NEW ZEALAND HELICOPTER

SAFETY UPDATE

DECEMBER 2019

NZ HELICOPTER ASSOCIATION

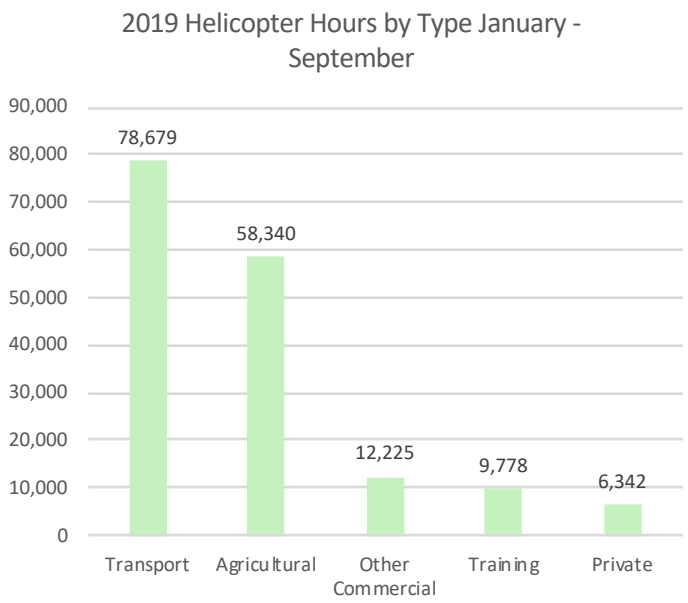
CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

INTRODUCTION

This is a further update on activity and safety performance in the helicopter sector, with activity and accident rate information current to September 2019. The report includes details of accidents and incidents for the purpose of raising awareness about risks and sharing lessons amongst the sector. If you have questions or comments about the information then please contact me at Joe.Dewar@caa.govt.nz.

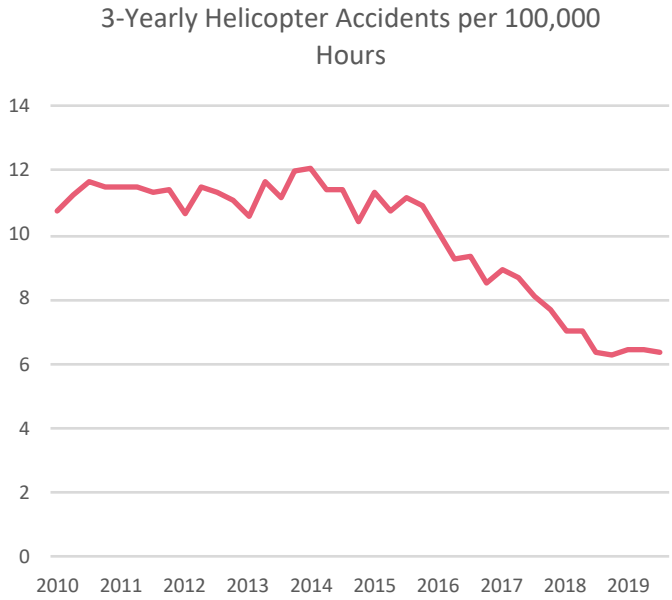
SECTOR ACTIVITY

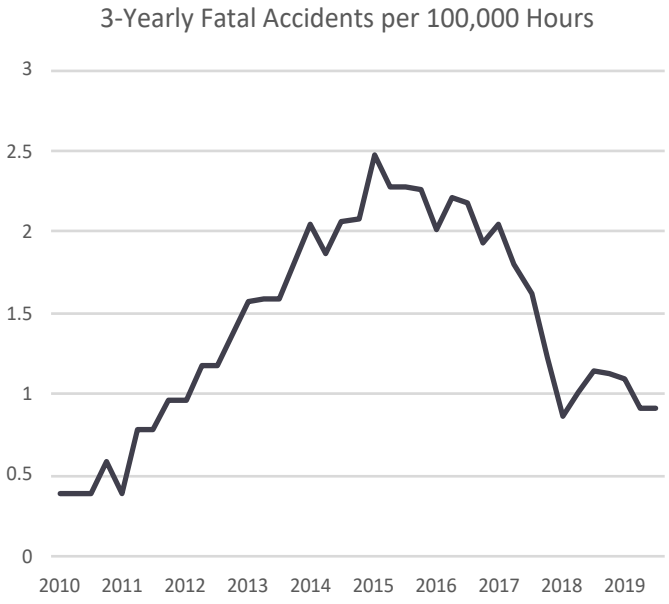
There have been a total estimated 165,000 helicopter hours in the year to September. Hours in the third quarter are lower that quarter 3 of 2018, with around 7,000 fewer total hours overall.

