Where have we come from with aircraft and where will or should we get to?

Where have we come from with aircraft and where will or should we get to?

It is only time and money

Honesty is the best policy!!

(normally)

Sikorsky S76

1. S76 Mk 1
2. S76 Mk 2
3. S76 A
4. S76 B
5. S76 A&
6. S76 A&&
7. S76 C
8. S76 C&
9. S76 C&&
10. S76 D

How far into the past?

1928- Australian Inland Mission



Auster 35

Standard crew in 1950s

1. Pilot
2. Ambulance Attendant
3. LAME

Aeromedical care and transport should be cost effective in either;

Reducing mortality/ morbidity, returning patients to the community.

Ensuring execution of Government policy.

1930s to 1960s
Improvised and reactive response

1960s

Coronary Care Units
- Monitoring and defibrillators

Intensive Care Units
- Ventilation

1970s
- Neonatal Care
- Coronary Arterial Graft Surgery
- Pacemakers

1980s

- Trauma Centre/ Systems
- Reduced obstetric care in regional areas

1990s

- Enhanced patient imaging
- Reducing regional medical support

2000s



- ECMO
- Thrombolytics

2020s

- Obesity
- Clot retrieval for cardiac and cerebral events

Aeromedical care and transport should be cost effective in either
Reducing mortality/ morbidity, returning patients to the community
Ensuring execution of Government policy

