

HIGH WINDS & TURBULENCE

EU ROTORS

November 2024

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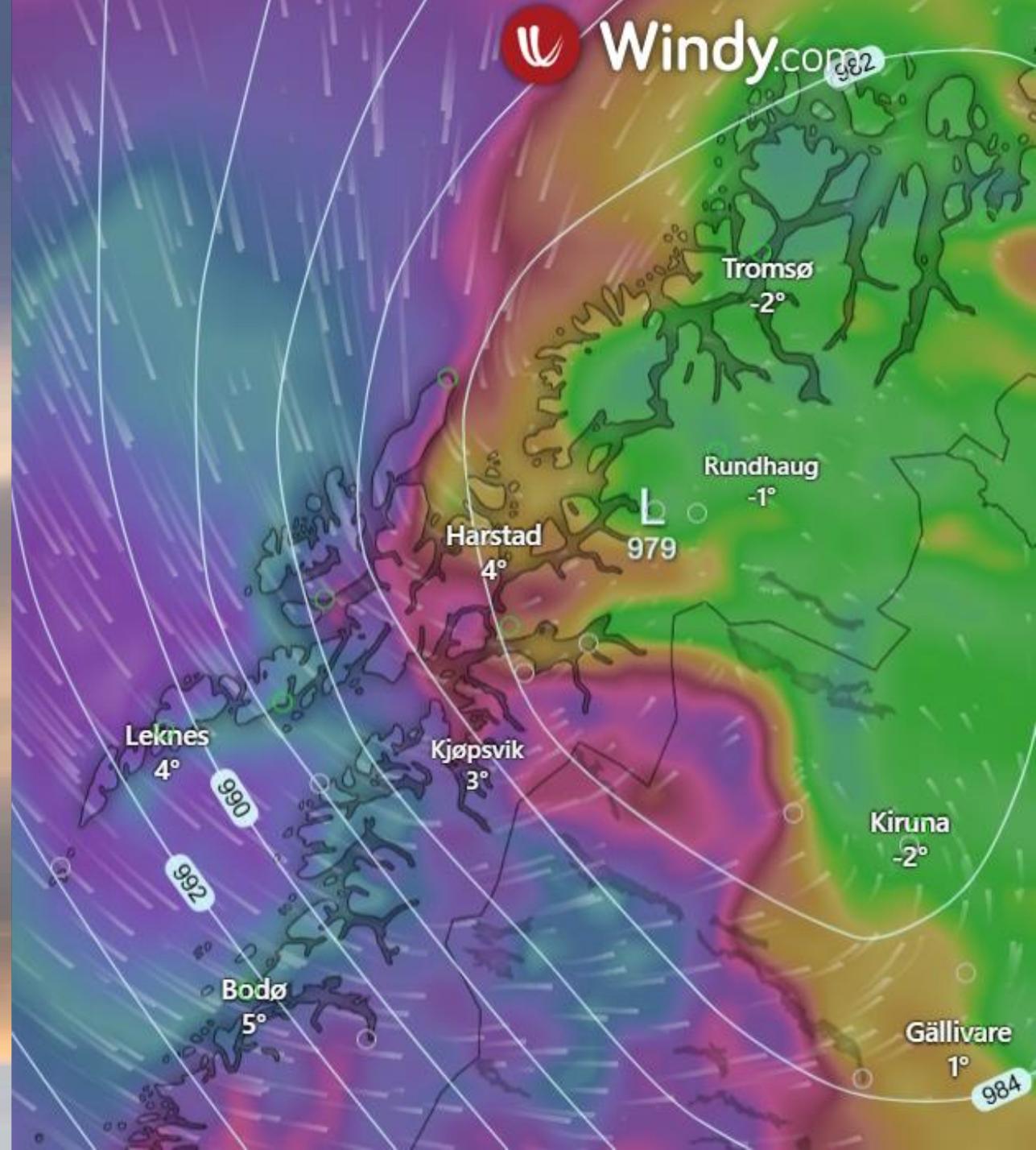
Balearic Helicopters

BEFORE YOU GO - MET CONDITIONS

- SYNOPSIS / WEATHER CHARTS
- METAR
- TAF
- CHECK FOR:
 - DEPARTURE
 - ENROUTE
 - DESTINATION
 - ALTERNATE

WEATHER FORECAST

- METAR ENAN 281050Z 26027G45KT
210V280 9999 VCSH FEW019 BKN031
03/M02 Q0992
- TAF AMD ENAN 281037Z 2810/2906
25022KT 9999 SCT020 BKN030 TEMPO
2810/2906 SHRA SCT020CB TEMPO
2810/2813 27025G48KT BECMG
2813/2815 27030G45KT BECMG
2900/2903 27020KT



AIRCRAFT LIMITATIONS – WIND

- Know your aircraft limits

Should the turnaround time be prolonged, short-term picketing of the aircraft is recommended : blanking plugs, covers fitted, even blade socks and poles in winds greater than 40 kt.

R
R
R

WIND SPEED LIMITATIONS FOR ROTOR STARTING AND STOPPING

The maximum wind speed for rotor starting and stopping is 40 knots from any direction.