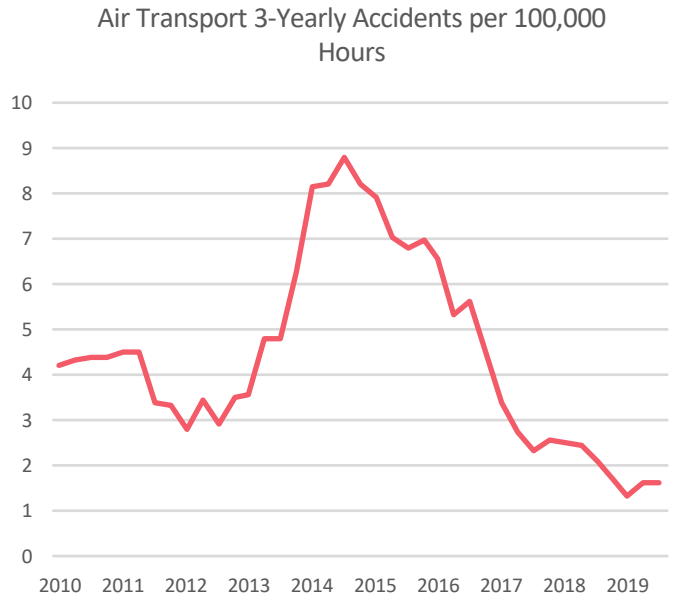


HELICOPTER ACCIDENT RATES

The overall 3-yearly rate of helicopter accidents per 100,000 hours, which includes all operation types, is 6.39 while the fatal rate is 0.91.






Air Transport 3-Yearly Accidents per 100,000 Hours
10
9
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7
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1
0
2010
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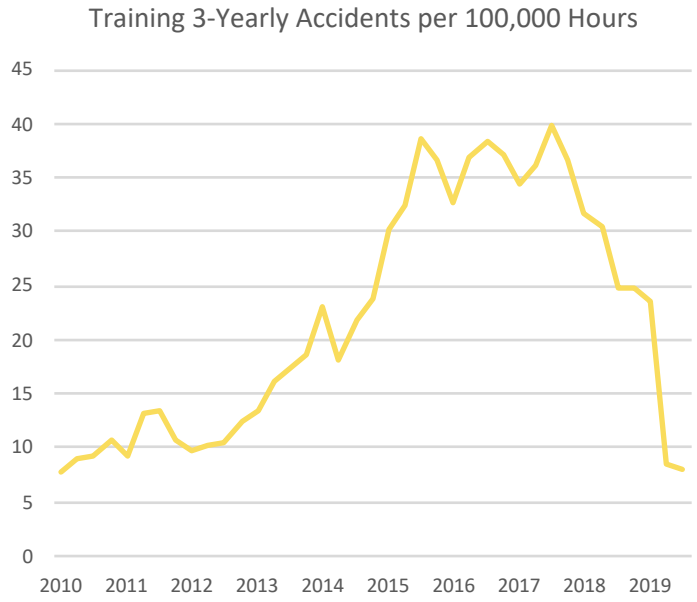
2015
2016
2017
2018
2019


