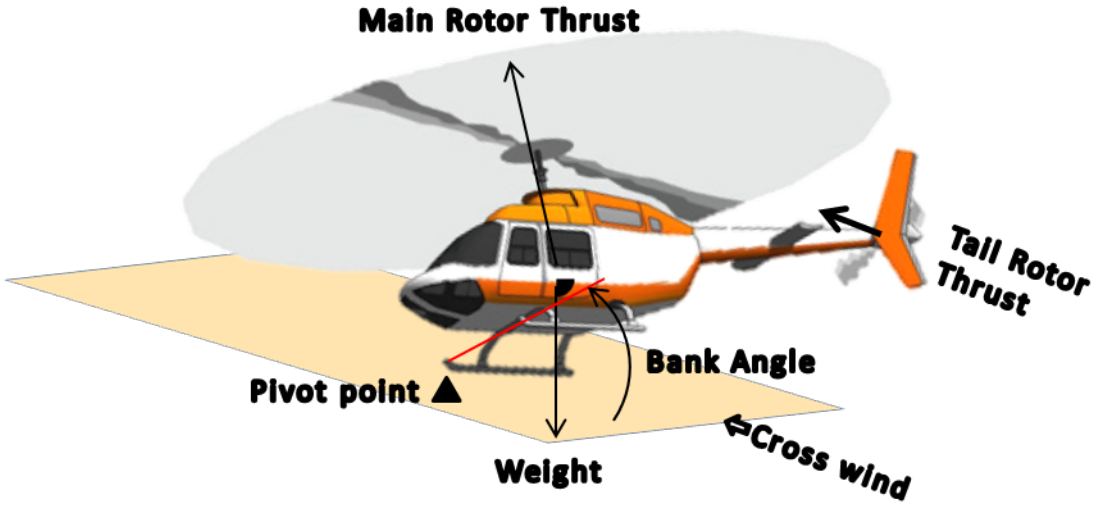

Figure 6: Dynamic Roll Over Force Vector Diagram

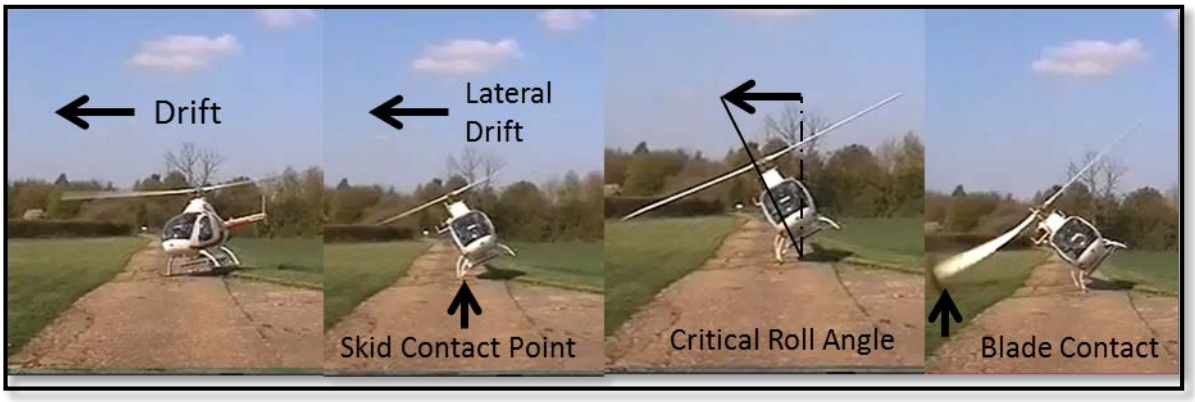

Figure 7: Dynamic Rollover Sequence - Example

3 Conclusions

3.1 Findings

The findings are statements of all significant conditions, events or circumstances in the (occurrence: accident, serious incident or incident) sequence. The findings are significant steps in the accident sequence, but they are not always causal or indicate deficiencies

a) The flight crew were licensed, medically fit and qualified for the flight in accordance with existing regulations.

b) The aircraft had a valid Certificate of Airworthiness and had been maintained in compliance with the regulations.

c) The aircraft was airworthy when dispatched for the flight.

d) There was no evidence of airframe failure or system malfunction prior to the accident.

e) The CG was within limits

f) The flight was conducted in accordance with the procedures in the company Operations Manual.

g) The first solo SOP is not clearly defined regarding adequate briefings and awareness for aircraft stability and dynamic roll over

h) There was no training or briefing regarding the onset of developing dynamic roll over and the corrective action

i) The Instructor did not have the VHF radio turned on. The subsequent reliance on non-verbal hand signal communication to indicate to the student during the power setting and lift off to the hover does not provide sufficient speed or clarity to the student of a developing safety critical situation.

j) There are no fire extinguishers or emergency equipment at the designated training areas used for the autorotation practice.

k) The operators Emergency Response Plan [ERP] is inadequately planned and organised with no clear accident response criteria.