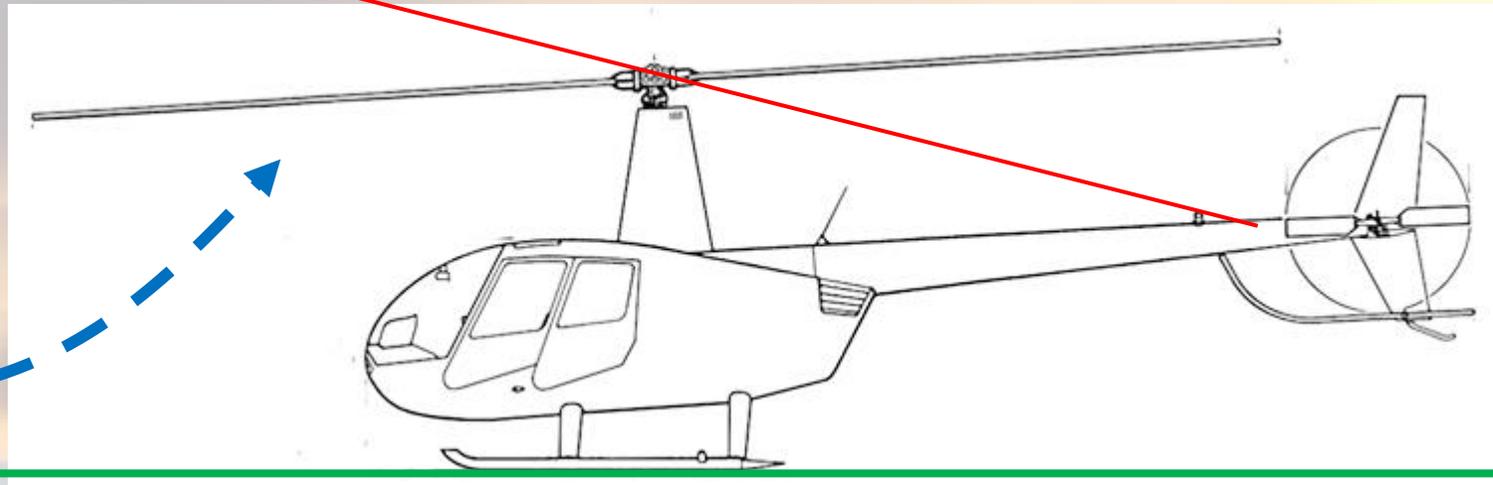
PERSONAL LIMITATIONS

- WIND SPEED & GUSTS
- VIZ & PRECIPITATION
- CLOUD BASE

- INCREASE WITH EXPERIENCE
- AVOIDS PRESSURE
- DON'T FORGET ATO / SPO / CAT LIMITATIONS

BLADE SAILING

- With no, or low RPM, blades are subject to moving by strong wind
- They can strike the fuselage or tailboom causing significant damage



BLADE SAILING



BLADE SAILING - PREVENTION

- In windy conditions – use the rotor brake to stop the main rotor blades, especially at low RPM
- Park a few degrees out of wind to prevent the lowest point of the disc to be directly over the tail boom
- **Never park a helicopter with a main rotor blade directly over the tail boom**
- In strong wind – use blade tie downs
- Startup – do not spend long periods of time at low RPM
- Startup – or..... **(don't try this at home).....**

BLADE SAILING



WIND - FLUID DYNAMICS

- AIR IS A FLUID
- WATER IS A FLUID
- AIR IS THINNER BUT BEHAVES THE SAME WAY.
- “IMAGINE A RIVER, SEE THE AIR”