Training 3-Yearly Accidents per 100,000 Hours
45
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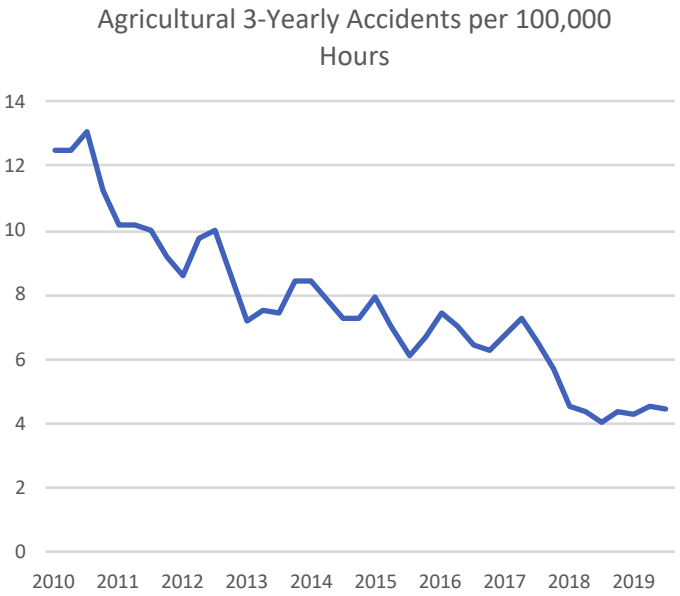
Agricultural 3-Yearly Accidents per 100,000 Hours
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12
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8
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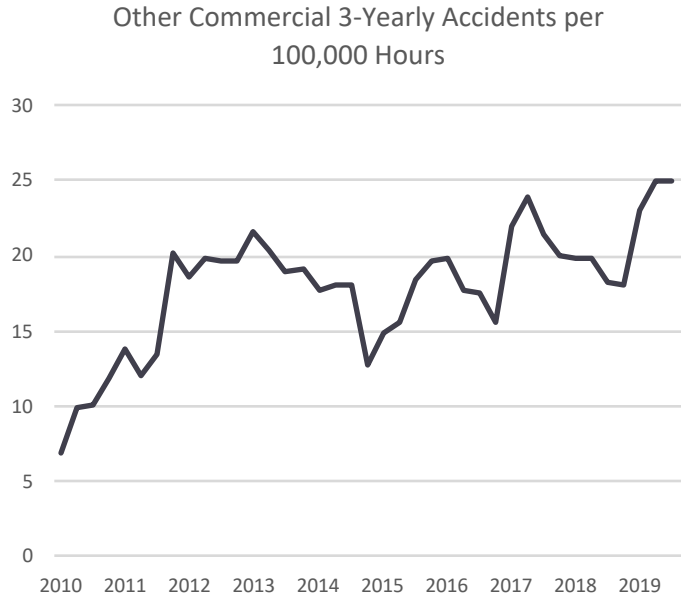
Other Commercial 3-Yearly Accidents per 100,000 Hours
30
25
20
15
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2010
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2018
2019

ACCIDENT DETAILS


January


North of Taupo


Bell 206


Collision/strike - wire

The helicopter hit power lines and crashed while spraying. During the last load of the job and while searching for broom to spray, the aircraft contacted high voltage power lines. The aircraft rotors cut through the power lines, rendering the helicopter uncontrollable, and it subsequently impacted the ground. The pilot indicated that although he was aware of the power lines, he lost situational awareness while focused on the search for pockets of broom.


January


Pacific Ocean


Hughes 500


Loss of control - strops/tie downs

It was reported that the New Zealand - registered helicopter attempted to take off while still strapped to the deck of a boat by one line. The aircraft was unable to climb and rolled back onto the deck.


February


Nelson


AS 350


External load

The helicopter was engaged in fire-fighting duties when the pilot noticed a sudden yaw to the left followed by another to the right. This was followed by a sudden pitch up. The pilot immediately jettisoned the monsoon bucket. The pilot found he had little directional control but was able to control the rate of descent down to the ground. The cause of the loss of control was the monsoon bucket making contact with the tail rotor.
The operator's investigation identified that the most probable cause was that the top ring in the bucket partially collapsed. An extract from the findings section of the report states: ***It is probable that the top ring in the bucket partially collapsed when the PIC was on his last dip fill essentially turning the bucket into a sack without the rigid top ring in place. Once the pilot released the water from the bucket and gained forward speed while travelling back down the valley the bucket would have experienced significant aerodynamic drag which moved it upward into the tail boom and tail rotor.***
The bucket was a Cloudburst CB1000MF. From the report: ***This investigation has highlighted a possible risk factor when operating the older style Cloudburst CB1000MF bucket with a collapsible top ring that is secured by Velcro. Partial collapse of the ring or if the ring comes away from the Velcro could cause an empty bucket to 'fly' erratically in flight and move dangerously close to the tail.***

March

Northland

AS 350

Ground handling/External load

At the end of a day undertaking DoC Track work, a ground crew member sustained fracture injuries during the loading of a bucket of gravel onto the back of a truck. The crew member was attempting to guide the bucket onto the truck. When the pilot lifted the load slightly to better position it, the crew member held on to the bucket and was lifted approx 3 metres into the air before releasing their grip and falling on to the roof of the truck, where they lost their balance and fell to the ground.

