



Helicopter Risk Mitigation

International
Association of
Oil and Gas
Producers



Presentation to the European Rotorcraft Forum, 12 September 2006
By Bob Sheffield, representing OGP's Aviation Subcommittee

Overview

- The current problem and the goal for improvement
- What's been proven already
- What remains to achieve the goal
- Justifying the necessary risk mitigation measures
- Conclusions and summing up



Three Main Points

- The risk of flying in a helicopter is an order of magnitude greater than in an airliner– **we have a problem**
 - Helicopter safety can be improved significantly – **we can fix it:**
 - Proven risk mitigations are available for helicopters.
 - We need new helicopters built to the latest design standards.
 - To be effective at lowest possible cost requires a combined effort from:
 - Regulators
 - Manufacturers
 - Operators
 - Their customers
- we need your help**



Cooperation is Key

- The best safety records come from those operations where either regulatory oversight or corporate care is highest.
- Corporate care is more expensive and less effective when the operators serve customers with different standards.
- If everyone in the industry (manufacturers, operators, regulators, and their customers) works together to implement the known, cost-effective solutions, these risk mitigations will be more effective and less costly.



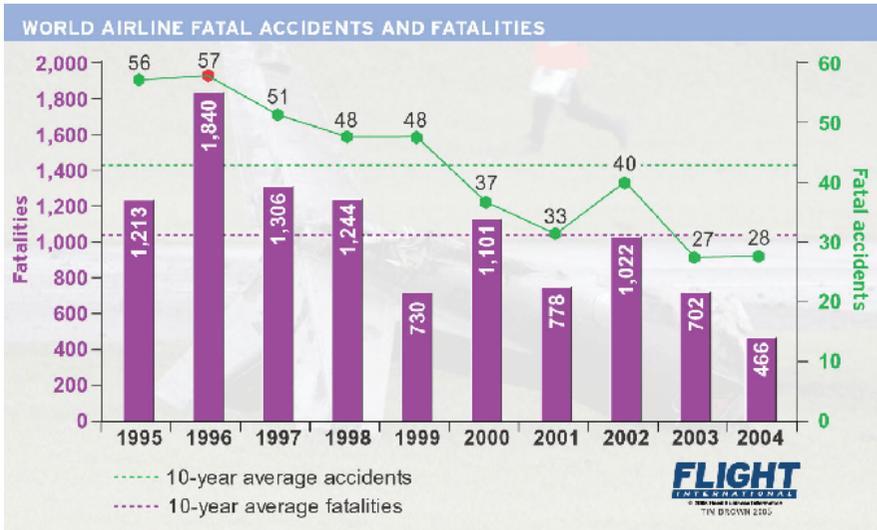
Oversight and Air Safety Performance Currently Vary Greatly with the Type of Operation

Fatal Accidents/million hrs

- Commercial airline 0.6
- Commuter airline 2.0
- Offshore helicopter transportation 6.4
- Helicopter support for seismic operations 23.0