FLUID DYNAMICS



WEATHER

- OROGRAPHIC UPLIFT
- LENTICULARIS CLOUDS
- CUMULONIMBUS CLOUDS



OROGRAPHIC UPLIFT - CLOUDS

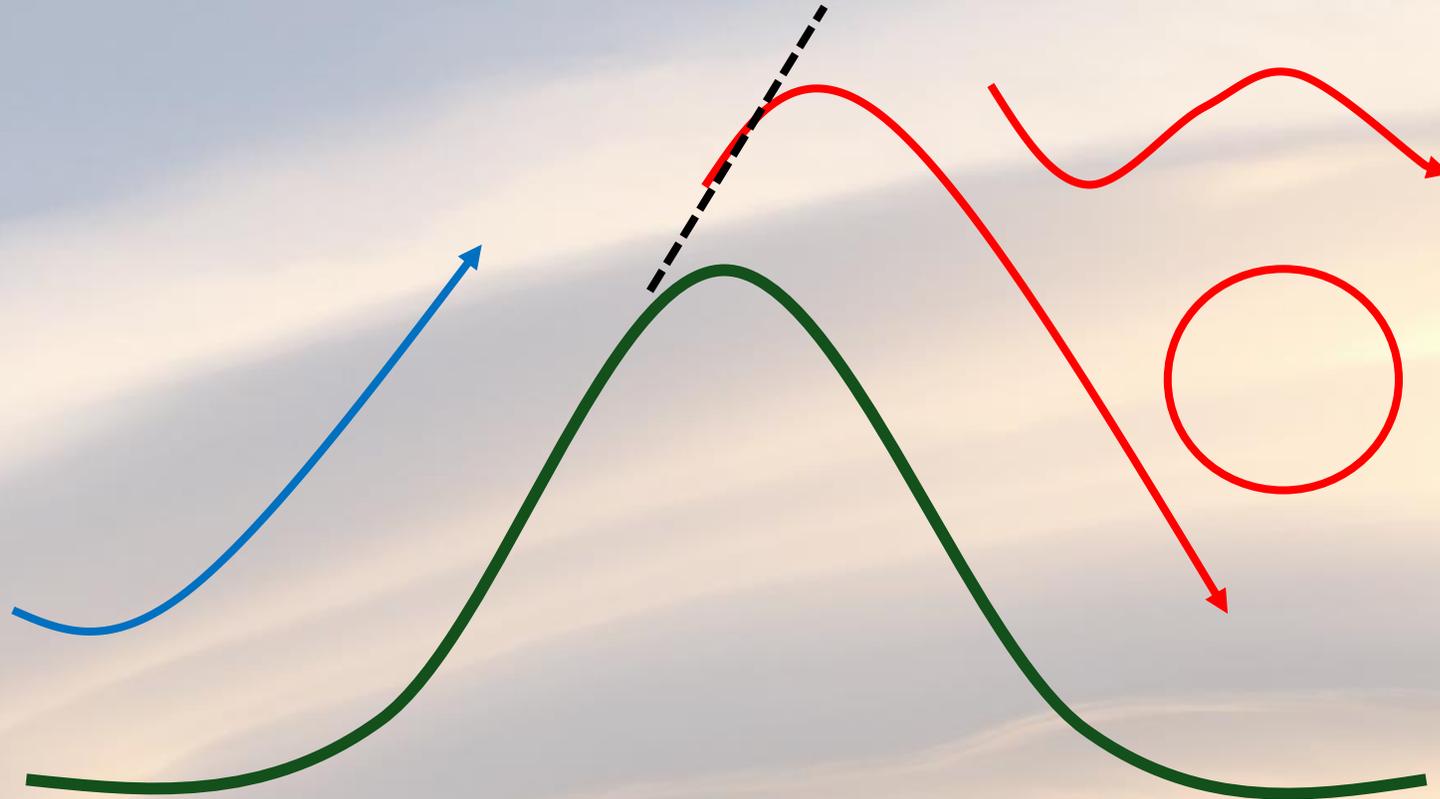


MOUNTAINS & RIDGES

UPWIND SIDE

UPDRAUGHTS
SMOOTH FLOW

LESS POWER



DOWNWIND SIDE

DOWNDRAUGHTS
ROTORS
TURBULENT FLOW

