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## ***Helipaddy's Paddy Wills and Sarah Chenevix-Trench report from Torrance on the current Robinson Safety Course***

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**P**addy and I attended the November RHC Safety course at Torrance, California, one of 15 that they are currently running each year in that location alone. The weather out there is extraordinarily good, with only 35 days of rainfall a year, and of these days only five are stormy. It really is very conducive to helicopter flying.

On my arrival, it was exciting to see three lady pilots out of a total of

40 students – no doubt well above average for the helicopter industry! We had not fully expected that the majority of the class would be commercial pilots, and thus relatively experienced already. Many had taken advantage of the post 911 GI bill to take up flight training. In fact, there were only three other private pilots in the class, a slightly worrying reflection on the state of GA flying, especially when you think that the Robbie is

the dominant helicopter for PPL(H) pilots and the weather conditions nigh on perfect. The nationality spread was mostly US, but also Brazil, Switzerland and Italy.

The course we took was conducted at the Robinson factory, the Mecca for Robinson owners. We had been previously introduced to Tim Tucker, course architect and their Chief Pilot, when he was over at HQ Aviation doing the first ever UK-based course there with Q Smith. Tim told us that 14,000 pilots have been through the course since it started in the 80s.

The course originally set out to try and deal with the problem of owners coming to collect their new



aircraft and subsequently having an accident soon after taking delivery, often when flying their helicopter back to their home base. In the 80s the purchase and collection of a new helicopter was naturally a cause for celebration (as it is today)

so new owners were wined and dined for a few days in Torrance before flying their shiny new machine home. We heard tragic stories where the management would be told the next day that the people they'd taken out to supper

**Far left: the Robinson factory is a Mecca for private helicopter owners**

**Left: entrance to an education Lower left: the Robinson factory at Torrance has grown from a single small shed in 1980**

the night before had never made it home. New rules were thus introduced at the factory to prevent pilots flying away machines without a number of strict criteria – must attend a safety course, must be current and must have conducted landings and take-offs above 5,000 feet density altitude. Tim Tucker reported that he – Chief Pilot – was even prevented from doing taxiing from one end of the runway to the other as he did not have a certificate of attendance for his own safety course!

### Day One

The first day starts, as do the subsequent days, with coffee and doughnuts. An engaging introductory speech was delivered by Kurt Robinson, one of Frank's three sons, who then handed over to Tim Tucker, the CFI of RHC. Tim has a wonderful calm delivery; he leans on the lectern and with the help of video clips (of varying quality), he launches into a description of the disasters waiting in the shadows for the unwary, unprepared, careless or maybe just unlucky.

In every case the chain of events that led to catastrophe could be traced back to a seemingly innocuous trigger, invariably to do with judgement rather than skill. The very fact we flew helicopters puts us into a risk-taking subclass of humans, thus tainted with the associated character flaws.

Everyone in the room was asked to raise their hand if they knew someone who had been killed in a helicopter accident. Most of the room raised their hands. When asked if that accident was completely unexpected only about





half raised their hands. Hence the concept of 'scary pilots' – the ones that are in a hurry and don't have time for planning or are overconfident may be skilled but

probably lack judgement. We all rather hoped we did not fit that demographic. That being said, Robinson also know that attendees to the safety course have a much

reduced accident rate. We all heaved a collective sigh of relief, only to be launched into a series of harrowing narratives of fatal accidents.



**Above quality depends on a skilled workforce that hand-makes components**

**Left: on the factory tour we saw R44s on order from China  
Right: 'I'm now in awe of the job performed by my engineers at Denham'**

It is interesting to note how the nature of accidents has changed over time. In the 1980s 73% of Robinson accidents were during training, 55% of those when flying dual with instructor and the number one cause was practice autorotations. In the 2000s if you analysed fatalities, 60% occurred during recreational flights, 12% dual instruction, 19% self-fly hire,



7% solo students and 2% ferry flights. If you break down the statistics as to common themes then the results for the R22 are: 29% weather, 29% wire strikes, 21% low RPM, 7% low-G mast bumping, 7% rotor stall/vortex ring and 7% maintenance.