Helicopters vs Fixed Wing

Operating cost difference of up to 10-fold

The transport platform choice should be based on patient needs

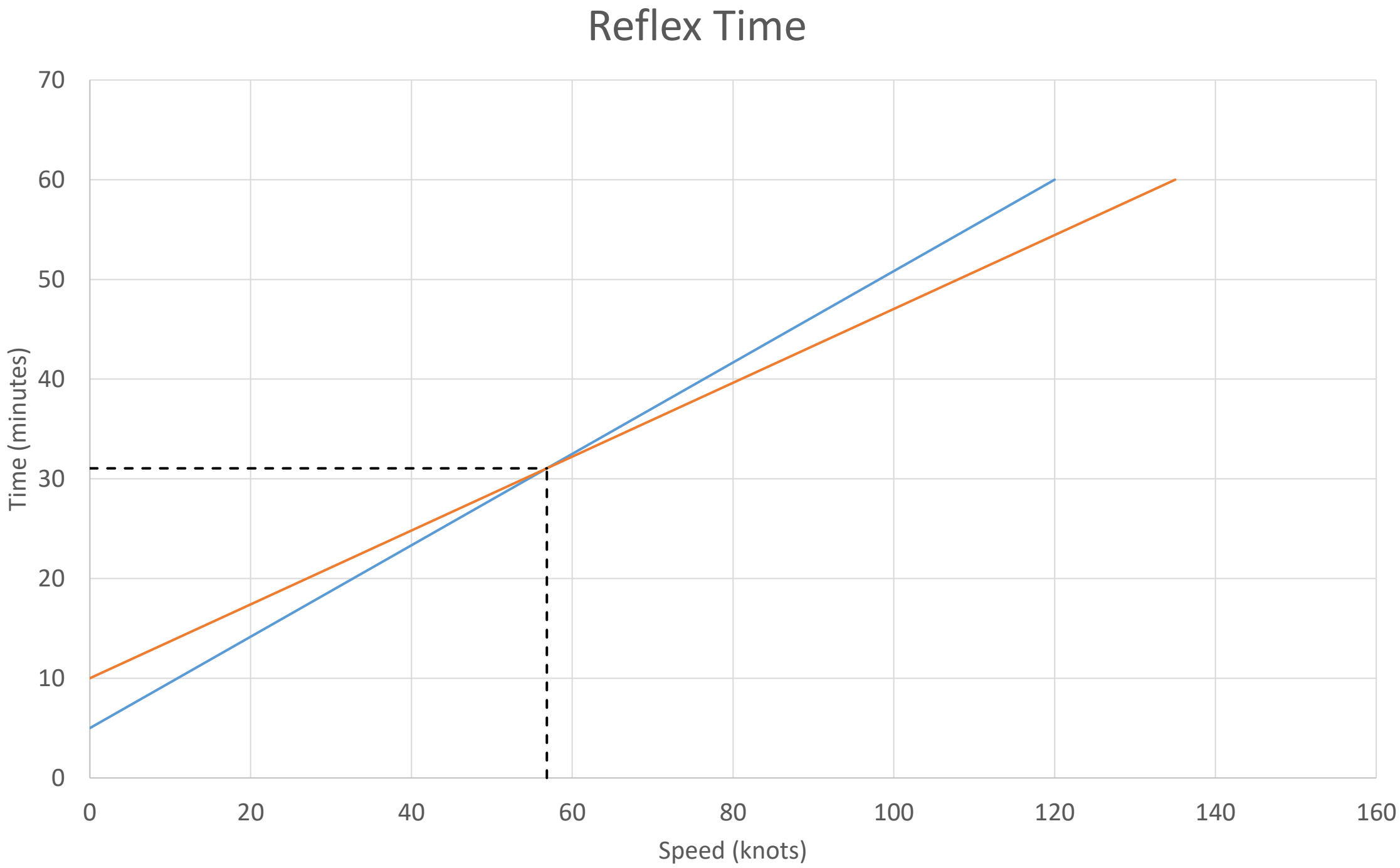
Fixed wing 1970s



Figure 8 - The blessing of VH-STO, the first Chieftain acquired by the St John Ambulance in December 1976. Left to right: Dr Fred Gilligan, the RAH's ICU Head is at the microphone; Phil Ferrier; pilot Barry Clifford; Bishop T.T. Reed, the St John

Rotary Wing
1980s




Reflex Time
70
60
50
40
30
20
10
0
Time (minutes)
0
20
40
60
80
100
120
140
160
Speed (knots)

SAFETY

Loss of control (LOC) occurs when an aircraft unintentionally departs from controlled flight, often leading to accidents if not promptly corrected.

Common Causes
Pilot- or human-induced factors include improper handling, spatial disorientation, distraction, complacency, or attempting manoeuvres beyond the aircraft's capabilities Wikipedia+1.

Environmentally-induced factors involve turbulence, wind shear, icing, or unexpected weather conditions Federal Aviation Administration+1.

Systems-induced factors include mechanical failures such as engine malfunctions, structural damage, or loss of critical flight instruments SKYbrary Aviation Safety.