3.2 Causes

Are actions, omissions, events, conditions, or a combination thereof, which led to this (occurrence: accident, serious incident or incident.

a) Inadequate briefing and oversight by the instructor prior to the student's first solo take off regarding CG distribution and the potential for an unstable condition developing.

b) The student did not recognise the onset of the developing dynamic roll over condition.

c) The instructor's SOP of using hand signals to indicate corrective actions did not provide adequate information to the student to prevent the onset of the rollover situation developing.

d) Incorrect application of the unstable condition recovery technique by the student.

3.3 Contributing Factors

[Are actions, omissions, events, conditions, or a combination thereof, which, directly contributed to this occurrence which if eliminated or avoided, would have reduced the probability of this occurring, or mitigated the severity of its consequences]

a) There was no direct verbal communication between the instructor and the student via a VHF radio or similar remote communication device to provide suitable, immediate intervention.
b) The change of the lateral controllability, in particular the dynamic stability when transitioning to the hover due to the CG shift, the pilots perception of the attitude change due to the conditioned fixed point visual references and control response.

3.4 Non-Contributing Safety Factors

[Are the actions, omissions, events, conditions, or a combination thereof, which had no direct contribution to this occurrence, but are risks in their nature, that were identified during this Investigation, both the immediate and the deeper systemic causes]

a) This was the first flight after an extended new year break
b) Mixed Military and Civil Students and Instructors with differing operational requirements
c) An aging fleet of BHT/AB 206-3B Helicopters
d) No air-conditioning in the helicopters contributes to accelerated and excessive heat induced fatigue

4. Safety Recommendations

4.1. General Information

The safety recommendations listed in this Report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation6, and are based on the conclusions listed in section 3 of this Report; the General Civil Aviation Authority (GCAA) expects that all safety issues identified by the Investigation are addressed by the receiving States and organizations.

4.2. Safety Actions Taken

Safety Actions Taken by Operator. The following safety actions were implemented by the operator following the serious incident that is the subject of this report:

- Operator has improved the safety briefings to student pilots regarding dynamic rollover awareness, onset and recovery techniques. The Training manual has been updated: Solo procedures
- The Training Manual CPL [H], Part 1 has been revised to mandate the use of the instructors radio and the instructors position relative the aircraft
- The operator is installing air-conditioning in the rotary wing AB and BHT 206 training fleets.
- The operator has installed a form of Wind Direction Indictor [WDI] as per CAR Part IX, Appendix 17/ Appendix Indicators and Signalling Devices/17.1 Wind Direction Indicator.
- The operator engaged consultants to evaluate the Safety Management System and provide recommendations for safety management improvements.
- The operator's Safety Manual was rewritten and re-issued in June 2013.
- The Emergency Planning Manual was re-written and re-issued in June 2013.
- A full emergency exercise was held in September 2013 to verify the new ERP.
- All management and staff have received SMS training. This program includes recurrent training.

4.3. Final Report Safety Recommendations

These safety recommendations are all addressed to the operator.

4.3.1. To The Operator

SR 01/2015

The operator is to comply with the GCAA CAAP 70 (Heliports: Air Service and Private Use (Not Air Service)) and CAAP 30 (The Issue and Verification of an Aerodrome Certificate (including Aircraft Landing Area Acceptance)) with reference to the Operator's Safety Management System for training area heliports.

4.3.2. To The Operator

SR 02/2015

It is recommended that the operator install a GPS or a Satellite Tracking System [STS] onto the aircraft with the ability to monitor and record aircraft position in real time

4.3.3. To The Operator

SR 03/2015

It is recommended in line with industry best practice, that the operator adopt the International Helicopter Safety Team [IHST Safety Management System Toolkit] and Gulf Flight Safety Committee initiatives to reduce accidents, including the adoption of the International Helicopter Safety Team/Gulf Flight Safety Committee initiatives to reduce accidents, to include the following: Manoeuvre Initiation Envelope (MIE) philosophy, integrating current international best practice into a comprehensive SMS based training environment.