

# Implementing and monitoring effective risk mitigations

Cologne 12th february





# Introduction



# Facts about Norway



**284 registered  
helicopters in  
Norway**

**4**

**Operators with approval  
for offshore operations**

**AOC**

**16 AOC`s related  
to helicopter ops**



**2 operators sharing the  
Oil & Gas market  
CHC & Bristow**

# Activities on the continental shelf



**Bristow Norway  
operates 24 S92  
helicopters including  
4 SAR**



**45 000 flight hours  
offshore, Bristow  
Norway alone  
produce 30 000 hrs**



Implementing and monitoring effective risk mitigations

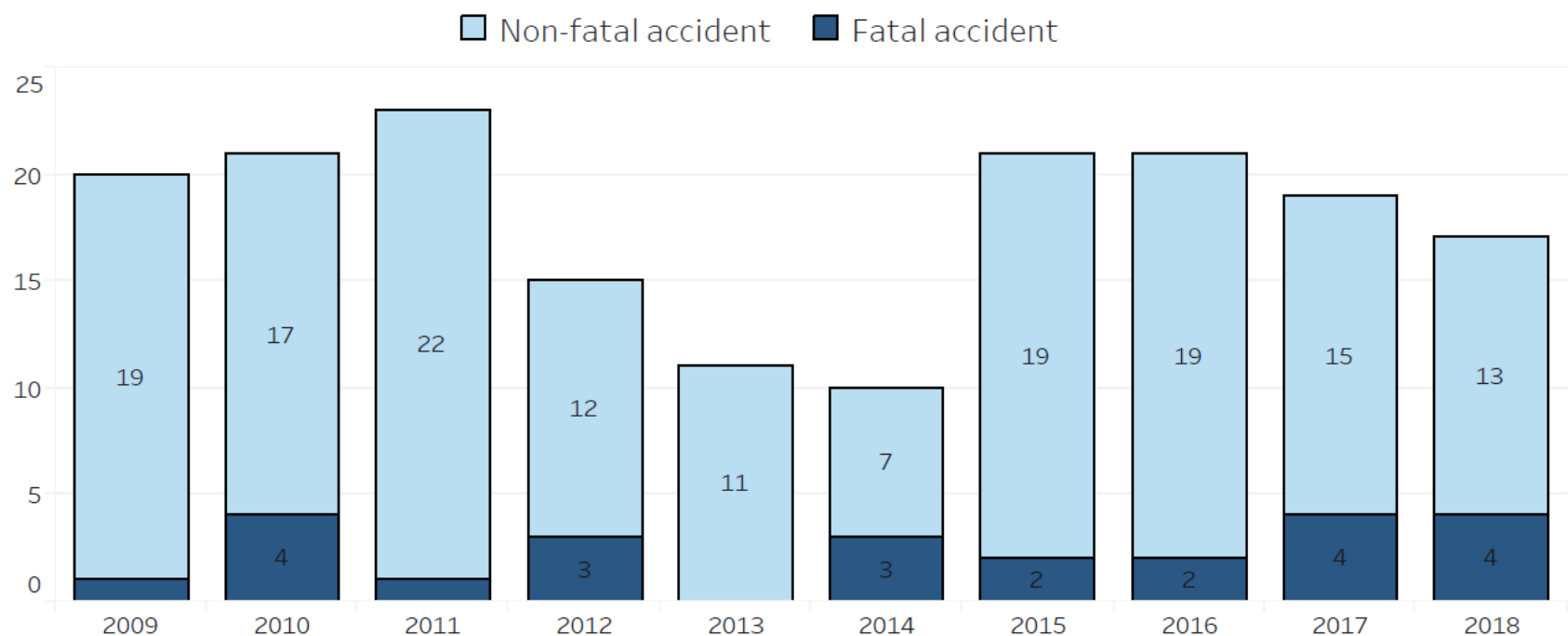




# Aviation accident statistics for Norway

## Accidents

An occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight until all such persons have disembarked, where a person is fatally or seriously injured, the aircraft sustains damage or structural failure or the aircraft is missing or is completely inaccessible



