

UNANTICIPATED YAW

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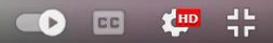
EUROPEAN ROTORS 2023, Madrid

Robinson R44 Loss of Control and Collision With Terrain



0:08 / 5:21

Scroll for details



UNANTICIPATED YAW...

- ▶ LTE – LOSS OF TAIL ROTOR EFFECTIVENESS
- ▶ LTA – LOSS OF TAIL ROTOR AUTHORITY
- ▶ LOC – LOSS OF CONTROL (YAW AXIS)
- ▶ LFE – LOSS OF FENESTRON EFFECTIVENESS
- ▶ FENESTRON STALL
- ▶ TAIL ROTOR VORTEX RING STATE
- ▶ LOSS OF TAIL ROTOR THRUST
- ▶ LOSS OF TAIL ROTOR CONTROL
- ▶ WEATHER VANING
- ▶ WEATHER COCKING

EASA DEFINITION

- ▶ LTE or unanticipated yaw results from lack of yaw margin encountered in certain flight conditions is not related to a failure or malfunction.



NOTE

- ▶ The tail rotor **IS** producing thrust
- ▶ Just not enough thrust to counteract the yaw
- ▶ The pilot needs to put in the correct input to stop the yaw
- ▶ It can happen to ANY helicopter with a single main rotor and anti-torque device (tail rotor / fenestron / NOTAR)



LOW RPM / OVERPITCHING

- ▶ Thrust is proportional to RPM Squared
- ▶ Loss of Main Rotor RPM will significantly reduce Tail Rotor thrust
- ▶ Loss of directional control



WIND DIRECTION

- ▶ Depending on:
- ▶ Wind direction relative to the helicopter
- ▶ Strength & Gusts
- ▶ Will require additional pedal input to maintain control

Helicopter Crash in Los Angeles Hospital



0:00 / 0:33



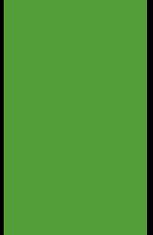
Factors effecting...

- ▶ **Heavy** – requiring more lift, therefore more tail rotor thrust to counteract torque
- ▶ **Hot**
- ▶ **High**
- ▶ **Humid**



Prevention

- ▶ Be aware of the wind direction when operating at low speed
- ▶ Where possible operate into wind
- ▶ Be prepared to apply pedal early and positively
- ▶ Don't allow rapid high-rate yaw turns
- ▶ Make sure you are in full control when taking off, anticipate the torque effect



Caution

- ▶ Be especially cautious when:
- ▶ WINDY / GUSTY
- ▶ HOT
- ▶ HIGH
- ▶ HUMID
- ▶ HEAVY



Recovery

- ▶ You are the pilot in command!
- ▶ You are the pilot in command from the moment the blades start turning until the blades have stopped.
- ▶ You command where the helicopter is to point!
- ▶ Input sufficient pedal to stop the yaw!
- ▶ Rapid response is essential
- ▶ This may lead to **over torque**, but better than a loss of control

Recovery

- ▶ Pedal to stop rotation
- ▶ If height permits:
- ▶ Reduce Power
- ▶ Forward cyclic to regain translational lift



TRAINING?

- ▶ EASA RECOMMENDATION:
- ▶ The Agency further recommends to NAA's to ensure that any PPL(H), CPL(H), ATPL(H) and Flight Instructor training courses include sufficient and dedicated training on LTE and recovery actions.
- ▶ Have you been trained in unanticipated yaw recovery?
- ▶ SIM or Actual Helicopter?

Privatvideo

ORF 2 HD

ZIB 1



FURTHER INFORMATION.

- ▶ ROBINSON HELICOPTER COMPANY – SAFETY NOTICE SN-42
- ▶ BELL HELICOPTERS - OSN 206-83-10
- ▶ AIRBUS - No. 3297-S-00 Unanticipated left yaw (main rotor rotating clockwise), commonly referred to as LTE
- ▶ FAA AC 90-95 - Unanticipated Right Yaw in Helicopters
- ▶ EASA 2010-12R1 - Loss of tail rotor effectiveness (LTE) or unanticipated yaw in helicopters



THANK
YOU