The results for the R44 are broadly similar, with weather being a big factor and 75% of those weather-related accidents take place at night. So from the primary cause being training accidents, one of the primary causes has become weather. Up until around a decade ago it was possible for every Robinson accident to be investigated by the Robinson Company but now the Robinson brand is distributed worldwide, only the fatal accidents are likely to be investigated and accident statistics are gathered from the USA only.

Many of the advances in safety for the R22, R44 and the R66 have been informed by post-crash investigation. Robinson has always taken the utmost care to investigate and learn from all the accidents that have occurred in its aircraft. The aim of the course is to try and reduce the risks taken by the major factor in all accidents, the human at the controls.

After an hour and a half of graphic videos and descriptions we were released from the classroom to eat more doughnuts, followed by the factory tour, a much-anticipated highlight, particularly for a Robinson owner. The factory is huge, arranged over three separate areas, and the tour is conducted at speed by an engineer walking backwards at all times, in order to more easily engage his audience.

This is not a robot-heavy operation: the raw materials for the construction process are brought into the factory as rolls of aluminium, steel rebar and plastic. The basic design of the R22 and R44 has not changed since Frank Robinson first conceived of a

lightweight utility helicopter in the mid 60s. The quality of production processes is dependent on having a skilled workforce hand-making the components.

Thus the first giant hangar is concerned with converting raw materials into parts, the second hangar resolves those parts into more refined articles – putting the twist into the blades, powder coating the main rotor shaft and other vulnerable components and beginning to create a recognisable aircraft. The third hangar constructs the electronics, which are pinned out onto 2D wiring diagrams to be tested before fitting. The exterior painting is done any colour you like as long as it's one of the twelve approved.

While looking round the factory we noticed a number of orders for R44s from China, but also an order from HQ Aviation in the UK for 3 R66s.

Factory tour over, we had lunch followed by more doughnuts and then it was back in the classroom. The afternoon was devoted to discussion of low RPM rotor stall, rotor stall at altitude (don't forget to read safety notices 10 and 24), low-G mast bumping, already a factor in

three of the seven fatal R66 accidents, vortex ring with discussion of the Vuichard recovery technique, energy management, autorotation and dynamic rollover.

Lessons learned from the first day:

1. Never fly in a Robinson without bladder tanks (awful post crash fire statistics)
2. Never store anything under your seats you would not be prepared to fall on from a height. Terrible description of people killed by storing the wheels under the front seats.
3. Fly higher. Fly faster. At 70kts and 500ft agl you only have 1.1sec of stored power. That is 1.1 seconds to rotor stall.
4. Carburettor icing WILL stop the engine dead.
5. In turbulence, reduce power. Low-G problems are very unlikely to happen if you are flying at less than 70kts.
6. Weight and balance is important.
7. In 40% of the wire strikes the pilot knew they were there!

## Day Two

Today was concerned with the Pilot's Operating Handbook (POH), that vital blue book generally





located near the right hand door of the helicopter. It was emphasised that the information in the POH evolves and as such it is necessary to keep up to date with changes. Additions and new advice are often added as a result of the post-accident investigations. For example, when referring to the cotter pins that secure the doors the word pin has been replaced with pins. The addition of the plural was the result of an accident in NZ when a door came off and went into the tail rotor. A change has been made advising pilots to check the circuit breaker is in, when the clutch light goes off on engine start and run-up.

This session was conducted once again by Tim Tucker and looked at the extraordinary dedication of the test pilots that enabled Robinson to develop the parameters of the limiting height-speed envelope,

so it had a max continuous of 206 bhp. The main reason is to increase the altitude capability of the aircraft but it also increases reliability and means that the blades, drivetrain and gearbox can be correspondingly smaller, reducing weight and wear. If you pull more power you are putting more stress on the components than they were designed for. Exceeding weight and balance, flying out of trim, overspeeding the engine or rotor RPM will all put excessive strains on components leading to metal fatigue and catastrophic failure. Most of the afternoon was concerned with do's and don'ts, mostly don'ts.

### Day Three

Day Three commenced with Daniel Huesca, the fast-talking technical representative for Robinson who was there to talk about

engineering works to be checked by a second pair of eyes, as is the case under EASA rules. There have been a large number of accidents in the States caused by mistakes in maintenance. How many of us have the following when conducting a preflight; ladder, flashlight, mirror and magnet?