SAFETY

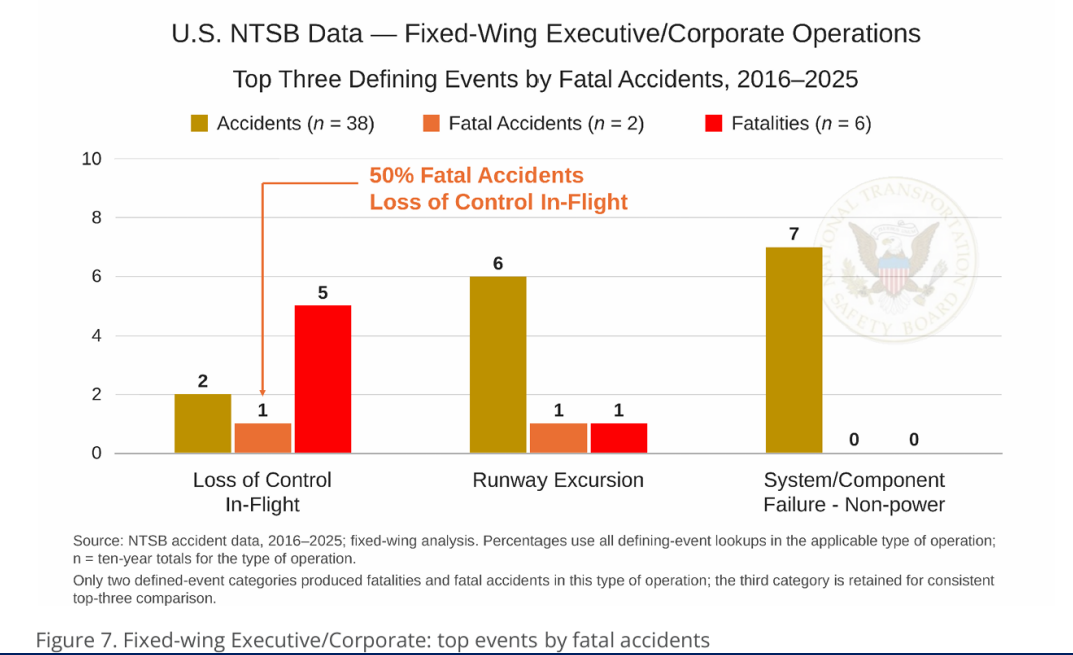