Source: Norwegian CAA

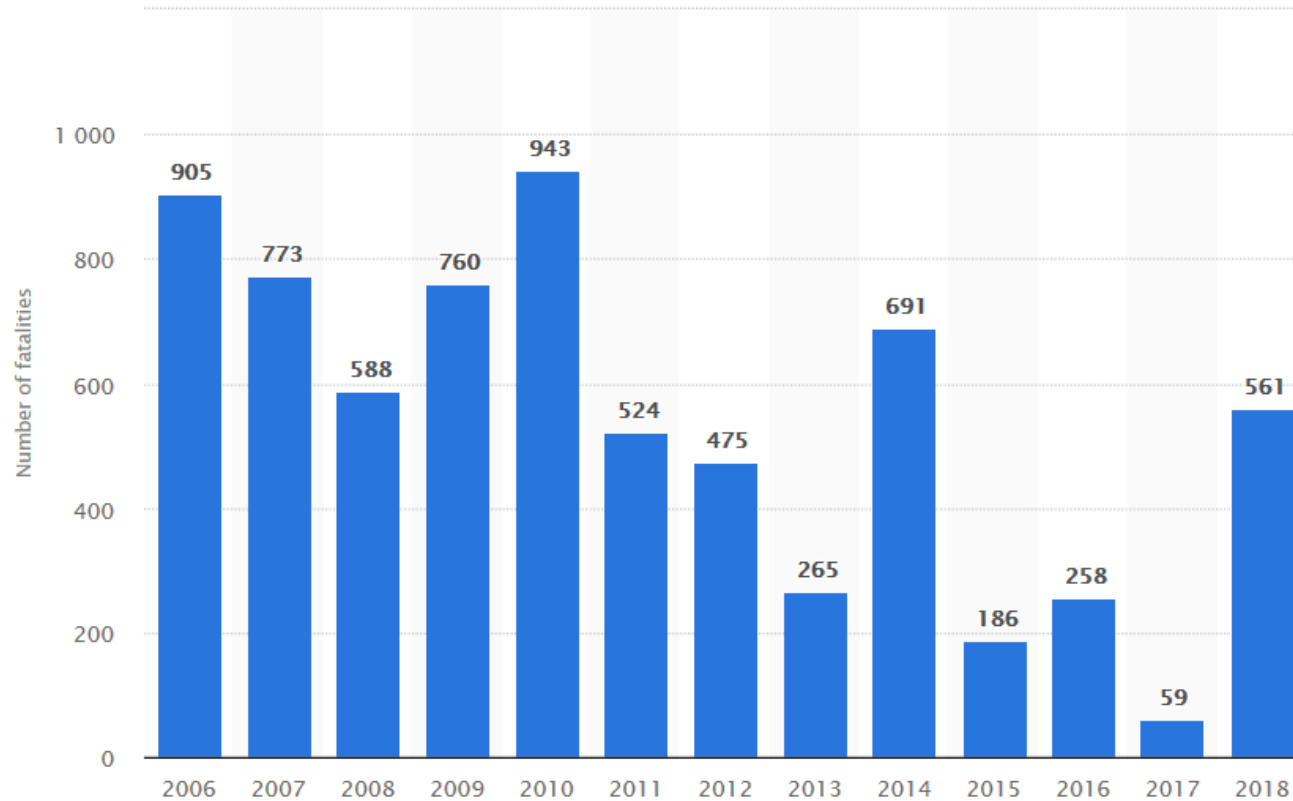
# Offshore helicopter accident statistics for Norway

Incidents	445	623	533	409	509	533	529	272	246	260
Serious Incidents	1	1	0	1	0	0	0	0	0	0
Accidents	0	0	0	0	0	0	0	2	0	0
Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018

