It is 11:27 on 6th January 2022!

Definitely time for tea & biscuits on this auspicious day!

A very Happy New Year and huge congratulations must go to the Robinson helicopter fraternity in Great Britain (GB) for safely taking us to the 10 year mark without a Robinson Helicopter fatal accident.
There will be many reasons for this success but I would like to give credit to the quality and dedication of the engineers and staff that maintain the fleet. The pilots, operators, flying schools and their staff and of course the high standard of flight instruction given by our flight instructors.
You are setting a fine example on how to operate the Robinson helicopter safely and in doing so are going a long way in proving my long held view that the Robinson product is not an inherently unsafe aircraft as some would have us believe.
However, do not relax as this is just the first milestone.
The hardest part of flight safety is to maintain the fatal accident rate at zero in the coming years; it is all too easy to relax thinking that we have solved the problem as we have not!
For example, we have a continuing number of new pilots joining our helicopter world and they will all need sound advice and guidance as they build their hours and experience.
And of course, one of our biggest dangers is 'complacency'.

In GB, apart from the obvious flight training aspect, the Robinson product is used very much as a back garden to back garden mode of transport, which requires a great amount of self discipline from the pilot in their decision making, particularly when it comes to determining acceptable weather conditions. As we are all aware, this lovely wet and windy rock we live on has some very challenging flying conditions, 'weather' in particular. However, we have proved that if you operate the aircraft within its limits, take and understand the advice given by RHC on critical flight conditions, listen and take note of flight safety information disseminated on a regular basis, and make the right decision, then the Robinson Product is as safe as any other helicopter.
Perhaps one of the messages that we are putting across and is now being understood by the pilot, is that most accidents could have been prevented *prior to takeoff!*
It's bad decision making that becomes the first link in the chain of events leading to an accident.

I was involved in the investigation of the very first R22 fatal accident in GB back on 28th March 1990; the R22 struck the top of trees on rising ground which were cloud covered at the time. I have been involved in the investigations from 1990 right through to the (to date) last Robinson helicopter fatal accident on 6th January 2012 at 11:26.
Perhaps this was a Robinson helicopter epiphany moment; a sudden intuitive perception of or insight into the reality or meaning of something initiated by an occurrence or experience, coincidentally on the day that we celebrate the actual Epiphany.

Accident Investigation has been a double edged sword. One side being the difficult aspect that the helicopter industry is very small, which meant that I would usually know the victims involved and, in some cases, might have been involved with their flight training.
The other being the opportunity Frank Robinson gave me to represent him; thus enabling me to enhance my knowledge of his product and further my passion for flight safety and the prevention of accidents.
Although the accident rate seemed relentless I was always sanguine about the future as I firmly believed that improving the pilot knowledge (during and post training) of the product systems, their critical flight conditions, their avoidance and the types and causes of accidents was an area that, if relentlessly pursued, would make a considerable difference to the accident rates in the future.

And as I have said before and I will keep harping on “Most accidents could have been prevented prior to takeoff”.

One of the most difficult aspects of being Frank’s man on the ground was the call I had to make to Frank to inform him of a fatal event. Frank took these accidents very, very personally and anybody out there who is under the misguided idea/opinion that the Robinson Helicopter Company does not care when one of their products is involved in a fatal accident is either delusional or has been brain washed by the proliferation of associated vultures attracted by the accident. I can tell you from very personal experience (not hearsay or assumptions) that it could not be further from the truth; Frank was tireless in his pursuit of flight safety and the prevention of accidents, as are all at RHC.

So now might be a good time to reinforce my long standing view which I have held since 1980, that the R22, R44 and R66 types are inherently safe and their tarnished reputation is more to do with issues of the lack of pilot knowledge, skill set and poor decision making/captaincy than any implied inherent design issue with the product.
As the saying goes…“A poor workman always blames his tools”.