The design philosophy for all Robinson machines is to be simple – if something isn't there it cannot malfunction. If it's supposed to move, move it. If it's not supposed to move, verify it doesn't. Identify liquids and check the colour. **CHECK YOUR BLADES.** Read the safety notices at the back of the operating handbook and most importantly, fill in your details in the front and send to Robinson. This means that you will be sent all the most up to date safety notices. They are also available online for free, without registration.

Daniel was keen to emphasise that you should listen to the machine as, in the majority of cases, mechanical problems would have been evident before failure occurs. This was not particularly reassuring to a PPL; I worry that I would not notice a rough running engine or a sticking valve.

Some pointers picked up from Daniel:

- Main rotor overspeeds damage spindle bearings – we were handed round a selection of misshapen bearings.
- Shut down properly, with time for cooling.
- Examine all torque stripes.
- Excessively worn main rotor pitch links will produce a 'hopping' ride.
- R22 has a slight left pedal bias in cruise flight.
- R44 has a right pedal bias in high speed cruise with the yaw string centred.
- Magneto problems are the source of almost all governor problems.
- Adhere to the maintenance schedule.

## Advanced Pilots Scheme

Attendance at a Safety Course is one of the compulsory elements to gain a Bronze level in the Advanced Pilots scheme that will be launched in the New Year. The programme is endorsed by both the CAA and the British Helicopter Association. Such a continuous assessment scheme is long overdue and will be an excellent conduit for the lone flier that has little or no peer guidance. The first level is Bronze and kicks in at 100 hours. Details at [advancedpilot.org](http://advancedpilot.org).

height velocity charts, the low hover and high hover points. The performance parameters for the R22, 44 and 66 are significantly more detailed than those of any other helicopter. The R22 was the first helicopter to be certified under the FAR27 – the airworthiness standards for normal rotorcraft. Introduced in 1980, these requirements were far more stringent than the CAR6 standards introduced in the 1960s. To this day many of the larger aircraft only comply with earlier standards.

The question was answered as to why Robinson took the Lycoming engine with a capability, in the R44, of generating 260bhp and derated it

maintenance, 'A' checks and all things engineering. Daniel brought with him into the classroom a number of stripped down Robinson assemblies so as to better examine the main rotor gearbox and mast assembly, the clutch plates, actuator and the main rotor pitch controls. He also passed round post mortem samples of blades, clutch plates and spindle bearings to see damage that had been undetected before disaster.

Daniel was keen to get us all to take our preflight checks seriously, and when we quiz the engineers as to leaks, cracks, chafing or corrosion if the engineers say "It's fine" don't take their word for it. In the USA it is not mandatory for all





- Do not take off in a machine where the blades take longer than five seconds to start moving after engaging the clutch. It is the work of a few minutes to tighten the clutch belts.

That was a pretty heavy morning. I am now in awe of the remarkable and conscientious job performed by my engineers in Denham, particularly Dave Cross.

### Day Four

This was the fly day where we all got the opportunity to fly with one of the Robinson test pilots and to run through any of the procedures explained in the past two days. It was a great excitement to be able to fly in the glorious Los Angeles sunshine for a whole hour. Some of the guys had never flown at sea level, having spent their whole lives up in the mountains of Utah and Colorado, always dealing with the associated limited power issues.

### Conclusions

When I got back to the UK and got back into an R44 for a short flight I did feel a degree of trepidation. My preflight check was more thorough, although fell short of the mirror and the magnet, and I followed the start-up procedure using the POH which I haven't done for a couple of years

**Right: the Robinson range are by far the best-selling helicopters in the world**

although all this new attention to detail will probably wear off. I think for all Robinson pilots attendance on the safety course is essential. Whether you have 100 or 1000 hours it will get you thinking about your responsibilities as a pilot and cause you to reflect on things

that we all get complacent about. It is in the few seconds that we forget to be pilots and allow ourselves to be distracted that accidents happen.

The next Robinson Safety Course in the UK, which is being organised by Sloane Helicopters, will be on 11th-13th July 2016. □