... and across operators within a given type of operation

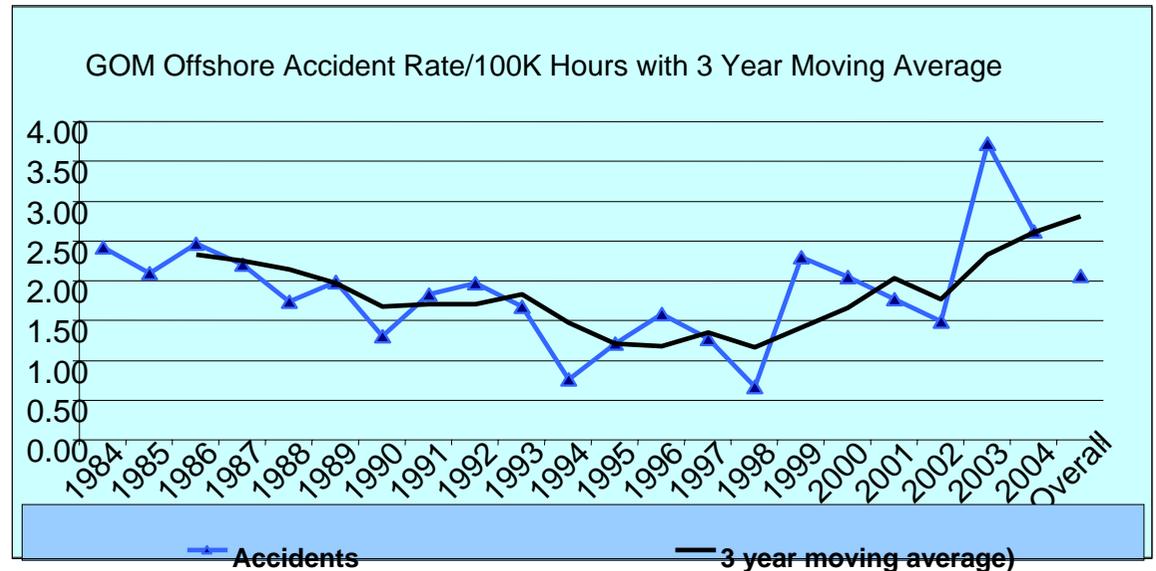




While airline safety trends are improving,

Helicopter safety trends are getting worse.

We know we have a problem, and we are confident that we know how to fix it.



While this chart shows helicopter accident rates for the U.S. Gulf of Mexico (GOM) the same trend holds worldwide – the rate is getting worse.



Opportunities for Safety Improvements

- The airline industry has made significant improvements in its safety record over the last 30 yrs through the introduction of:
 - Damage tolerant design; system redundancy; improved reliability/crashworthiness
 - Modern flight simulators
 - Engine and vibration monitoring systems to identify incipient failures
 - Safety Management Systems and Quality Assurance to reduce human errors
 - Flight data monitoring programs (FOQA)
 - Disciplined take-off and landing profiles (e.g. stabilised approach)
 - EGPWS/TAWS; TCAS
- All of these are available today for helicopter operations and are being implemented in some parts of the helicopter industry.
- However some helicopter industry segments have adopted few of these measures.
- We need to apply all these risk reduction measures to all helicopter operations.



The Helicopter Safety Goal

- OGP Safety Commitment: “The individual risk per period of flying exposure for an individual flying on OGP contracted business should be no greater than on the average global airline.”
- This goal coincides with IHST’s goal of reducing the current helicopter accident rate by 80%.
- This presentation will show you how this goal can be achieved.



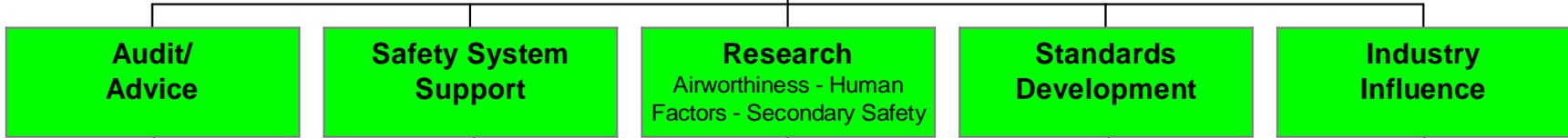
Overview

- The current problem and the goal for improvement
- [What's been proven already](#)
- What remains to achieve the goal
- Justifying the necessary risk mitigation measures
- Conclusions and summing up