For example, right from the early 1980’s it has been relentlessly argued by some that the Robinson Helicopter fatal accidents are due to a flawed product design.
In particular it was, and still is to this day, primarily aimed at the main rotor system which is said to be ‘inherently unstable’.
In my humble view, if this is the case, then why has it not been a worldwide issue rather than what seems to be local ‘hot spots’?
With thousands of hours in the Robinson product, from flight instruction to air testing etc. why am I still alive?

Some of the arguments put forward by various bodies over the years to try and argue the point that there is a design fault with the Robinson product are:

- “The helicopter broke up in flight”.

Usually based on evidence conducive to a main rotor blade to tail cone or cabin contact issue. Well, that may have happened but for the main rotor blade to diverge from its normal path of rotation the pilot has to make it happen!
The main rotor to tail cone or cabin contact is a symptom and not the cause; the pilot had for some reason lost control of the aircraft prior to the break up. For example, allowing the rotor RPM to decay to the point of Low RPM Rotor Stall, putting the helicopter into a ‘low-G’ situation or excessive control inputs/ over controlling.

- “The fatal accident occurred even with a flight instructor onboard”.

Flight training inherently carries more risk of accidents and unfortunately the risk applies to all training platforms but a training platform that became the world’s most popular helicopter type will statistically be seen to have more accidents due to numbers.

- “The fatal accident occurred with a very experienced flight instructor onboard”.

Well, what is meant by ‘experienced’? When you look at what was/is considered to count as ‘experienced’ you find that the so called experienced flight instructor would likely be a high time aeroplane flight instructor with a few hours rotary hours as an add on to their instructor ratings. Most probably the worst type of instructor teaching in *any* two (2) bladed helicopter. They are used to flying docile stable platforms, where interaction times are much greater and of course the real danger is the reaction to a low RRPM audible caution and light activation. This would invoke a simple human factor issue; a ‘revert to predominant type reaction’ to a stall warning, likely causing the instructor to push the nose down and subsequently inadvertently expose the aircraft to low G.
Not my idea of an ‘experienced flight instructor’ in relation to flying a helicopter, which are inherently *unstable*, and in particular, a two (2) bladed light sensitive R22 platform.

- “The fatal accident occurred with a very experienced helicopter flight instructor onboard”.

Well again, what is meant by ‘experienced’. The instructor might have been a very experienced helicopter flight instructor but on which type of platform? Some of the instructors on board at the time of these accidents were ex-military, ex-Vietnam pilots, used to flying heavy docile high inertia military platforms or the Bell 47, Bell 206 or the Hiller. Again, docile platforms with high inertia rotor systems. Not my idea of an ‘experienced flight instructor’ in relation to flying a low inertia, two (2) bladed, light, sensitive R22 platform.

What the few examples above seem to indicate to me is that the pilot/instructor experience given is not always what it seems to be. That it is probable that there was a lot more ‘human factors’ at play than may have been taken into account during the subsequent investigation.

- High time fix-wing instructors reverting to predominant training… pushing the nose down as an instinctive reaction to a low RRPM caution and exposing the aircraft to low-G.

- Hight time rotary instructors, whose experience is in high inertia, docile, platforms, where they have more interaction time to correct inflight issues, are very likely to be much slower in their reactions and correcting a student's control input errors. For example: With the R22's low main rotor inertia and reasonably high main rotor RPM, if the instructor is slow to react to low RRPM issues, or allows the student to put a large forward cyclic control input, thing can happen very quickly, within 2 to 3 main rotor blade orbits, which occur within circa half a second! However, if the instructor is aware that for example in the case of the R22, that the most amount of stored kinetic energy they can use to recover a low RRPM situation is in their airspeed and the great benefit of a low inertia rotor system is that the positive effect of transferring (flare) this stored energy into the main rotor system is instantaneous, it would assist in the prevention of Low RPM Rotor Stall. It's like turning on an energy tap!

- It is possible that the accident pilot/instructor was flying the aircraft based on the natural tendency to fly and react too inflight issues in accordance with (IAW) their predominant type, which was not the Robinson helicopter.

All helicopter types have their areas that bite; it does not make them unsafe. Just that the instructor/pilot, must be well versed in them and actively guard against them.