March

Wairarapa

MD 600

Landing accident

While conducting a ridge top landing the pilot noticed a momentary shake in the cyclic. Subsequent inspection identified that the main rotor had contacted the tail boom and sustained some puncture and delamination damage. The operator identified that using increased aft cyclic on the sloping ground at the site may have contributed.

April

Manawatu

Robinson R44

Collision/strike - wire

The pilot was conducting aerial spraying work when the helicopter struck an electric fence wire while completing the third load of the job. The pilot was aware of the location of the wire and had avoided it during the other spray runs and on previous work on the block. He managed to execute an emergency landing, however the helicopter suffered extensive damage to the front canopy, a rotor blade and during the ensuing heavy landing.

April

Auckland Island

BK117

Under investigation

The helicopter was on an air ambulance flight to the Auckland Islands with 3 crew on board when it was reported missing. The 3 crew were subsequently rescued with some minor injuries. The TAIC are investigating the accident.

May

Auckland

Hughes 500

Take off accident

The pilot forgot to uncouple the foot pedals before the take off. Once the helicopter became airborne it immediately began to spin. The pilot dropped the collective and a skid partially collapsed on contact with the ground.

June

Southland

Robinson R44

Collision/strike - tree/bush

During a mustering operation the helicopters main rotor blades contacted foliage. This was not noticed until the post flight inspection. The investigation determined that the pilot may have been task fixated on the cattle and as such lost situational awareness while operating at foliage height.

The pilot has been counselled on his actions, has undergone low level operational training and conducted a FCCC 137 check.

The operator is also implementing SOPs for mustering.

June

Fiordland

Hughes 500

Landing accident

While carrying out a WARO operation, the pilot landed on a ridge top, reduced power to ground idle and secured the friction. On exiting the helicopter the pilot checked the skids which appeared flat and solid against the surface and the helicopter appeared level. As the pilot walked away he saw the helicopter fall backwards. The tail rotor contacted the ground and was damaged. The report determined the the vibration of the helicopter allowed the hard-frozen surface to give way to a soft area under the LH reaer heel of the helicopter.

July

Southland

Robinson R44

Landing accident

Upon landing the helicopter drifted right and the main rotor came into contact with the hangar door.

September

Otago

AS 350

Landing incident

The helicopter was landed with the nose into the hill for a 'power off' pick of passengers with collective down, flight idle maintained. As clients were getting into the machine the tracking finger on two blades contacted the snow in the 12 o'clock position. Noise was heard first to raise attention and the pilot then noticed the mark in snow. The passengers were removed from the helicopter and it was shut down for inspection. It was then relocated to a close safer area (the lodge) for the engineer to fit a replacement cap.

The investigation into the incident determined the following:

For this type of pick-up the landing site is selected and prepared by the heli-ski guide. On this particular occasion the guide selected a site with soft snow and a sloping hill face in front of where the helicopter was to be positioned. The guide believed that the site was suitable for the landing with no further preparation required. The guide had used this site previously with no issue.

The organisation has conducted an internal investigation and concluded that the following factors may have contributed to the incident:

- The guide's selection of the landing site, and
- The soft snow not being stamped down prior to the landing, and
- The pilot's insufficient risk assessment of the landing site, and
- The decision to do a 'power-off' landing, and
- The snow thaw period.

OTHER OCCURRENCES IN 2019

Some issues and trends are apparent from the safety data for the helicopter sector over 2019. They are:

- External load equipment and operations
- Third parties/ground crew
- Doors opening inflight
- Inflight vertical oscillations
- Oil-related issues identified by maintenance organisations.

Each of these will be discussed below with reference to incident and defect reports.