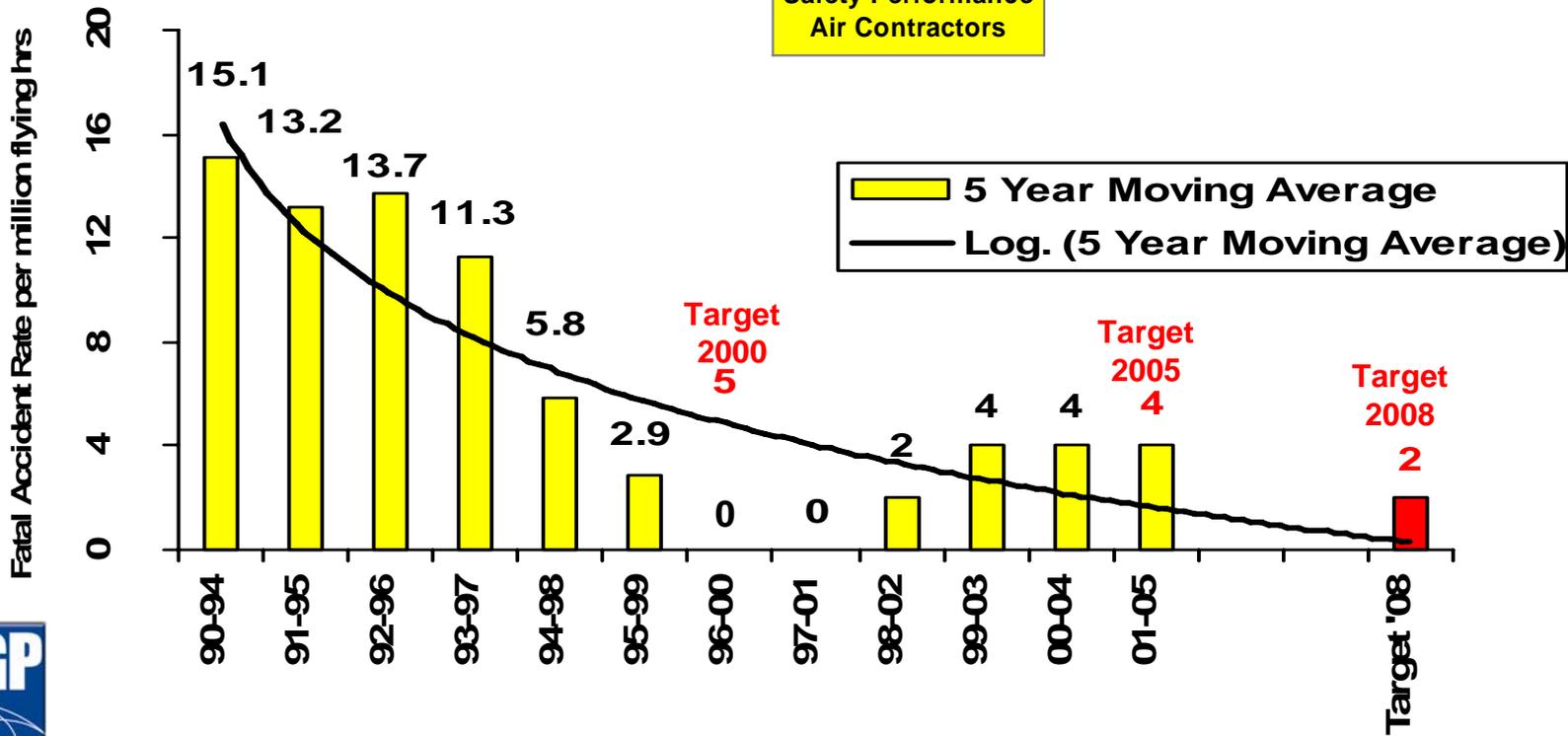


Resultant Shell Fatal Accident Rate

STRATEGIC SAFETY TARGETS



Safety Performance Air Contractors

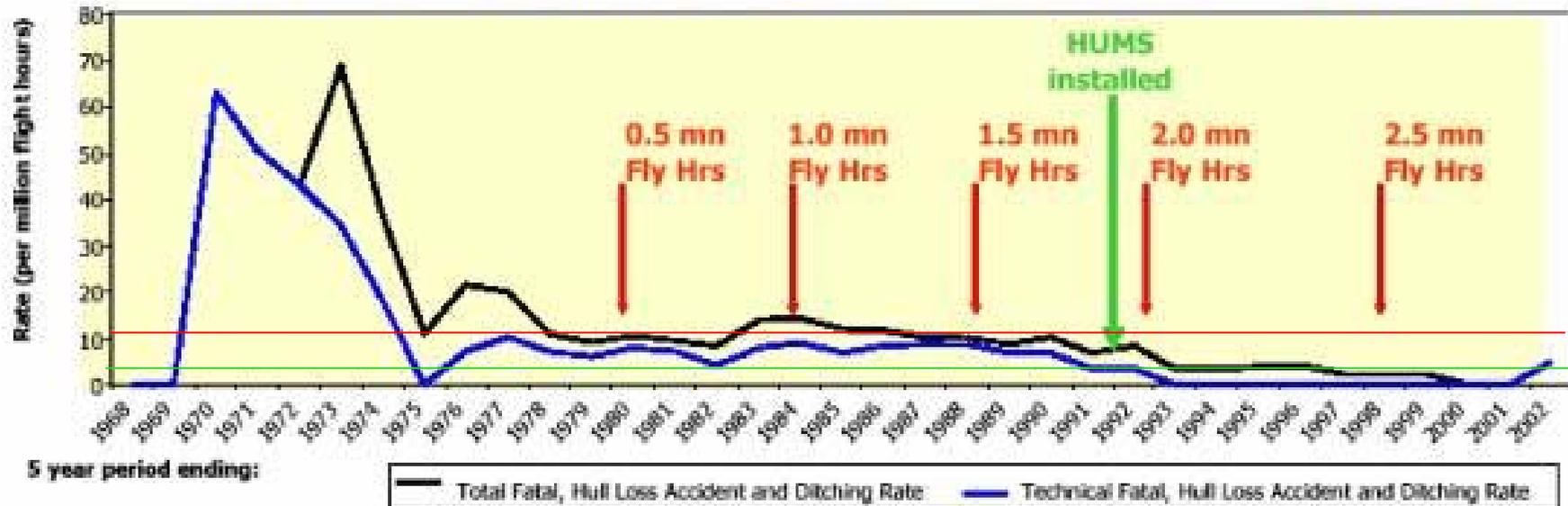




The Influence Of HUMS

UK Public Transport Helicopters > 3175kg MTWA

Fatal, Hull Loss Accident and Ditching Rate (5 year moving average)



>10
~ 2



Overview

- The current problem and the goal for improvement
- What's been proven already
- **What remains to achieve the goal**
- Justifying the necessary risk mitigation measures
- Conclusions and summing up



Shell Aircraft Analysed Accident Data to Evaluate Potential Risk Mitigations

- OGP published data on offshore accidents – GOM and Worldwide
- NASA/TM – 2000-209579 – US Civil Helicopter Accidents 1963 – 1997
- Individual NTSB/AAIB Accident Reports
- Annual Business Turbine Accident Review 1993 through 2003 – Breiling Associates
- Design Reviews
- FAA Final Rules – 14CFR Parts 27 and 29 and associated NPRMs
 - Amendments 12 through 47 (Part 29)
 - Amendments 11 though 40 (Part 27)
- Type Certificate Data Sheets for offshore helicopters
- Design certification reviews with Sikorsky and Eurocopter specialists on S76 and AS332
- CAA Paper 2003/1 – Helicopter Tail Rotor Failures
- UKCAA MORs for S76 and AS332
- SINTEF Helicopter Safety Study 2 – Dec 99



In Sum - What Have We Learned?

- Essential Pre-requisites for Safe Operations
 - Safety culture supported by Quality and Safety Management systems
- Equipment fit
 - Appropriate to the operation
 - HUMS/EGPWS/TCAS and cabin egress modifications
- Pilot procedures
 - Helicopter Flight Data Monitoring (HFDM, also known as HOMP or FOQA)
 - Flight simulator training in LOFT scenarios emphasising CRM
 - Helideck performance profiles
- Helideck management
 - Helicopter Landing Officer and Helideck Assistant training
 - Helideck procedures
- System failure management
 - HUMS/VHM/EVMS
 - Engine monitoring
 - Flight Simulator training
- Human error in maintenance
 - Human factors training
 - Duplicate inspections/RIIs
 - HUMS/VHM/EVMS



All these items are addressed in OGP's Aircraft Management Guide, and will mitigate risk, but they are unlikely to achieve the long term safety goal.