My view has always been that the R22 is a very safe and an exceedingly good training platform.
It has sensitive, light handling qualities.
It requires light sensitive control inputs, a good level of awareness, with quicker intervention times required, which culminate in the production of a very rounded less complacent pilot to the point that, generally speaking, if you can fly the R22 well, then you can fly any helicopter well.
However, this does not work the other way around!
A pilot, and in particular a flight instructor, coming from a docile, high inertia rotor type will find it initially difficult to adapt to the R22's sensitivity and the tendency for things to happen a bit quicker.
From an instructor point of view, I would agree that the R22 suffers fools, far less gladly, than other helicopter types.

There is an exceedingly good example of the issues flight instructors can find themselves with when training on different platform types.
This example happened in GB during the early 1990's when very experienced helicopter instructors unwittingly encountered just such a situation; flying to predominant type and not actual type.
A very well-known helicopter operator/flying school changed their training platform from the Bell 47 to the R22.
As the school started to build the training hours it became apparent that they were suffering from a number of small incidents with the R22 that had not been previously encountered with the Bell 47.
Being the very professional flying school that they were, the school principal and the flight instructors discussed the issues and came to the conclusion that the problem probably stemmed from the instructors handling the R22 as if it was a Bell 47.
They needed to take into account the fact that they had changed their training platform from a relatively docile, high inertia platform on which they had a lot of experience to a very sensitive low inertia platform on which they had a lot less experience.
The issues were resolved by knowledgeable professional instructors willing to look at all possible reasons, including their instructional technique, rather than just blaming the helicopter type.

It is all too easy just to blame the Robinson product for the accident, which is reinforced by the vultures who circle an accident site waiting for their chance to make money out of the misfortunes of others.
The media will roll out their reporters, who seem to suddenly become aviation experts and accident investigators overnight, and churn out articles that can be egregious in their content with headlines such as
"Danger spins from the sky" containing what I can only describe as sensationalised misinformation. We add to this a proliferation of internet warriors who seem to know the cause of the accident even before the accident investigator arrives onsite.
This is just simply 'trial by media' which has the ability to detrimentally affect any product and hinders the actual search for the truth. As the saying goes, innocent or not, "Mud sticks"!

The mud can stick to such an extent that New Zealand (NZ), a country that operates and has an industry that relies heavily on the Robinson product, particularly the R44, initially put the type on a 'watch list'. Following a non-fatal accident where an R44 allegedly clipped a tree and caused the media to dig up a previous training flight that suffered

from a low-G event, the NZ Department of Conservation (DOC) then stopped using Robinson Helicopters to transport their staff because of safety concerns with the Robinson product. Other departments and councils then followed suit. One of their main issues seems to be with a high percentage of low-G accidents.
There are well documented statistics on the product accident rates published by the local authorities and it is not my intention to drag these out again but to try and understand why NZ has a problem with one particular critical flight condition: low-G.

I am very conscious of the fact that although I have had the great pleasure of visiting NZ I have not flown a helicopter in that environment and so this leaves me lacking in any sort of experience associated with operating in this particular country.
I know that it has been argued that the particularly hostile mountainous regions, when it's associated windy conditions, requires a special type of helicopter pilot. However, I do not accept this as a valid argument as there are plenty of places around the world that have equally hostile environments, if not worse than NZ. My view is that poor captaincy and their psyche is probably at the heart of the problems being experienced.

For example, this is a country where, despite the fact that an FAA Airworthiness Directive prohibiting the demonstration of low-G has been in force for many years, allegedly has instructors who still teach the student pilot this critical flight condition up to the point of the uncommanded right roll; just as we did in the days of crispy bacon and long hot summers.