EXTERNAL LOAD EQUIPMENT AND OPERATIONS

Many thanks to those who attended the recent workshops on 'Inspection and Safe Use of Lifting Equipment'. There were a number of lessons learned from these, which are discussed below. The key risks on external load operations, evidenced by the safety data, are these:

- Load/strop tail rotor contact
- Lines/strops hooking on skids
- Load fouling (terrain contact)
- Ground crew/third parties
- Load rigging failure

LOAD/STROP TAIL ROTOR CONTACT

These are accidents where the load or the strop/hook makes contact or wraps around the tail rotor system in flight. What do these accidents teach us? For one, short strops and light or empty loads are a big risk in flight – the Airbus Helicopters Safety Notice have some pertinent points relating to this https://www.

pilotopolicial.com.br/wp-content/uploads/2017/07/cargaexternaaribus1.pdf

Turbulence increases the risk of loads/strops flying backwards. Unusually configured loads also have the potential to contact the tail rotor, which is why it is critical to make sure that pilots and ground crew know the nature, weight, and configuration of loads, and that they carefully monitor them inflight and 'fly the load' correctly. You also need to make sure that the people on the ground that you are flying for know the importance of and fully understand the characteristics of the load and letting you know these.

February 2017

Ohakune

Hughes 500

Load - Tail Rotor Contact

A MD 369E was conducting external load operations moving beehives in the Raetihi area. For this operation, two company helicopters had been engaged, with both pilots electing to use a bee-wing, attached to the belly hook of the aircraft with a short 10 metre cable, to lift the pallets of beehives.

At approximately 0920 hours NZDT, the aircraft was on a return flight from the drop off location when the cable, weighted only with the bee-wing, came into contact with the tail rotor. This resulted in the cable wrapping around the tail rotor hub and gearbox, causing the tail rotor assembly and cable with the bee-wing attached, to depart from the aircraft. As a result, the aircraft yawed to the right and the pilot was unable to maintain directional control. After several rotations, the aircraft struck the side of a ridge, rolled approximately 35 metres down the slope and came to rest on its right side. The pilot, and sole occupant of the helicopter, sustained significant injuries and was subsequently airlifted to hospital.

The safety investigation was unable to determine conclusively why the cable contacted the tail rotor. It is most likely that the short strop, low mass configuration increased the risk of contact with the tail, particularly when combined with an airspeed at which the load may become unstable.

Image of the cable wrapped around the tail rotor.

LINE HOOKS ON SKID

These accidents and incidents involve lines, strops, and cables wrapping around or 'hooking' onto the helicopter skids while the hecliopter is on the ground or in the hover. They can occur particularly in the hover when the line(s) may have any 'slack'. 'Skid fouling' can lead to significant control dificulties, as well as dynamic rollover. Read the lessons learned from the accident below.

February 2015

Marlborough

Hughes 500

Line Hooks on Skid

While refilling the monsoon bucket in the Wairau River one of the four strops attached from the helicopter hook to the bucket got caught around the left rear skid (also fitted with a snow shoe). The pilot descended to release tension and the current carried the bucket down stream pulling the aircraft out of C of G and causing tail rotor strike. The aircraft spun around several times uncontrollably and ended up on its side in shallow water on the river bank. The operator investigated and identified the following lessons from the accident:

- Fire bucket harnesses should not be connected directly to the hook. Instead they should be attached to a long line of at least 7 metres, meaning the pilot has only one line to focus on instead of four;
- 7mm non-rotating steel wire rope should be used because these do not catch in the wind or flutter; and
- Fire fighting with a monsoon bucket should be included in the annual flight crew competency check, during which pilots must demonstrate their ability to rig the load safely.

Image of the wreckage.

MAIN ROTOR BLADE STRIKES

This is it is all about flight planning and equipment. Strops and lines have simply got to be long enough to ensure safe terrain and obstacle clearance. In confined areas, it's not going to be enough to continually back yourself to keep clear of hazards while you're busy picking up or positioning loads. The second one concerns ground crew and communication – crew have got to have an understanding that they have a role in ensuring that clearance is maintained and communicating with the pilot.

January 2018

Marlborough

R44

Main Rotor Blade Strike

The pilot was engaged on an external load operation, slinging loads of fencing equipment. While entering a hover and focusing on positioning the load, the main rotor blade made contact with a tree on the pilot's blindside. The pilot released the load and turned towards the track to land. The helicopter made contact with the edge of a bank, spun to the right, and descended backwards into the bush. The pilot was not injured.