Source: Norwegian CAA

# Global Aviation accident statistics

## Number of worldwide air traffic\* fatalities from 2006 to 2018

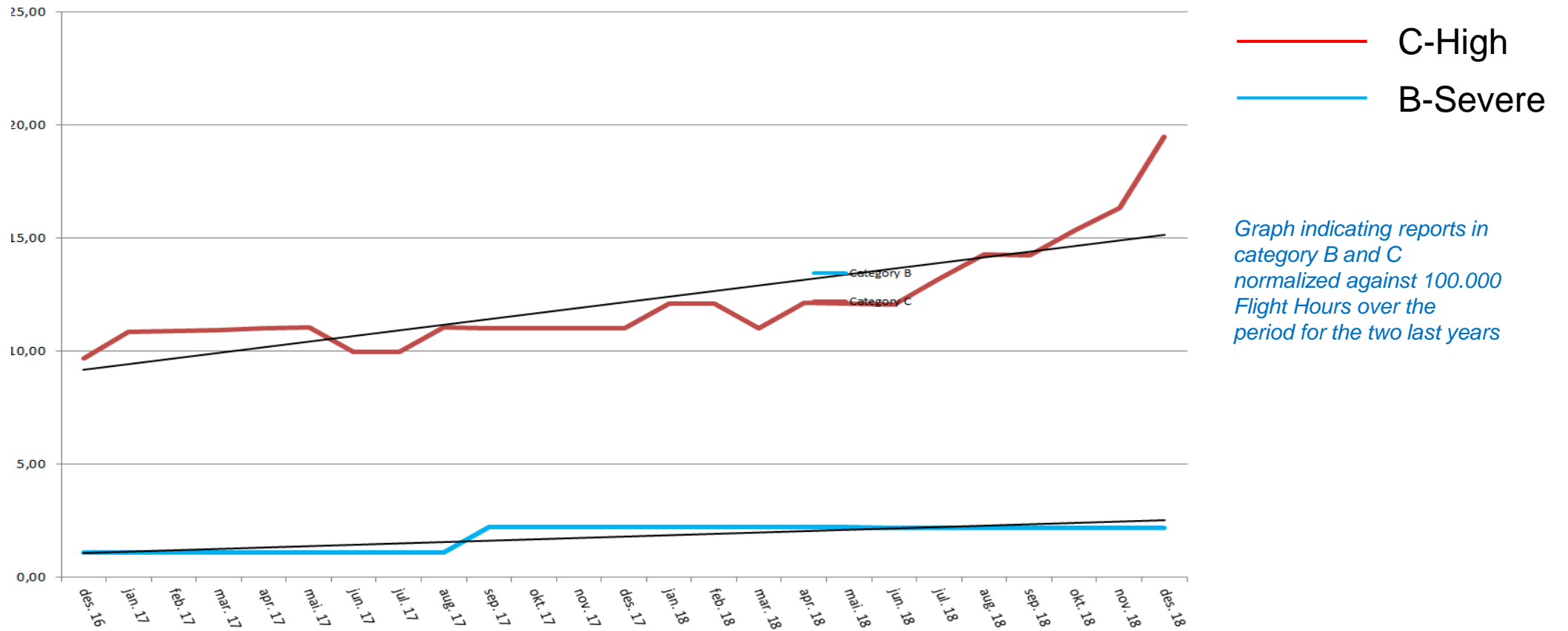


Source: Statista 2019



# Bristow Norway events with high risk factors

Air safety severity trends based on reported incidents over the period of last 2 years



# Reporting statistics

## Healthy reporting culture

Total number of safety reports in Sentinel 2018: **680**

	2015	2016	2017	2018 Target	Q1	Q2	Q3	Q4	YTD	COMMENTS
TRIR– Incidents / 200,000 hrs for Bristow – Norway activities	0,00	0,25	0,73	0	0,51	0.63	0,74	0,69	0,69	Positive trend
<u>Air Safety Reports – No. of Reports</u>	376	288	325	MONITOR	90	85	87	104	366	Trends reveal events with higher risk rating then we have seen in previous Q's
Incident category A - cathastropic	0	0	0	0	0	0	0	0	0	
Incident category B - hazardous	0	1	0	0	0	0	0	0	0	
Incident category C - major	1	3	5	<5	1	3	0	5	9	
<u>Ground Occurrence Reports- No of Reports</u>	87	81	107	MONITOR	27	20	35	39	121	
Incident category A - cathastropic	0	0	0	0	0	0	0	0	0	
Incident category B - hazardous	0	0	0	0	0	0	0	0	0	
Incident category C - major	5	5	2	<5	0	0	0	0	0	
<u>Ground Handling Reports-No of Reports</u>	81	63	63	MONITOR	28	99	26	40	193	
Incident category A - cathastropic	0	0	0	0	0	0	0	0	0	
Incident category B - hazardous	0	0	0	0	0	0	0	0	0	
Incident category C - major	0	0	0	<5	0	0	0	0	0	