Problem.
At this point the student pilot will have to make a counter instinctive control input to correct the uncommanded right roll (with *aft cyclic* and not the instinctive left cyclic control input) which can be at a rate of 100 degrees a second accelerating!
They are teaching a critical flight condition to the point that requires a counter instinctive control input from the pilot rather than a conventional control input. The very possible negative result of this training is the danger that the future pilot will not consider the situation dangerous and respond to a low-G situation until they feel the right roll, which of course is too late.
Do these alleged instructors really think that the pilot who is experiencing elevated stress levels in turbulence for example, is really going to be able to instinctively correct an uncommanded right roll with an aft cyclic control input?
No.
They will instinctively apply opposite left cyclic at the same rate as the right roll and the result…a low-G fatal accident!
Why?
Human factors!
Any time a pilot finds themselves in a situation that take them outside of their comfort zone, it inevitably leads to high pilot workload and with that comes the corresponding stress. As the situation becomes more difficult, the pilot's brain, and in particular the limbic system region, will perceive this as a threat and trigger the release of steroid hormones including adrenalin and the primary stress hormone cortisol, which marshals systems throughout the body to deal with the threat; increasing heart rate, blood pressure and blood flow etc. Neurotransmitters are also released that will suppress (shut down) activity in areas at the front of the brain concerned with concentration, rational thought, short term memory and inhibition, thereby hindering the ability of the person to handle complex social or intellectual tasks and behaviours.
These mental events were critical in primitive times to allow the person to react quickly to the threat; the fight or flight response. The pilot has no control over these mental events!

In short, the pilot will find that as the stress reaction to the threat evolves, even simple tasks that they could carry out easily before the threat/stress occurred, become difficult if not impossible to perform. The pilot's situational awareness, verbal functioning, mental capacity, auditory functions etc. will be reduced and they will swiftly become overwhelmed by events, leading to a loss of control of the situation.

There may also be an element of surprise such as a sudden encounter with turbulence when flying in a hilly or mountainous region; this can cause the pilot to suffer from the 'startle effect'.

The 'startle effect' has the following effects on the pilot's physical and mental responses:

- The physical effect (uncontrolled/automatic instant reflex) which means that the pilot can unwittingly induce large negative control inputs or even freeze on the controls. Sir Sterling Moss famously said: "*Calling on my years of experience, I froze at the controls*". I am sure that at some point in our lives we have all sat in the cinema and jumped out of our skin when we have been startled by an event on the screen, often resulting in our popcorn being thrown over the people sitting close by! That is a physical uncontrolled / automatic instant reflex.

- The mental effect disrupts cognitive processing which can negatively influence the pilot's decision making and problem solving abilities; it is very easy for the pilot to become over whelmed by the intense physiological responses.
- These responses have the following effects:
    - Increase in heart rate and blood pressure.
    - Breathing increases in both rate and depth.
    - The liver releases additional sugar and the adrenal glands release adrenalin.
    - Muscles tense - as an example, a caution I keep referring to when flying a Robinson product is that this will cause the pilot to unwittingly override the engine governor, so obtain plenty of manual throttle manipulation time to improve your manual throttle skill set.
    - The pilot will sweat
    - Brain activity is negatively affected as reactions will become more instinctive and less reasoned.

It has been found that the recovery from the mental aspect of the 'startle' can take some 30 seconds after the event occurs and this will depend on the complexity of the task/s in hand.
So the pilot's cognitive processing is disrupted thereby making problem solving and decision making very difficult, if not impossible.
The end result is that the pilot is just unable to react in a timely manner to the event and the accident happens or the pilot reacts in a negative way with the same outcome.
I'm afraid, the brain sitting in the dark is not going to allow the clarity of thought or sufficient time to enable the pilot to make a counter instinctive control input, even to save their life!