MORE POWER

RIDGES



↑ RIDGE CLIMBING IN THE WINDOW
YOU ARE DESCENDING
YOU WILL NOT CLEAR RIDGE
TURN AWAY

→ RIDGE NOT MOVING IN THE WINDOW
YOU ARE NOT CLIMBING
INCREASE ROC IF POSSIBLE OR TURN
AWAY

↓ RIDGE DROPPING IN THE WINDOW
YOU ARE CLIMBING
YOU WILL PASS OVER THE RIDGE

LOW SPEED / HOVERING

- CONTROLLABILITY MORE DIFFICULT
- MORE POWER REQUIRED
- UNANTICIPATED YAW



GUSTING WIND



Frankie HM Channel

SUBSCRIBE

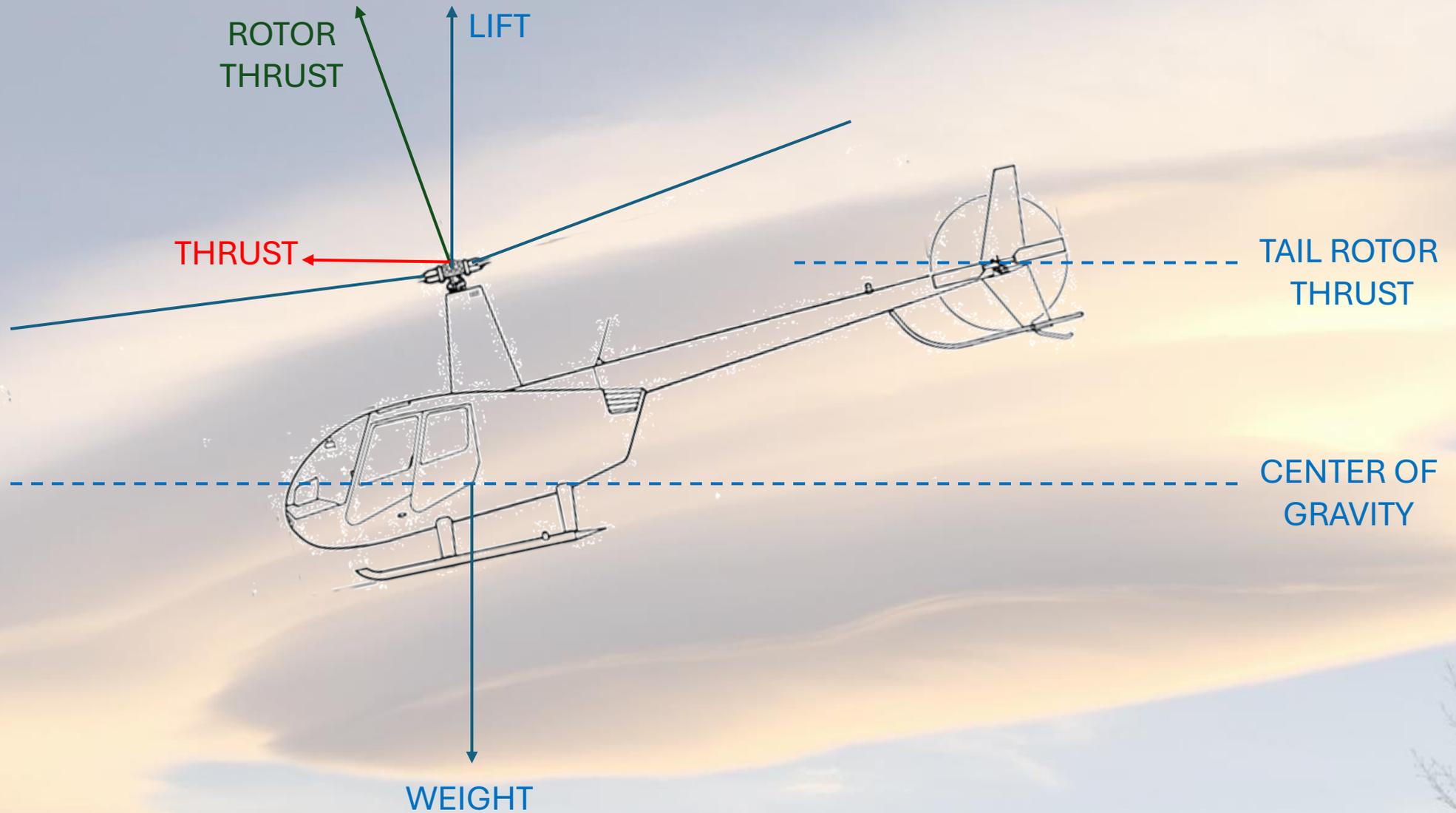
CROSSWIND LANDING



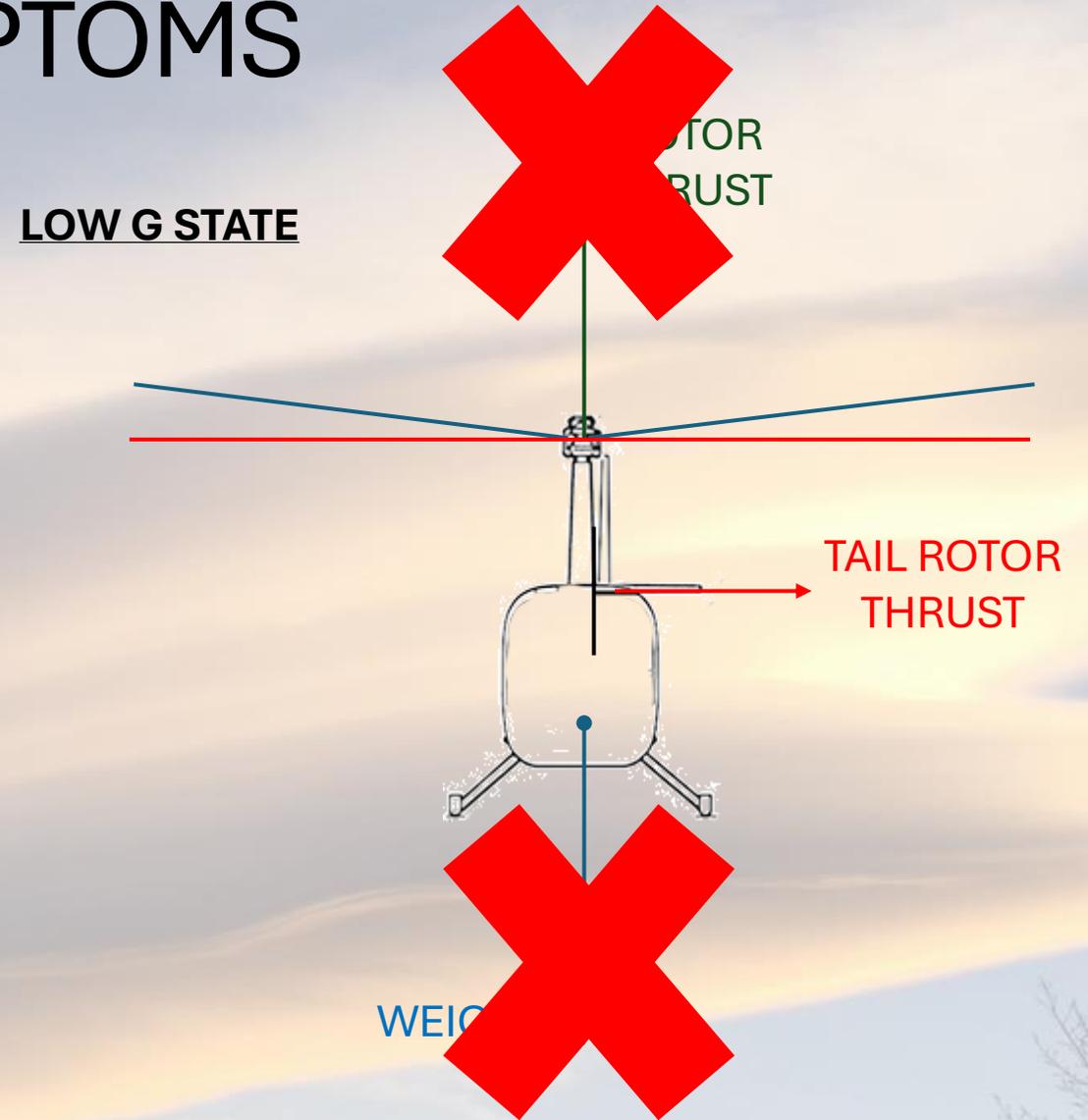
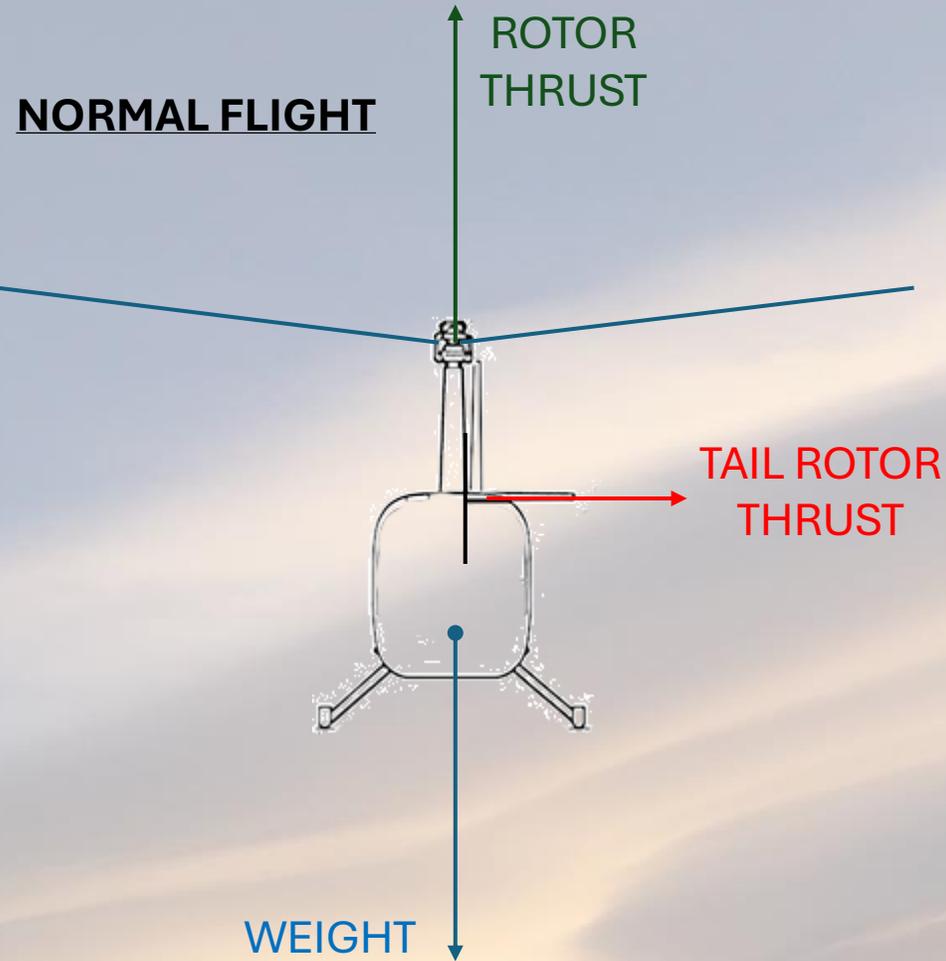
LOW-G