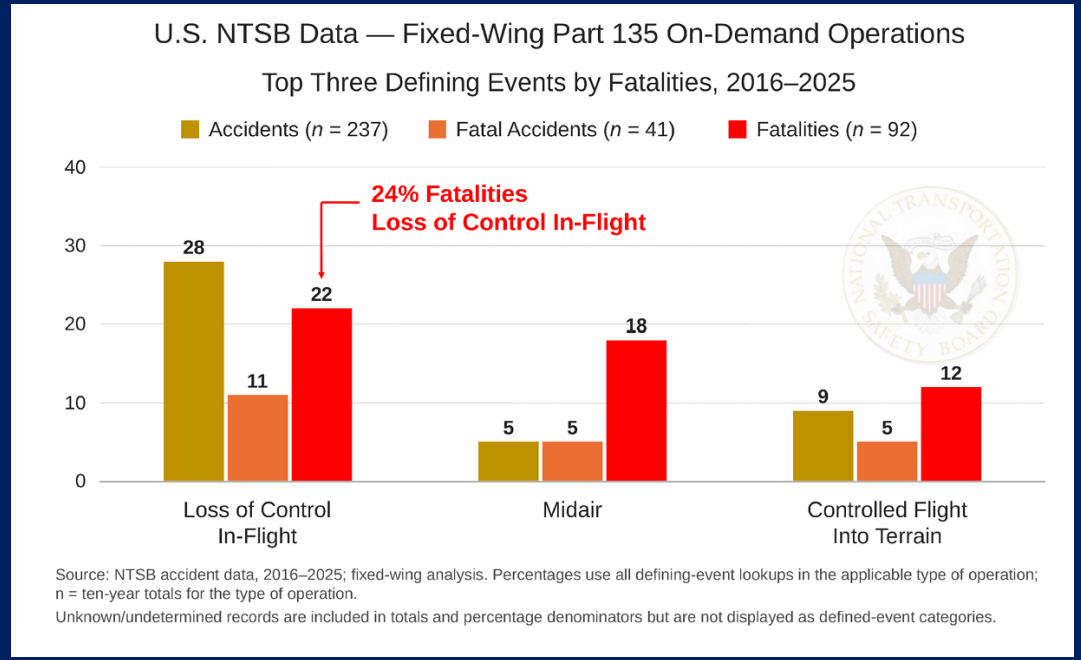
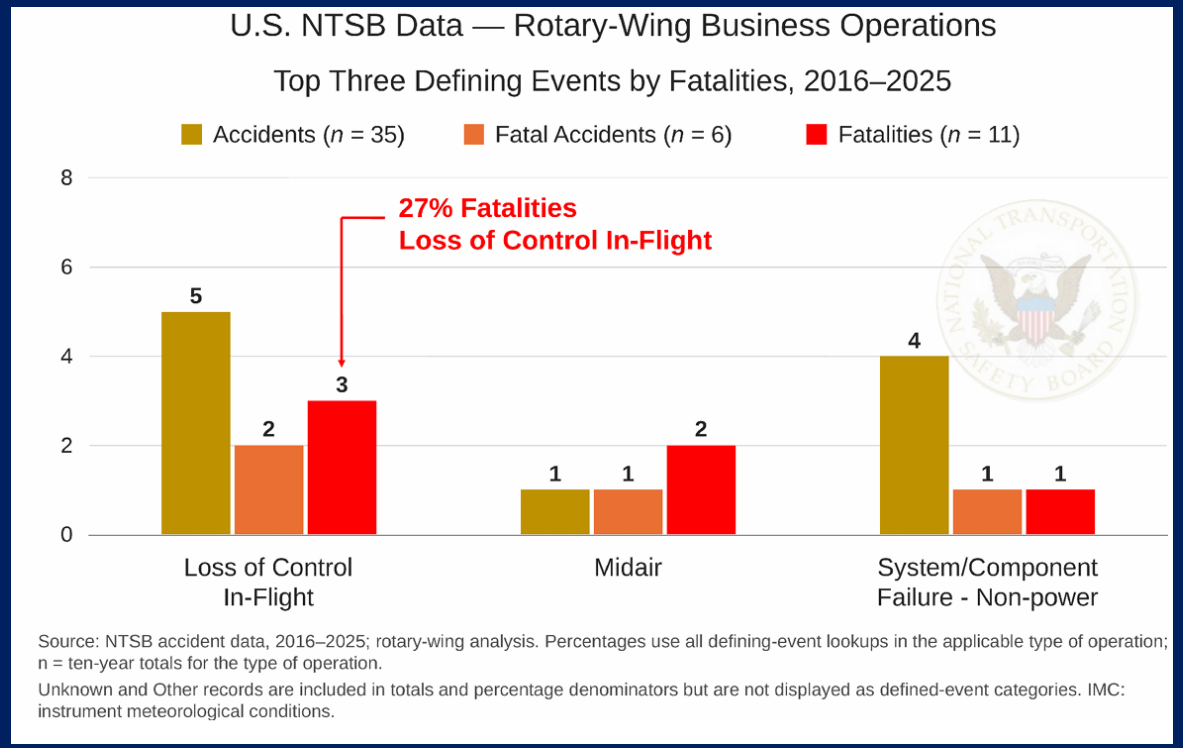