Are these high incidents of low-G possibly a direct result of the instructor allegedly teaching a pilot to only react to a critical flight condition at the point it is happening? Pure 'human factors' will prevent the pilot from successfully recovering. They should be teaching the pilot to react/recover at a much earlier incipient stage, where pilot stress levels are much lower, with less chance of being 'overwhelmed by events'.
A very early incipient stage of low-G for example is the slightly weightless feeling you get in your stomach when going over a hump back bridge. If the pilot, when experiencing the slightly light on the seat sensation during turbulence, just reloads the disc by applying aft cyclic control input, then their possible exposure to a low-G condition is greatly reduced.
Added to this training must be the understanding that when encountering turbulence the pilot should immediately *slow down.*

This is for a number of very good reasons:

- The uncommanded right roll couple is caused by the aircraft attitude putting the tail rotor anti-torque thrust above the aircraft centre of gravity (C of G) causing a rolling couple in the direction of the tail rotor thrust vector (to the right) and the further the thrust vector is above the C of G, the greater the rolling couple. So, slowing down will change the attitude of the aircraft such that it will reduce the rolling couple by bringing the tail rotor anti torque thrust down to a point more in line with the C of G.
- The more tail rotor thrust being produced, the smaller the couple has to be to initiate an uncommanded right roll, and the quicker the aircraft will roll. By slowing down, the pilot will also be reducing the power demand, which reduces the anti-torque thrust being produced by the tail rotor, thus reducing the possibility of the uncommanded right roll.
- The aircraft handling becomes more manageable at a slower speed; aircraft responses to flight control inputs happen less quickly, which helps reduce the tendency to over control, thus reducing the workload and the associated increase in pilot stress levels.
- Finally, the student should be taught that they should fly out of the turbulent area, or if this is not possible, they should land. As with most inflight emergencies, the safest place is usually right below you… on the ground!

Do these same instructors teach other critical flight conditions up to the cusp of the event rather than just to the early incipient stages?
A moot question when such drastic actions are taken against a helicopter type, when the extent of the problem seems to be localised and flight instructors are allegedly ignoring an FAA Airworthiness Directive, the aircraft limitations and teaching the critical flight condition low-G up to a possibly unrecoverable point as argued above.
Which just so happens to be the very issue that has caused the safety issues, which have basically lead to the grounding the aircraft type in NZ!

It is my understanding that the fatal accident that culminated in effectively grounding the aircraft type due to perceived safety issues was involved in flight training at the time.

My knowledge of the accident is no more and no less than that gained from the very comprehensive accident report issued on 19th February 2015 by the Transport Accident Investigation Commission (TAIC) in New Zealand. I am sure that the document has been sifted through with a very fine tooth comb by all of the interested parties, of which I am not one of them, other than someone interested in looking at flight safety and accident prevention. In my humble view, the underlying problem is one of flight training rather than an inherent design problem with the type as some people are advocating. In fact the report covers a number of flight training issues and gives some very positive recommended changes, which are all very encouraging.

Below are some of my general thoughts regarding the training aspect of the accident flight that come to mind reading the referenced report:

- The accident training flight is described as 'ad hoc'. I'm not sure how this was meant to describe the way the flight training was planned/carried out but my understanding of 'ad hoc' is that the term is used as a criticism, in the sense that something done as hoc is done hastily and can be ill thought out, but this might be my misunderstanding of its intended interpretation. At best it might imply a very casual approach to flight training involving a student with circa 10 hours total time.
- What was the reasoning behind the decision to take the considerably high risk of conducting the early stages of flight training in a hostile environment i.e. at the end of a valley in a mountainous region, and not at the much safer environment of the airfield they had just departed from?
- Furthermore, why would an instructor elect to enter a mountainous region and transit to a training ground through a valley in a two (2) bladed helicopter, that is like ***any other*** two (2) bladed helicopter: susceptible to the possibility of low-G issues when encountering turbulence.
- And to do this with a low time student, open to inappropriate control inputs due to tension on the controls from natural elevated stress levels and lack of experience, at speeds of 100kts plus, where the aircraft will react more quickly to any inappropriate student control inputs.
- And with the knowledge that there is always the possibility of unexpected turbulence which, if encountered at the reported speeds, would possibly challenge an experienced pilot to not over control, let alone a 10 hour student?
- Apart from the high risk associated with the hostile mountainous training environment factor of the training flight, there seems to be a very casual approach to the flight training, highlighted by the fact that the training flight was 'ad hoc' with a 10 hour student.
- The instructor made a call to a person on the ground via his mobile phone! Even if this call was made via a hands free system, this is might be considered as an unwarranted distraction from the supervision of a low hours student flying at high airspeed in a hostile environment, with the ever present danger of unexpected turbulence. To me this is an unforgivable drop in guard of instructor student supervision and a primary instructional duty to be alert to what the student is doing and guard the flight controls. Student pilots are unpredictable due in part to their elevated stress levels and things can happen very quickly, possibly beyond their ability to react…hence the need for an alert instructor.