All But The Latest Helicopters Have Significant Design Gaps

- ***“Most important issues would be to improve helicopter design and continuous airworthiness” - SINTEF***
- ***“The evidence that tail rotors were ... not meeting the spirit of airworthiness requirements, was stark and compelling” – UK CAA***
- ***“ ..This means that the helicopter is not considered airworthy without HUMS installed and in function.” – Norwegian Committee for Review of Helicopter Safety***
- Typical aircraft in common use today - AS-332 Super Puma, Bell 412, and S-76 were designed to requirements that are now over 25 years old
- Latest design requirements offer:
 - Improved performance with one engine inoperative
 - Redundant systems with flaw tolerance
 - Fail safe designs
 - Digital flight management systems to reduce pilot workload, improve situational awareness, and help cope with emergencies
 - Crashworthy airframe, fuel cells, and passenger/crew seats



New Types



EC 135



Agusta Bell 139



Sikorsky S92



EC 225

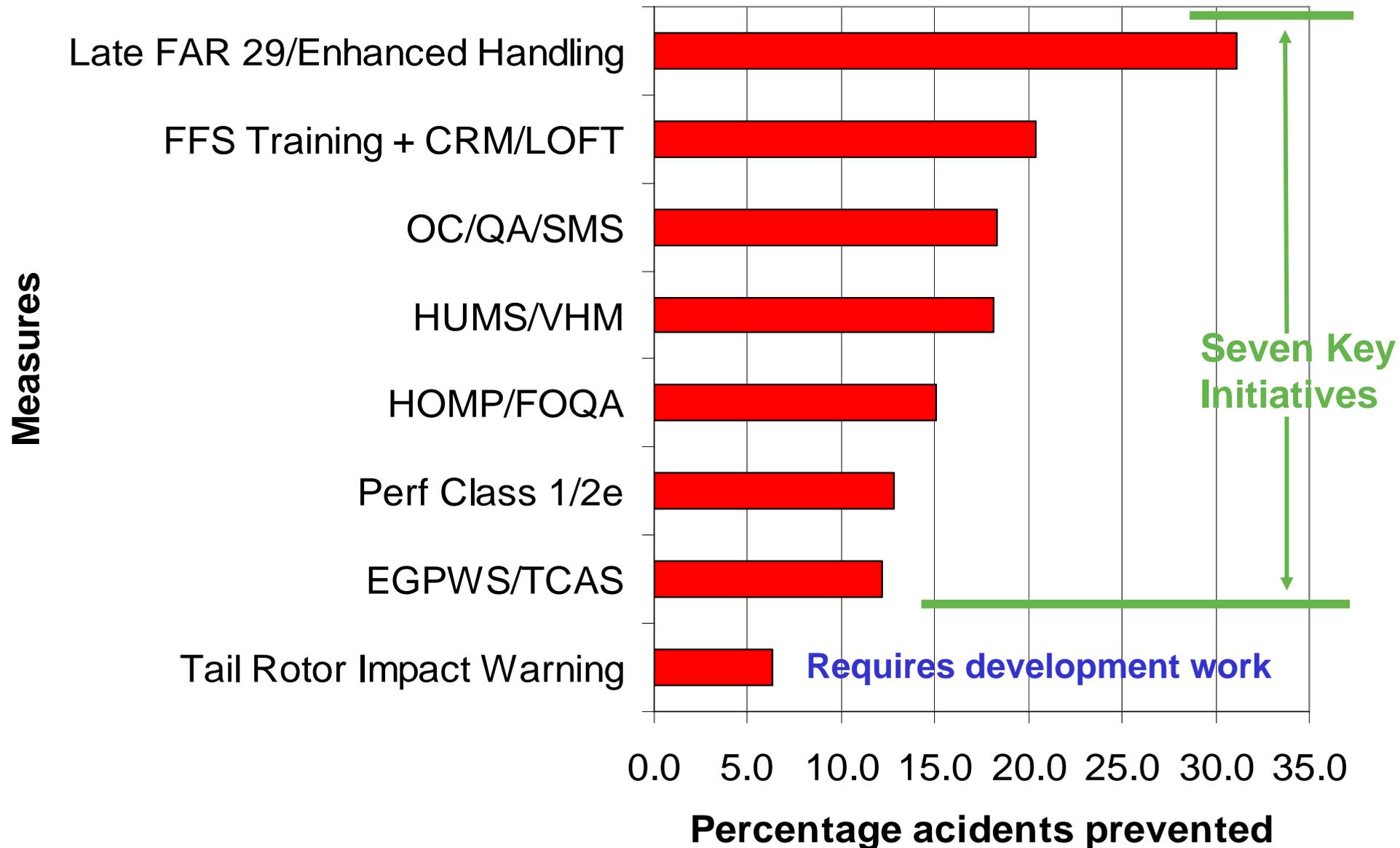


Overview

- The current problem and the goal for improvement
- What's been proven already
- What remains to achieve the goal
- Justifying the necessary risk mitigation measures
- Conclusions and summing up



Percentage of Accidents Reported in NASA Study Preventable by Individual Mitigation Measures



Risk Mitigation Options

OPTION A – Baseline NASA

FAR Part 135/Part 91 Twin Engine –
early FAR 29

OPTION B – Typical global offshore (OGP)

Baseline/early FAR 29 + **Limited
SMS/QA and Ops Controls + part
HUMS + CRM, part simulator, LOFT**