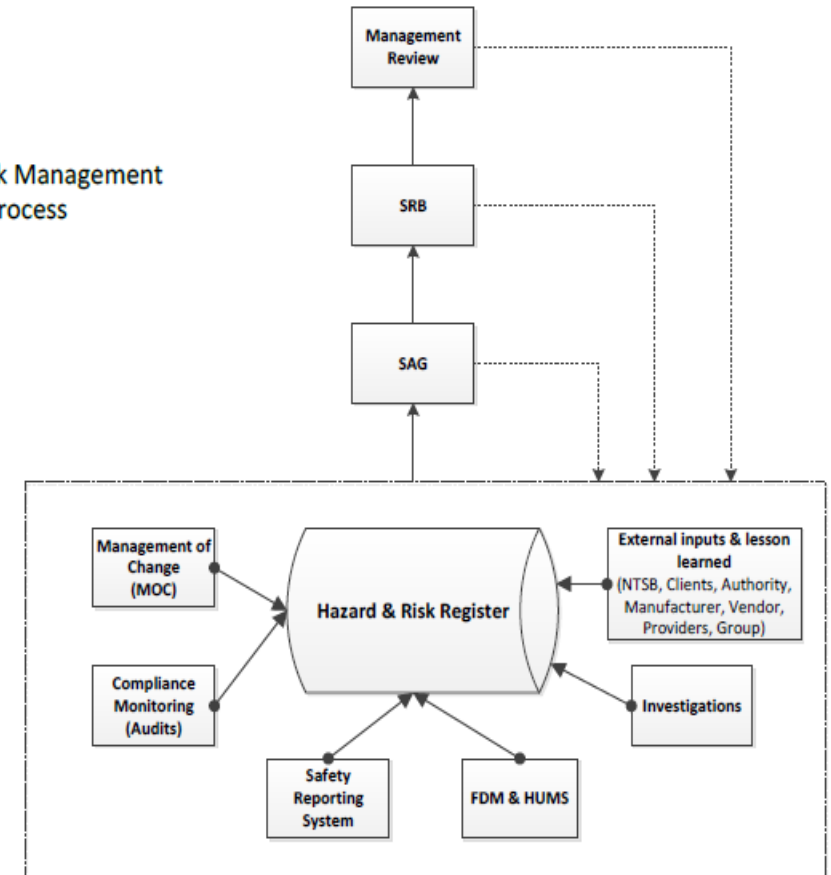
# Reporting process

## How do we monitor and classify risk?

Sentinel is our current reporting module and initial reactive risk is set by SAG on weekly meeting.