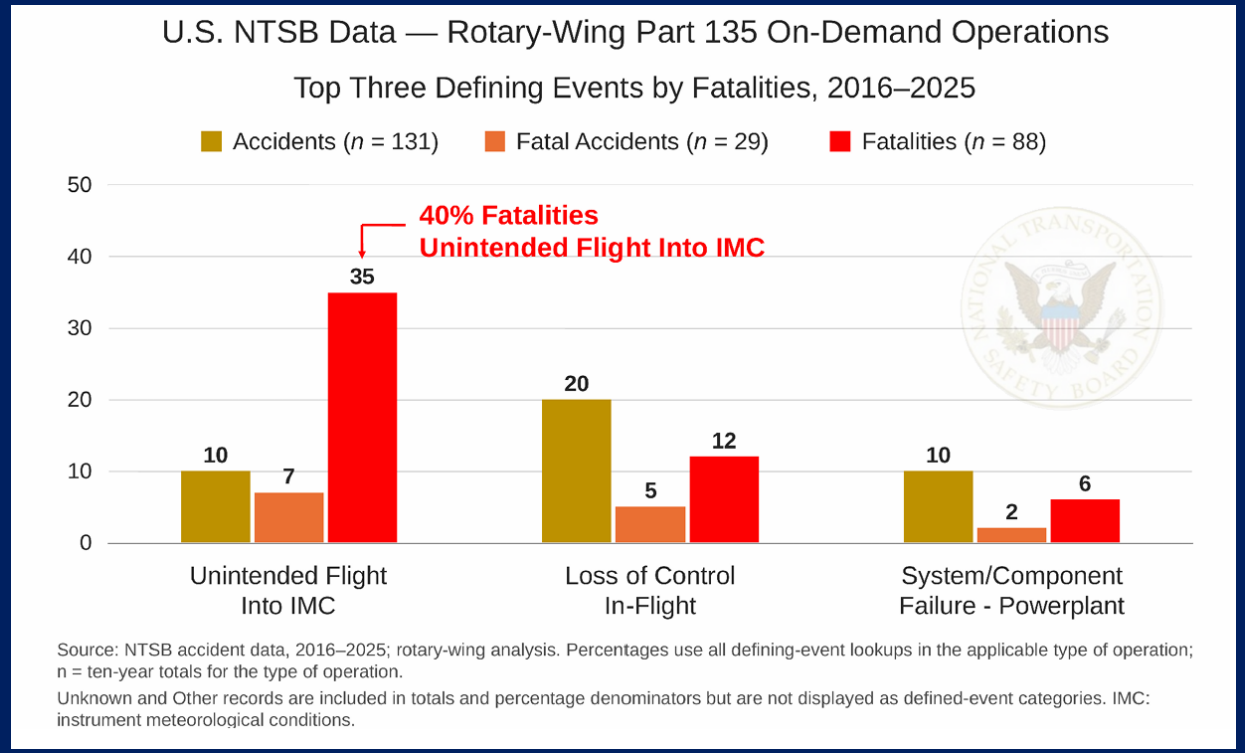