- Can occur in **ANY** 2 bladed rotor system
- Caused by:
 - **PILOT ERROR** – Continued flight in turbulence
 - **PILOT ERROR** – Rapid forward movement of the cyclic (bunting, push over)

NORMAL FLIGHT – 1 G

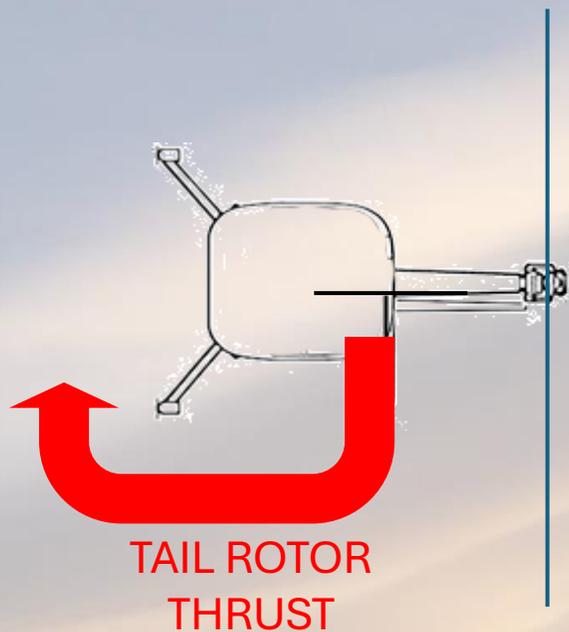


LOW G – INITIAL SYMPTOMS

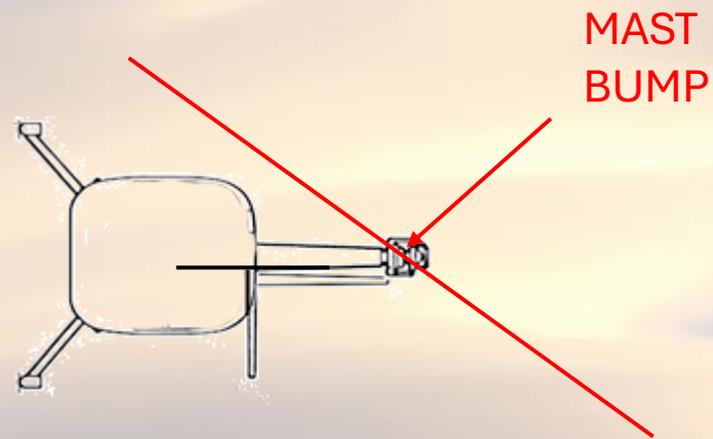


LOW G – RIGHT ROLL

RIGHT ROLL
180° PER SEC



PILOT ERROR
LEFT CYCLIC



LOW G – MAST BUMP

MAIN ROTOR BLADES CONTACT THE ROTOR
MAST SEVERING THE ROTOR SYSTEM

IF YOU ARE LUCKY:

THE MAIN ROTOR BLADES WILL ENTER THE
COCKPIT

DEATH WILL BE INSTANTANEOUS

IF YOU ARE UNLUCKY:

THE MAIN ROTOR BLADES WILL SEVER THE TAIL
BOOM

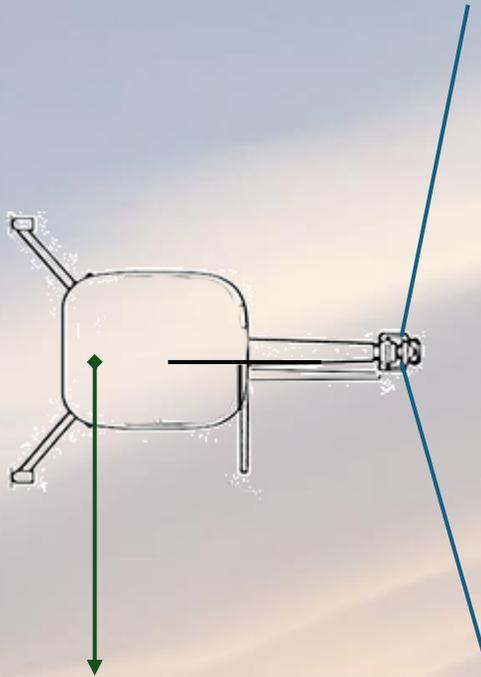
YOU WILL BE ALIVE FOR THE DESCENT

BUT IT WILL STILL BE FATAL



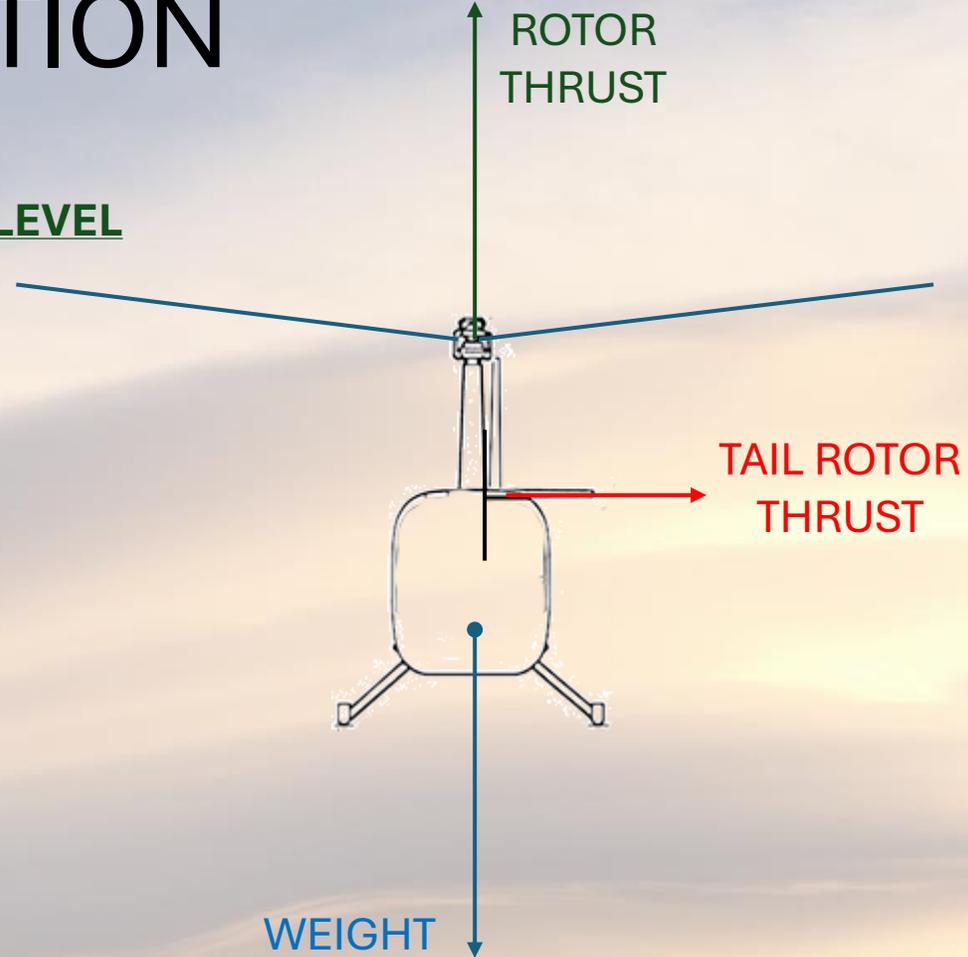
LOW G – CORRECT ACTION

AFT CYCLIC



LOADING THE DISC
GENERATES G-FORCE
BLADES WILL RETURN TO CONING

WINGS LEVEL



WEIGHT

ROTOR
THRUST

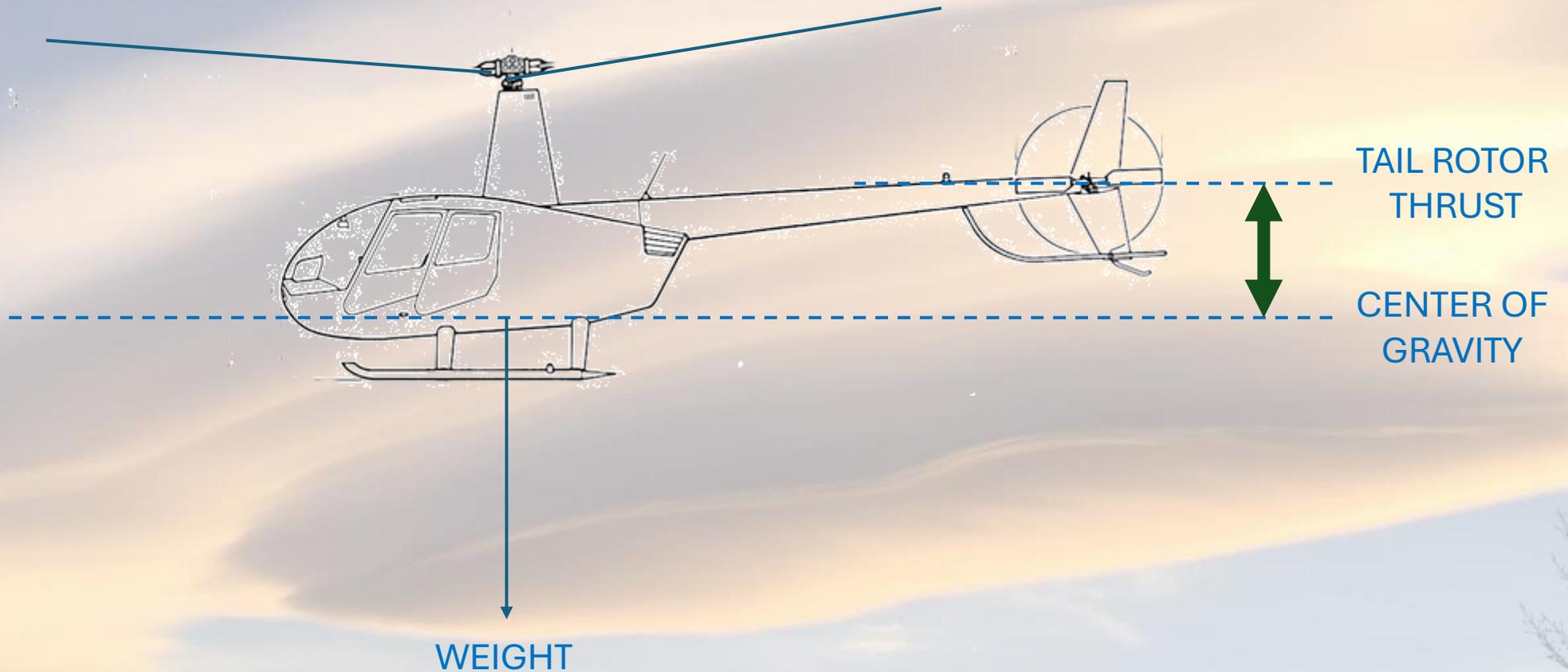
TAIL ROTOR
THRUST

LOW G - PREVENTION

SLOW DOWN!!