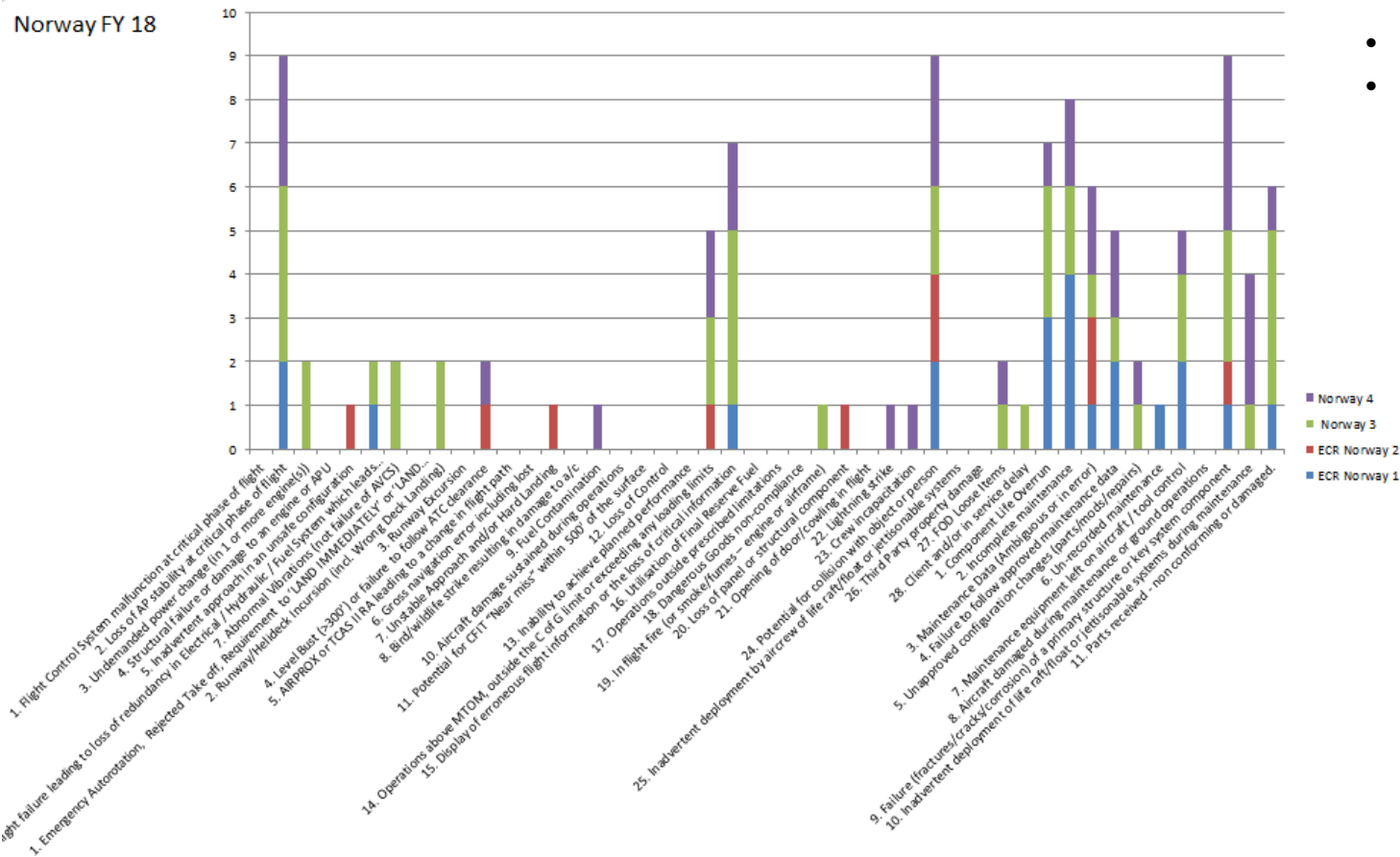
Incident Ref	Report Source	Aircraft Type	Operator	Flight No	Date of Occurrence	Status	Incident Title	Coordinator Name	Risk	Location	Actions	Operational Phase
47598	ASR	Skorsky 5-92	NOR	232	12/21/2019	Co-Ordinated	ERRONEOUS FLIGHTPLAN CALCULATIONS IN OFPL THOMPSON, Susan (1)	Bergen (Prestland)	3		2	Other
47599	ASR	Skorsky 5-92	NOR	52	12/21/2019	Co-Ordinated	NAME ON HELICOPTER NOT UPDATED.	THOMPSON, Susan (1)	1	Stavanger (Sola)	1	Approach
47570	ASR	Skorsky 5-92	UNOP	21	12/21/2019	Co-Ordinated	LATCH OPEN ON THE FORWARD COILING.	THOMPSON, Susan (1)	1	Stavanger (Sola)	1	Paused
47569	GHR	Skorsky 5-92	NOR	BH4650	12/21/2019	Co-Ordinated	PASSENGER CHECKED IN MORE BAGS THAN ALLO JACKSON, Elaine (2)	Bergen (Prestland)	2		2	Maintenance
47567	GHR	Skorsky 5-92	NOR	BH4240	12/21/2019	Co-Ordinated	BAG NOT LOADED OFF OFFSHORE.	JACKSON, Elaine (2)	1	Bergen (Prestland)	1	Other
47564	GHR	Skorsky 5-92	NOR		12/21/2019	Co-Ordinated	INDEPENDENT INSPECTION SIGNATURE MISSING	THOMPSON, Susan (1)	2	Bergen (Prestland)	2	Maintenance
47563	GHR	Skorsky 5-92	NOR		12/21/2019	Co-Ordinated	INDEPENDENT INSPECTION SIGNATURE MISSING	THOMPSON, Susan (1)	2	Bergen (Prestland)	2	Maintenance
47547	ASR	Skorsky 5-92	UNOP	741	1/18/2019	Co-Ordinated	ONE PASSENGER TOO MANY	HELLESOY, Kjell (10)	1	Bergen (Prestland)	1	Other
47529	GHR	Skorsky 5-92	NOR	BH4675	1/18/2019	Co-Ordinated	BAGS FROM FLIGHTS IN SAME TROLLEY.	JENSEN, Dag Vidar (1)	1	Stavanger (Sola)	1	Paused
47525	GHR	Skorsky 5-92	NOR		1/18/2019	Co-Ordinated	#3 SUPPLY MODULE	BYRNE, Tor (1739)	3	Stavanger (Sola)	3	Maintenance
47524	GHR	Skorsky 5-92	NOR	25124	1/18/2019	Co-Ordinated	BOARDING WRONG FAL	JENSEN, Dag Vidar (1)	1	Bergen (Prestland)	1	Other
47523	ASR	Skorsky 5-92	NOR	521	1/15/2019	Co-Ordinated	INCIDENT/ACTIVATION OF BLT.	HELLESOY, Kjell (10)	3	Stavanger (Sola)	3	Cruise
47521	ASR	Skorsky 5-92	UNOP	751	1/15/2019	Co-Ordinated	RAMP OPEN IN FLIGHT	HELLESOY, Kjell (10)	3	Bergen (Prestland)	3	Approach
47513	ASR	Skorsky 5-92	UNOP	535	1/15/2019	Co-Ordinated	AVC USE	HELLESOY, Kjell (10)	3	Stavanger (Sola)	3	All
47512	GHR	Skorsky 5-92	NOR	24625	1/15/2019	Co-Ordinated	BAG SENT TO WRONG DESTINATION	JENSEN, Dag Vidar (1)	1	Bergen (Prestland)	1	Other
47504	ASR	Skorsky 5-92	UNOP	304A	1/14/2019	Yes	SUSPECTED BROCTRORE	HELLESOY, Kjell (10)	3	Stavanger (Sola)	3	Initial Climb