Figure 7. Fixed-wing Executive/Corporate: top events by fatal accidents

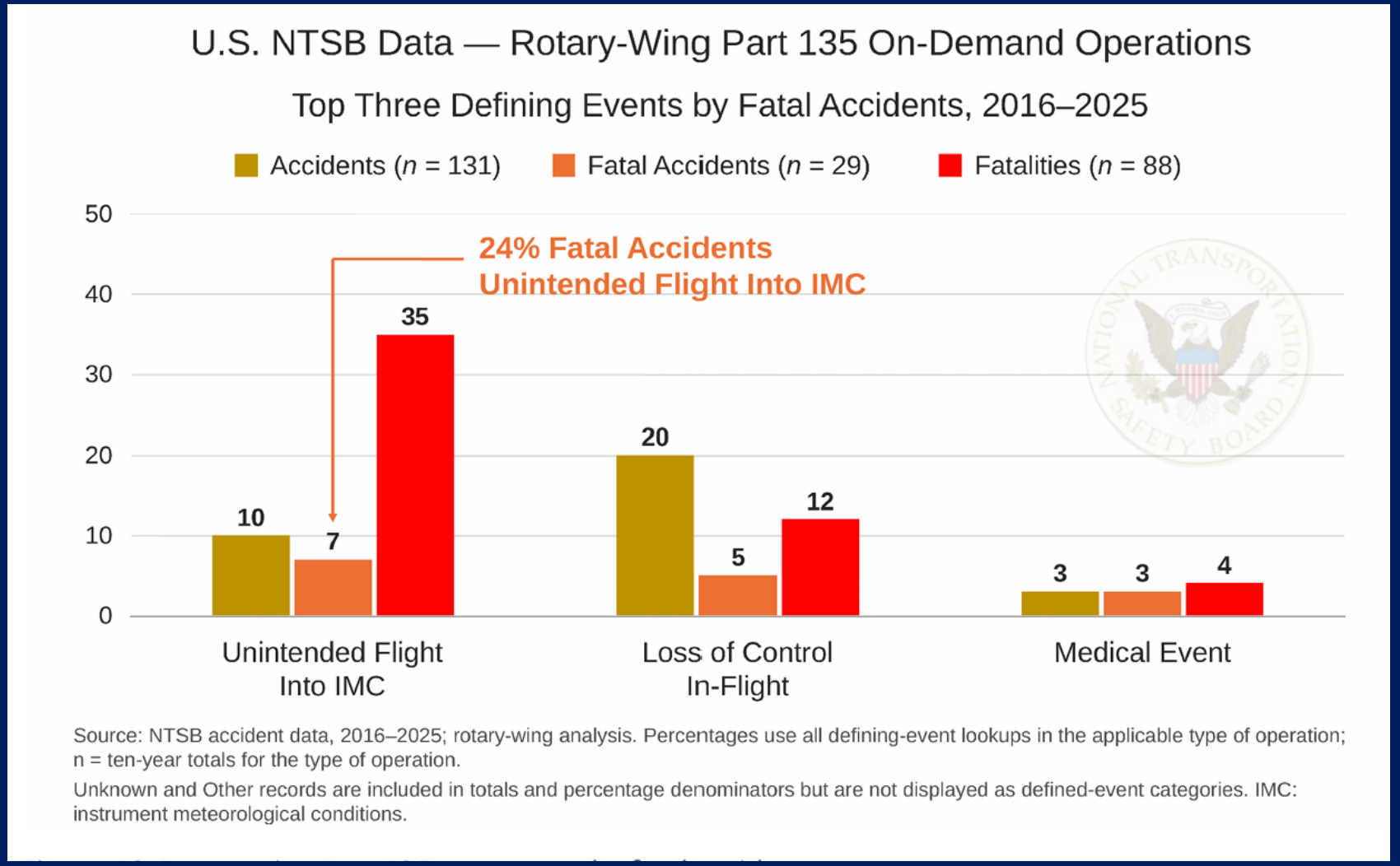


SAFETY


U.S. NTSB Data — Rotary-Wing Business Operations
Top Three Defining Events by Fatalities, 2016–2025
Accidents (n = 35)
Fatal Accidents (n = 6)
Fatalities (n = 11)
27% Fatalities
Loss of Control In-Flight
8
6
4
2
0
5
2
3
1
1
2
4
1
1
Loss of Control In-Flight
Midair
System/Component Failure - Non-power
Source: NTSB accident data, 2016–2025; rotary-wing analysis. Percentages use all defining-event lookups in the applicable type of operation; n = ten-year totals for the type of operation.
Unknown and Other records are included in totals and percentage denominators but are not displayed as defined-event categories. IMC: instrument meteorological conditions.


U.S. NTSB Data — Rotary-Wing Part 135 On-Demand Operations
Top Three Defining Events by Fatalities, 2016–2025
Accidents (n = 131)
Fatal Accidents (n = 29)
Fatalities (n = 88)
40% Fatalities
Unintended Flight Into IMC
50
40
30
20
10
0
10
7
35
20
5
12
10
2
6
Unintended Flight Into IMC
Loss of Control In-Flight
System/Component Failure - Powerplant
Source: NTSB accident data, 2016–2025; rotary-wing analysis. Percentages use all defining-event lookups in the applicable type of operation; n = ten-year totals for the type of operation.
Unknown and Other records are included in totals and percentage denominators but are not displayed as defined-event categories. IMC: instrument meteorological conditions.

SAFETY


U.S. NTSB Data — Rotary-Wing Part 135 On-Demand Operations
Top Three Defining Events by Fatal Accidents, 2016–2025
Accidents (n = 131)
Fatal Accidents (n = 29)
Fatalities (n = 88)
50
40
30
20
10
0
24% Fatal Accidents
Unintended Flight Into IMC
10
7
35
20
5
12
3
3
4
Unintended Flight Into IMC
Loss of Control In-Flight
Medical Event
Source: NTSB accident data, 2016–2025; rotary-wing analysis. Percentages use all defining-event lookups in the applicable type of operation; n = ten-year totals for the type of operation.
Unknown and Other records are included in totals and percentage denominators but are not displayed as defined-event categories. IMC: instrument meteorological conditions.

SAFETY



Global aerospace news

SAFETY



S-70UAS U-HAWK, Picture Lockheed Martin

Future power systems



Aircraft's MDA1 eViator all-electric regional airliner

Future power systems
(the sky is not the limit)

USS Enterprise – Ion drive



Future power systems
(the sky is not the limit)

USS Enterprise – Ion drive

Positively charged Xenon ions forced through an electrically charged field produces a lot of momentum.