60 – 70 KNOTS

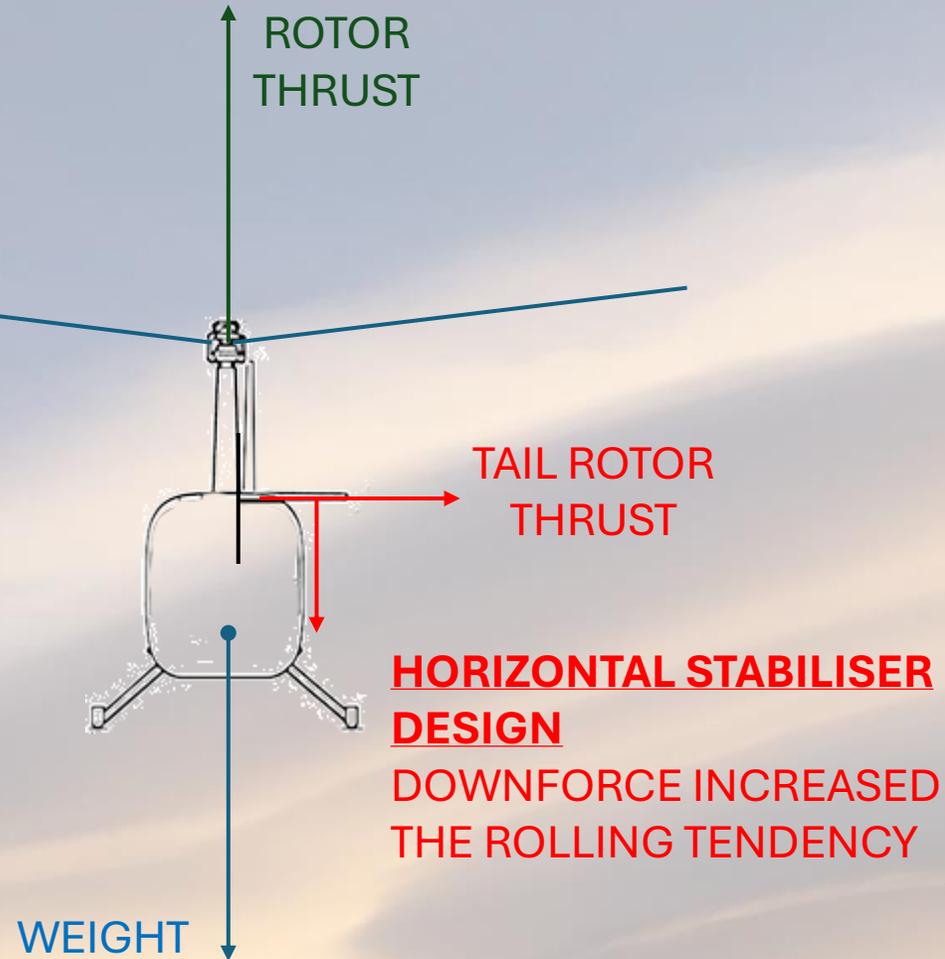
REDUCES THE ROLLING TENDENCY



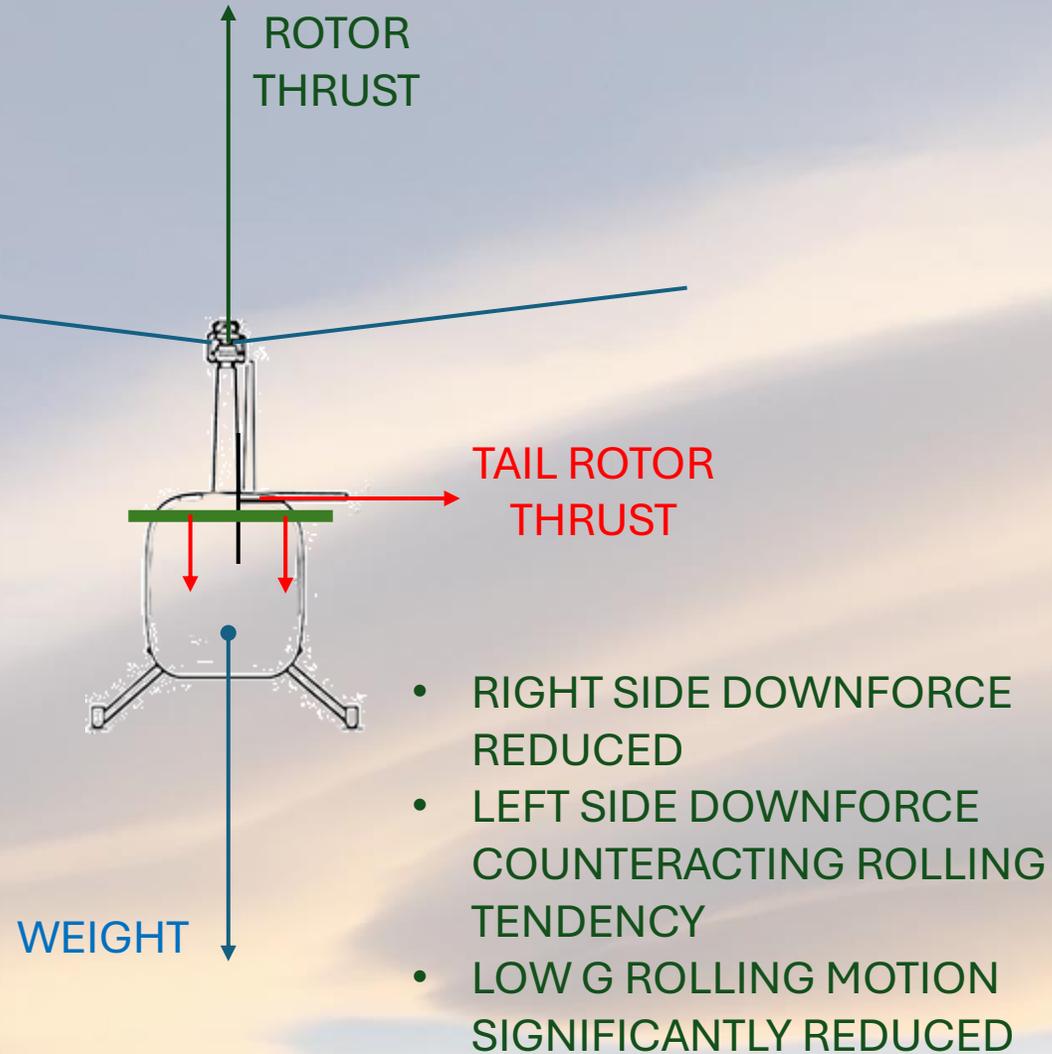
LOW G - PREVENTION

- READ THE WEATHER BEFORE FLIGHT
- LOOK AT THE WIND SIGNS IN FLIGHT
- DO NOT CONTINUE
- DIVERT
- LAND
- DON'T PERFORM AEROBATIC CYCLIC PUSHOVERS

RHC HORIZONTAL STABILISER



NEW RHC HORIZONTAL STABILISER



FURTHER READING

- RHC Safety Notice 32: High Winds or Turbulence
- AIRBUS - SIN 3093-S-00-Rev-2: Main safety tips to be applied close to or at VNE
- ESPN-R: HE7 Techniques for Helicopter Operations in Hilly and Mountainous Terrain
- ESPN-R: HE13 Weather Threat For VMC Flights