47494	ASR	Skorsky 5-92	NOR		1/12/2019	Co-Ordinated	WRONGLY INSTALLED ANCHOR NUTS.	BYRNE, Tor (1739)	3	Stavanger (Sola)	3	Maintenance
47487	ASR	Skorsky 5-92	NOR	255	1/11/2019	Co-Ordinated	DOUBLE CHECK OFF DECK CLEARANCE	THOMPSON, Susan (1)	1	Stavanger (Sola)	1	Approach
47486	GHR	Skorsky 5-92	UNOP	944	1/11/2019	Co-Ordinated	LUGGAGE NOT TAKEN OFF OFFSHORE	JENSEN, Dag Vidar (1)	1	Bergen (Prestland)	1	Other
47484	GHR	Skorsky 5-92	UNOP		12/21/2019	Co-Ordinated	MISSING TECH DOC.	BYRNE, Tor (1739)	2	Flora	2	Other
47483	ASR	Skorsky 5-92	UNOP	521	1/11/2019	Yes	DOF2 FAULT	HAMMERSTAD, Tor (1)	3	Stavanger (Sola)	3	Cruise
47482	GHR	Skorsky 5-92	UNOP		1/11/2019	Co-Ordinated	MISSING SIGNATURE ON LIE	THOMPSON, Susan (1)	3	Stavanger (Sola)	3	Other
47481	ASR	Skorsky 5-92	UNOP	63F	1/11/2019	Yes	ADC 2 FAIL	HAMMERSTAD, Tor (1)	3	Bergen (Prestland)	3	Cruise
47479	ASR	Skorsky 5-92	UNOP	205	1/10/2019	Yes	ADC FAIL	HAMMERSTAD, Tor (1)	3	Stavanger (Sola)	3	Climb
47476	ASR	Skorsky 5-92	UNOP	812	1/10/2019	Yes	APU FAIL ON GROUND	HAMMERSTAD, Tor (1)	3	Flora	3	Take-off
47475	GHR	Skorsky 5-92	UNOP		1/10/2019	Yes	CHIPPING OF WIGS BELOW CAPTAINS PEDALS	THOMPSON, Susan (1)	3	Stavanger (Sola)	3	Maintenance
47473	GHR	Skorsky 5-92	UNOP		1/10/2019	Yes	ROTATING GESSOR BEARING, EXCESSIVE WEAR	BYRNE, Tor (1739)	4	Stavanger (Sola)	4	Maintenance
47471	ASR	Skorsky 5-92	UNOP		1/10/2019	Yes	SHIP MOVED INTO TAKE OFF SECTOR DURING DE	HELLESOY, Kjell (10)	1	Bergen (Prestland)	1	Take-off
47467	GHR	Skorsky 5-92	UNOP		1/10/2019	Yes	UPPER CLANGHELL DOOR INCORRECTLY INSTALL	THOMPSON, Susan (1)	3	Stavanger (Sola)	3	Maintenance
47466	ASR	Skorsky 5-92	UNOP	276	1/10/2019	Yes	APU FAIL	HAMMERSTAD, Tor (1)	3	Bergen (Prestland)	3	Take-off
47458	ASR	Skorsky 5-92	NOR	484	1/10/2019	Yes	ADC 1 FAIL	HAMMERSTAD, Tor (1)	3	Stavanger (Sola)	3	Cruise
47448	ASR	Skorsky 5-92	UNOP	330	1/7/2019	Yes	UNBURY PASSENGER	HAMMERSTAD, Tor (1)	1	Bergen (Prestland)	1	Standing
47443	ASR	Skorsky 5-92	UNOP	BH 26	1/7/2019	Yes	DOF RUNAWAY	HAMMERSTAD, Tor (1)	3	Bergen (Prestland)	3	Climb
47438	ASR	Skorsky 5-92	UNOP	251	1/7/2019	Yes	AHRS 2 FAILED	HAMMERSTAD, Tor (1)	3	Stavanger (Sola)	3	Cruise
47437	GHR	Skorsky 5-92	UNOP		10/26/2018	Co-Ordinated	MISSING LIE AND SIGN OFF	BYRNE, Tor (1739)	2	Bergen (Prestland)	2	Other
47412	ASR	Skorsky 5-92	UNOP	252	1/2/2019	Co-Ordinated	RAMP OPEN	HELLESOY, Kjell (10)	1	Bergen (Prestland)	1	Take-off