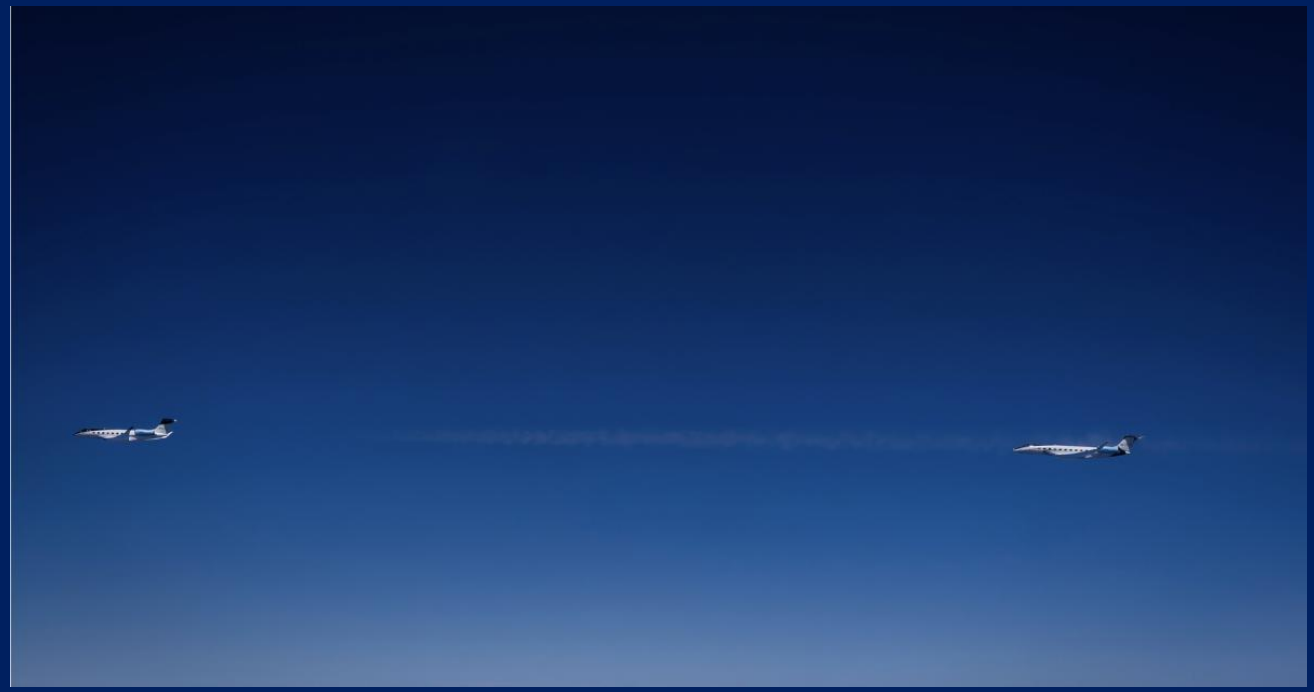


Future power systems Sustainable Aviation Fuel (SAF)

agricultural crops and waste, animal fats and vegetable oils

between 60 and 100 per cent reduction in harmful emissions compared to normal jet fuels

CSIRO



Gulfstream 700 flying lab, follows a G800 to measure emissions comparing Jet A and SAF.
Photo Gulfstream

Future power systems



Picture Helitrader

Airbus calculated 30 minutes hovering in a H125 required the following amount of fuel.

1. 200kg Jet A
2. 250 kg Hydrogen
3. The fully electric version required an 8-ton battery

Future power systems



Hybrid – turbine generators

Pros

1. Fuel savings of up to 40%
2. Readily available technology
3. Refuel services already in place
4. Increased performance
5. Possibly less maintenance

Future power systems



Hybrid – turbine generators

Cons

1. Increased Electromechanical interference / Electromagnetic interference

Future power systems

Hydrogen ions passed through a polymer exchange membrane the charged ions provide your electrical power.

