

Swiss Method revolutionizes Vortex Recovery

Every year, numerous helicopter accidents happen due to the vortex ring state. In the vortex, the helicopter enters a sudden, rapid descent, resulting oftentimes in fatal consequences. The Swiss Inspector Claude Vuichard of the Federal Office of Civil Aviation in Switzerland has found an alternative method that reduces the height loss to a minimum during the recovery.

by Daniel Dubouloz

It was one of the most tragic helicopter accidents of the year 2013, when a Eurocopter Super Puma AS332 crashed during a Localizer/DME Approach to Sumburgh Airport on the Scottish Shetland Islands with 18 people on board. Four passengers lost their lives in the accident. Investigation showed that both engines delivered power until the impact, no technical problems could be found in the black box data. The British Investigation Board AAIB published a bulletin shortly thereafter, which identified the combination of an articulated nose-up attitude, low speed and a high sink rate at a high power setting as the cause of the vortex ring state, which brought the helicopter down. The phenomena of the vortex ring state is initiated by the main rotor, which sucks in its own downwash (vertically, downward stream produced by the helicopter). In other words: The crew is jeopardized because of the fact that the rotor does not generate any lift anymore, as the helicopter is accelerated downwards in his own suction. Any increase in power actually worsens the situation, since it makes the helicopter sink even faster. The only possibility to stop the downward movement consists in leaving the suction, that is located vertically underneath the helicopter.

Development of Method after a Vortex-Experience

The so far only worldwide applied recovery technique could be dangerous, since it is not always possible to fly out of the vortex by flying forwards, especially during rescue- and aerial work missions. Neither can it always be afforded to lose as much as 500 feet (152 meters). Accidents caught on video show precisely, that the recovery with the standard procedure oftentimes ends up with an accident. Many years ago, the now 59 years old Claude Vuichard got caught in a vortex ring state in

the Wallis Region in Switzerland. The helicopter was carrying a log on a 40 meter rope. The commercial pilot and flight instructor managed to escape the situation with his Ecureuil AS350. „I started to think about a better way of getting out of this situation, I was wondering if there was not a safer method that would prevent me from losing lots of height in order to leave this dangerous state of flight“, Vuichard remembers. The former Air Zermatt Pilot realized, that the method leading to a minimum of height loss consisted in catching the outermost end of the upwind part of the vortex, that streams upwards next to the rotor. An amazingly simple method, that can save lives especially when operating at the performance limit, for instance at high density altitudes. When applying this technique, the Pilot flies sideways out the downward suction of his helicopter. Take off power is set and simultaneously the torque increase of the main rotor is compensated with the performance pedal. Simultaneously, the cyclic is pushed into the opposite direction of the power pedal (cross steering). Thereby, the main rotor instantly moves into the upwind part of the vortex and the situation is recovered. The height loss only amounts to roughly 20 – 50 feet, which is ten times less compared to the regular method. Especially for operations taking place in proximity of the ground, it is the only way for the crew to escape this dangerous situation.

Robinson adopts Vuichard's Method

In 2011, Claude Vuichard participated in a Robinson Safety Course that took place in Switzerland. During the course, he demonstrated his recovery method to Tim Tucker, Chief Instructor of Robinson and a well-known helicopter expert. Tucker was stunned by this method and tested it during flights in the United States. Furthermore, he sent Vuichard's documentation to other helicopter manufacturers. In March 2014, Vuichard got a surprising email: Tim Tucker reported that his recovery method was now being taught during all Robinson Safety Courses and had also been implemented into the "Flight Training Guide" of Robinson as "Vuichard Recovery Technique". Claude Vuichard remains very modest, however feels honored by the fact the recovery method bears his name. Since Robinson has adopted his method, in medium turn most helicopter pilots worldwide will apply his method, since the majority of flight students start their flying career on a Robinson helicopter. However, the certification specifications CS27 and CS29, analogical to the FAR27/29 in the United States, do not require a defined maneuver in order to escape the "vortex ring state". For this reason, Vuichard assumes the other manufacturers like Agusta Westland, Sikorsky, Bell or Airbus will not be interested in the implementation of a new procedure. Still, Robinson's voluntary Flight Training Guide might reach numerous helicopter pilots – even those, who have been flying for years.

Potential to Save Lives

Vuichard suspects the conservative schemes in aviation as a reason, why nobody had discovered this alternative method before him. "The vast majority of flight instructors are being educated as decades ago", and realizes that the implementation of new methods is thus hindered. Claude Vuichard realizes that the implementation of this method will proceed rather slowly. More publications in corresponding magazines in the English speaking countries, most of all the United States, would be necessary in order to get the attention of the helicopter community on a broad scale. Vuichard is sure that if the method is taught during basic training and refresher courses, it will become a standard reaction like the stall recovery in a piston powered airplane and will lead to a significant reduction of accidents and incidents – it even has the potential to save many lives every year and the associated damage and insurance cases.