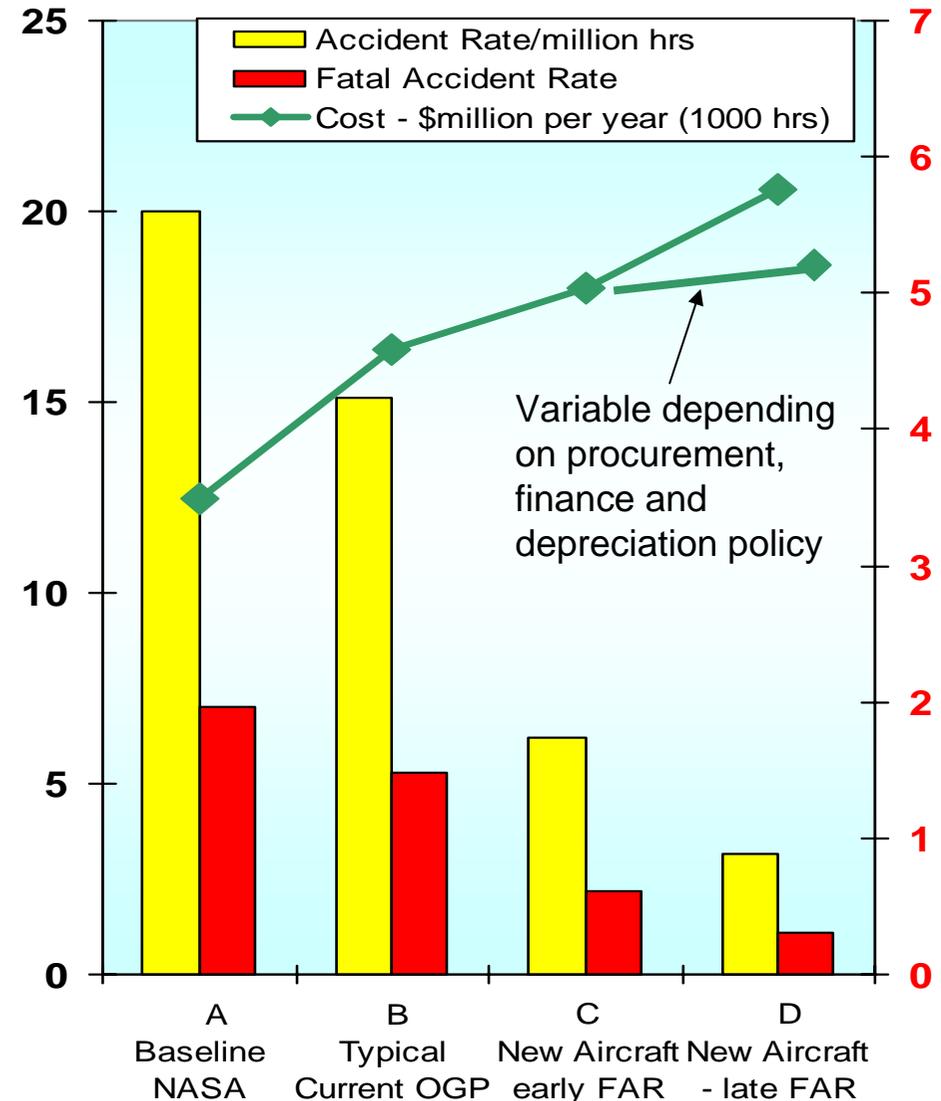
OPTION C – New aircraft – early/mid FAR

Option B + **full SMS/QA + full HUMS +
full simulator training + Perf Class
2 + HOMP + TCAS/EGPWS**

OPTION D - New aircraft - late FAR 29

Option C + **enhanced cockpit/HQ +
enhanced Perf Class 2/Class 1 +
Impact Warning System**

Cost assumes no action taken to
reduce costs through efficiencies; e.g.,
smart procurement, higher utilisation,
sharing etc



Overview

- The current problem and the goal for improvement
- What's been proven already
- What remains to achieve the goal
- Justifying the necessary risk mitigation measures
- Conclusions and summing up



How To Achieve the Air Safety Goal

- Customers must commit to the goal and contract for higher standards.
- Manufacturers must support HUMS/VHM/EVMS, the latest design standards (FAR 29 - 47) and provide affordable solutions for legacy aircraft.
- Operators must adopt proven global best practices as their minimum standard
- Regulators must support proven global best practices.
- All stakeholders must support these initiatives:
 - Transition to new aircraft built to the latest design standards on new contracts.
 - Require annual training in flight simulators to practice crew coordination during emergency procedures.
 - Equip all helicopters with Vibration & Health and Engine Monitoring Systems such as HUMS/VHM/EVMS
 - Require operators to implement quality and safety management systems.
 - Require operators to implement HFDM (HOMP).
 - Require operators to fly profiles that minimize the risks of engine failure.
 - Equip all helicopters with EGPWS/TAWS (or AVAD) and TCAS/ACAS