There has always been the following amusing, but exceedingly valid anecdote, behind the student/flight instructor relationship: "The student is intent on killing themselves and taking the instructor with them during the majority of their flight training. The instructor is there to prevent it".

The tragic accident that in part culminated in the safety issues associated with the R44 seems to me to be more a one of flight instruction issues and poor captaincy, rather than an inherent design defect with the aircraft. It's now approaching 4 years since the grounding of the R44. What are NZ's training industry and authority doing to address the recommendations listed in the said referenced accident report to enable the industry, that relies heavily on the R44 product for a living, to start flying the product again?

Mandating that the early stages of flight training be conducted at an airfield and it's immediate local area and leave the hostile environment of the mountains to the advanced stages might be a start!

Nothing is ever going to be gained in the realms of flight safety and accident prevention if we allow political pressure, based upon ill-informed and misguided information, put out there by the media to cynically sell newspapers or the litigation circus, who are both in it for ulterior motives, to muddy the water.
What is required is a NZ Epiphany moment! In my opinion, NZ are in to the realms of 'throwing the baby out with the bathwater'.

There has to be a realistic understanding that it is in the interest of the manufacturer to recognise a problem if it exists and rectify it. No manufacturer would blindly accept the negative impact of a fatal accident by blatantly refusing to confront it.

Robinson Helicopter Company (RHC) have always been exceedingly good at championing flight safety, accident prevention and pushing out flight safety information *but if it is ignored then that is a pilot captaincy issue and not a product safety issue.*

If the pilot purposely ignores and operates the aircraft outside the limitations set out in the Pilots Operating Handbook (POH), low-G demonstrations for example, which is also placarded in the cockpit in full view of the pilot, *then this is not a product safety issue; it's a pilot captaincy issue.*
There are a number of very good flight safety tips published in the back of the (POH) that directly relate to the said issue:

Safety Notice SN-10 - FATAL ACCIDENTS CAUSED BY LOW RPM ROTOR STALL
Safety Notice SN-11 - LOW-G PUSHOVERS – EXTREMELY DANGEROUS
Safety Notice SN-24 - LOW RPM ROTOR STALL CAN BE FATAL
Safety Notice SN-32 - HIGH WINDS OR TURBULENCE

RHC have recently fitted an engine monitoring unit (EMU) as standard to their various types. There is also a current option for a cabin mounted camera. This is a real step forward in the possibility of obtaining helpful information as to how the pilot lost control of the aircraft which, for obvious reasons, has not been available in the past.
GB has clearly demonstrated that if you:

- Operate the aircraft within its limitations.
- Heed the advice given by the manufacturer on critical flight conditions.
- Conduct flight training in a well-disciplined manner.
- Teach good pre-flight planning.
- Propagate a good flight safety culture and relentlessly pursue it.
- And understand that most accidents could have been prevented prior to take-off!

Then the Robinson Helicopter does not have an inherent design problem or a safety issue; it is as safe as the pilot at the controls, which can be said of any other aircraft type.

Going forward we need pilots to understand that when they are issued with their licence, this is just a licence to learn. The pilot needs to adopt a real thirst for knowledge and understand that there is only one stupid question and that is the question you do not ask!

And…planning, planning, planning, as most accidents could have been prevented *prior* to take-off!

So, thank you for 10 years without a Robinson fatal accident in GB and here's to the next 10 years.

Knowledge is flight safety helping to keep your RPM in the green.

Richard Mornington Sanford