The operator's investigation identified situational awareness as the main contributor to the accident. The key lessons identified were the importance of making sure that ground crew understand their responsibilities around providing guidance to pilots where terrain/obstacle clearance has been identified as a hazard. In addition the operator noted the importance of ensuring that longlines are of

sufficient length to give maximum practical clearance of obstacles.

GROUND CREW

These accidents and incidents involve ground crew on external load operations. Ground crew also feature prominently in the load/rigging failure. Ground crew occurrences highlight the importance of proper risk assessments, training, and communication on external load operations.

Another issue to mention is FOD risk from rotor downwash. This is not specific to external load operations but we have had some very close calls reported this year. Ensure that all ground crew know the risk of FOD and the ability of something as insignificant as a plastic bag to damage or even bring down a machine.


March 2019


Northland


AS 350


Ground Crew

At the end of a day undertaking DoC Track work, a ground crew member sustained fracture injuries during the loading of a bucket of gravel onto the back of a truck. The crew member was attempting to guide the bucket onto the truck. When the pilot lifted the load slightly to better position it, the crew member held on to the bucket and was lifted approx 3 metres into the air before releasing their grip and falling on to the roof of the truck, where they lost their balance and fell to the ground.

LOAD/RIGGING FAILURE

These accidents and incidents involve loads breaking up or failing inflight due to being mis-rigged. This frequently results in an empty strop, which raises the risk of tail or main rotor contact. The key lessons from these accidents and incidents are:

- Use the right gear for the load and think carefully about this, which strops are appropriate? What length? Would a chain be better? Do you need a swivel?
- The load needs to be carefully assessed before flight.
- If another contractor is involved in rigging the load, they need to be fully, thoroughly briefed on the job and the general risks of load/rigging failure.


March 2009


Otago


AS 350


Load/Rigging Failure

The pilot was conducting external load operations from an engineering company premises on to a building site. The external loads consisted of 780 kg steel portals which the operator was required to lift from the yard at the rear of the engineering premises and then fly to the drop-off site. During the lift of the second portal on the day the nylon ropes used to lift the portal failed, allowing the portal to fall to the ground landing in the rear yard of the premises. Two employees of the engineering company were positioned within the yard holding ‘tag’ ropes to control the load as it was lifted. Neither person was

injured during the incident however the portal was substantially damaged.

Image of the fallen portal.

Prior to the job an on-site meeting was held at the incident site between the pilot and the staff. At this meeting the sharp edges of the metal cleats were discussed and a request was made by the pilot for padding to be placed on the cleats that would come in contact with the strops. The engineering staff carried this out by wrapping rags around the cleats, secured by tape.

Image of the padding applied to the portal cleat.

The portal was rigged by two employees from the engineering firm using two 680 kg nylon ropes provided by the operator. This load was lifted to a height of approximately 8 metres at which height the helicopter stabilised in the hover (potentially to enable the stability of the load to be assessed by the pilot). At that point one of the ropes failed, transferring the entire 780 kg weight onto the remaining (680 kg rated) rope. The single remaining rope then also failed allowing the portal to fall back into the engineering yard. The cleat had cut through both the padding and the nylon rope.

THIRD PARTY/GROUND CREW RISKS

A number of reports have been received this year relating to third parties/ground crew. In particular, these have involved guides, DoC workers, and loaders. The incidents include doors/hatches/pods opening in flight, incorrectly loaded equipment, FOD from rotor downwash, and accidents and incidents arising from insufficient mission planning and communications between pilots and ground crew.

The key lessons from these occurrences are:

Plan – ensure that you have robust mission risk assessment and briefing procedures for your own ground crew and ESPECIALLY for third parties such as DoC. Don't skip steps – make sure that every individual mission is risk-assessed and that everyone involved is clear about their role and what to do when unexpected problems arise.

Educate – ensure that your ground crew and third party service users know the risks involved when procedures are not thoroughly followed. The September landing accident reported above is a good example of this. Crew and third parties need to know

the risks of all aspects of your operations, including door/pod open and close procedures, FOD risk, and particularly confined landing/takeoff area risks. If you need to, read up on the 'Overlapping Duties' provision under the Health and Safety Act, and reminding your third party contractors of these if necessary - Google the CAA's Health and Safety Unit's Overlapping Duties fact sheet if you need to.