We have many imperatives to make these improvements!

- Respect for people – the disparity between helicopter safety and airline safety



- ALARP – we know what can be done and that the cost is not disproportionate to the benefits to be gained
- The Ford Pinto story
- The “Red Face” test
- Good business sense – safer operations will attract more customers.

Here Is The Difference the OGP Can Make

- **10 year accident record for offshore helicopter operations**
 - Fatal accident rate – 6.4 per 1 million hrs
 - 51 fatal accidents
 - 250 fatalities
- **10 year accident record for offshore helicopter operations**
 - Fatal accident rate – 2.0 per 1 million hrs – **Average commuter airline and North Sea**
 - 18 fatal accidents **helicopters**
 - 78 fatalities **Lives saved - 172**
- **10 year accident record for offshore helicopter operations**
 - Fatal accident rate – 1.0 per 1 million hrs – **Average global airline***
 - 9 fatal accidents
 - 39 fatalities **Lives saved - 211**



- Please join the IHST and contribute your knowledge and data to the process.
- Help us “raise the bar” for all helicopter operators.
 - Helicopter operators who want to make these improvements suffer from competition from the low cost operators who barely meet standards.
 - Make the best risk reduction measures more affordable.
- Support IHST goal of reducing helicopter accidents by 80% and by implementing the risk reduction measures featured in this presentation.



Questions?



To Learn More

- about the OGP Position on Helicopter Safety
- and Shell Aircraft's Research on Helicopter Risk Mitigation
- go to Mark Stevens presentation