The residue is mixed with Oxygen; the discharge is water.

Loading systems



Loading systems



Loading systems



Loading systems

Stretcher loading was manual handling (for a KA 90 up to 6 people.
Hydraulic platforms located at selected airports.
Internal hoist.

The manual loading of low aircraft was quick less than 15 minutes for two routine stretcher cases

Loading systems

We now have very complex loading systems that have reduced manual handling

Loading systems



Future aircraft



Artist's impression of Airbus Flightlab A321 aircraft carrying Wing of Tomorrow branding, of the type expected to support Airbus' wing research flight test campaigns (Image: Airbus)

Future aircraft



Rotorcraft

blem
imized
itionally
eeds

ER, US NAVY

76 is intended to be a proof-
gy demonstrator, and its
seeks to validate
es and integrated concepts
o different-sized

would be
t
ant
ng off,
g in austere
n

technology challenge is creating a
ces two opposed aerodynamic
red lift required for vertical take-off
e wing-borne lift needed for efficient,
flight. This is a DARPA-hard problem
imized for hovering are traditionally
peeds, and vice versa," he adds.

RMANCE

gy Bell's X-76 requires brings the need
to validation.
moves into fabrication and flight
ll shift from concept validation to
performance of the integrated
ultimately be measured not just by
bility, but by the ability to validate
chnologies applicable to future
" says Higgins.
challenges as the next step, drawing

incorporated numerous lessons from the Osprey into the design of the X-76. The most visible change is moving the engines from the rotating pylons, as on the V-22, to the center fuselage. Even highly detailed changes within the drive-system components have been incorporated, all expected to benefit the manufacturing, production, assembly and testing of the X-76."

With such a new concept, Higgins continues: "The program is designing and building around system integration labs to reduce the risk of the key enabling flight hardware and software technologies before flight test. There are inherent risks in trying something new, and the system integration labs help to increase confidence that the key enabling technologies will operate as expected in their intended environment."

TACKLING TRANSITION

As with all tiltrotor concepts, the transition phase is the most critical. During the Osprey's development, losses

"Bell's concept uses rotors where they are most effective – during take-off, landing, hover and low speed flight – and then removes them from the airstream for high-speed cruise"

CMDR. IAN HIGGINS, SPRINT PROGRAM MANAGER, US NAVY

1

accelerates, lift shifts from the rotors to the wing, and propulsion changes from rotor-driven thrust to a jet or turbofan system. The rotors must be slowed, stopped and folded while maintaining vehicle stability and staying within component load limits.

"The process is reversed during the transition from high speed to vertical flight. It requires tightly integrated flight controls, propulsion and structural design to ensure a smooth, safe transition between the aircraft's

2

55 years of helicopters

- Hiller 1100
- Bell Jet Ranger
- Squirrel
- Bell Long Ranger
- Hughes 500
- Bell 212
- Sikorsky S76
- Dauphin
- Bell 412
- Dauphine 365
- BK 117
- Bell 222
- Leonardo 139



101st Airborne Division Soldiers are loaded on to a UH-1 during Operation Apache Snow , May 1969

65 years of fixed wing

- Drover DHA-3
- Aerocommander Shrike
- Cessna 401, 402
- Cessna 441
- Nomad N22
- Beech Queen Air
- Piper Navajo
- Piper Chieftain
- Mitsubishi MU2
- King Air 90
- King Air 200
- King Air 300
- PC 12
- Hawker 800
- PC 24



A rendering of the Hynaero Fregate-F100 amphibious water bomber, which Hynaero and Leonardo will collaborate on (Image: Hynaero)

Am I being silly thinking it is about time there was a fixed wing air ambulance developed?

Thank you

This presentation was made carbon neutral by carbon offsets gained when the author restrained from chilli con carne for a period of 6 weeks.