February 2018


Southland


AS 350


Landing incident - rotor wash

When hovering down into a DOC pad at the tramping hut, the pilot reached approximately 30ft AGL when a tent and a large sheet of plastic blew up in the down wash and almost made contact with the main rotor blades. The operator's report noted that the pad was quite tight and required pilots to line up with a marker beam when landing - the pilot was focused on this when the incident occurred, limiting their situational awareness of the rest of the pad.

As a result of the incident, it was decided that the Department of Conservation would put up appropriate hazard notification in the hut regarding tents and other camping equipment, and would post signage around the helicopter pad identifying it as a hazardous area. The operator also included unsecured tents and other equipment as part of their hazard/risk assessment of landing at remote DOC hut sites. They also made it a requirement that any DOC personnel on board be required to perform visual inspections of landing sites and to advise pilots of any hazards.

DOORS OPENING INFLIGHT

Since this was identified as a safety issue following the fatal Wanaka accident in October 2018, numerous reports have been received relating to doors opening inflight and hatches and pods not being secured. These have related predominantly to pilots, ground crew, and third parties not sufficiently closing/latching/securing machines before take off. Some also relate to defects with doors. Note the following safety message:

An increasing number of reports have been received relating to helicopter doors opening inflight, across a number of helicopter makes and models. A recent occurrence on an AS350, where the rear quarter door opened inflight causing damage, highlights the significant risk this can present to safe operations. Pilots and crews (including anyone responsible for loading/unloading passengers or equipment) must ensure that all doors and hatches are securely fastened. It is possible that doors may appear closed and latched, even though the latching mechanism has not fully engaged. Clothing, equipment, airflow or vibration may cause the door to 'pop' open. Passengers should be briefed that their clothing and equipment can open door latches in flight. When closing the doors it is vital to check and confirm that they are secure. While the PIC is ultimately responsible, everyone contributes to continued safe operations, this includes ensuring that all doors and hatches are closed and secure before take-off.


October


West Coast


AS 350


Door opening inflight

Both the passenger door and rear left quarter door almost came open inflight. During the loading of the helicopter the pilot did the normal walk around as the loader finished loading and securing the doors. Once the pilot boarded, the loader gave him the thumbs up. After takeoff a small sound was heard. The pilot saw the top of the passenger door and rear left quarter door open. It was only due to luck and a small portion of the bottom pin on the rear left quarter door being in the hole that the doors stayed together long enough to do a landing in a river bed which was the nearest landing site. After closing and securing the doors the flight continued without further incident.

INFLIGHT VERTICAL OSCILLATIONS (BOUNCE)

There have been several incidents reported this year relating to vertical oscillations/vibrations or 'bounce' inflight. These are a concern. Looking at the occurrence data, there have been 12 incidents of this type reported since 2000, involving multiple model types including AS 350s, 500s, and R44s. If you have experienced an event or incident like this but did not report it, then please send through any information that you have, preferably on the CA005 Helicopter and Ag Form- accessible from the CAA forms page under Part 12 Reporting. Email your information to either myself – Joe.Dewar@caa.govt.nz or Safety Investigator Siobhan Mandich – Siobhan.Mandich@caa.govt.nz
At this stage, we need to collect more data about this type of occurrence to understand the phenomenon, your views on causal factors, and what to do about it. An example of a recent occurrence is provided.


October


Canterbury


AS 350


Vertical oscillation inflight

A vertical vibration was noted on descent to land. The helicopter developed a vertical vibration which very quickly increased and became very uncomfortable. The pilot tried to alter the collective and cyclic to change the vibration, which was ineffective. The pilot then put the aircraft into a medium right-hand turn which stopped the vertical bounce immediately. The incident is currently being investigated by the Operator and the CAA.

OIL-RELATED ISSUES

A number of operators and helicopter owners will have been notified by maintenance providers about issues relating to engine oil, specifically the Aeroshell 560 product. The general sequence of events is this: high engine oil pressure noted by operators, followed by maintenance organization inspections discovering a 'sticky, black, tar-like substance' contaminating internal surfaces and blocking the pressure oil screen, restricting oil feed to vital components of the engine. If this has happened to you and you have not reported it, then please submit information via the channels mentioned before – we need all the information we can get. These incidents are being investigated currently with multiple tests being run. One possibility is that certain agricultural products are combining with this oil type resulting in these incidents. If you have any information about this, or views on which product types might be reacting with this oil type, let us know.