## Safety Risk Management Process



# Data collection and classification

## How do we monitor and classify risk?



- Elevated risk events based on recurring incidents reported more than 1 time.
- Most likely lead to an investigation
- Investigation results ends up with root cause and safety recommendations



# Risk assessment

## How do we monitor and classify risk?

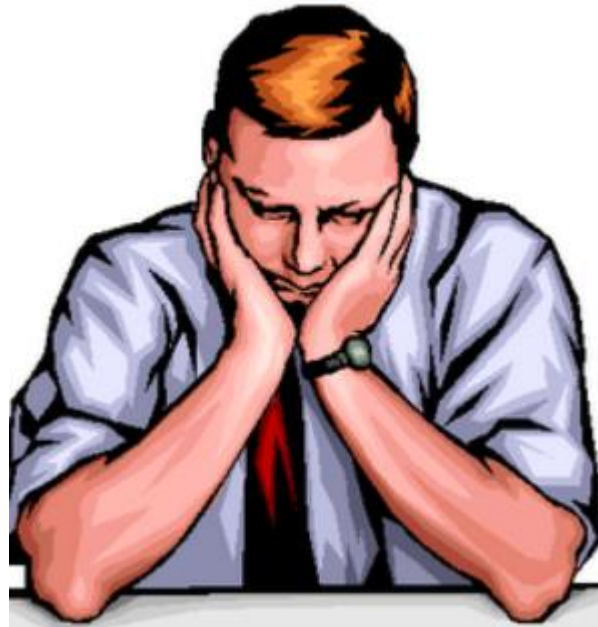
- And through the Bristow hazard management register set up for the generic, base and mission specific risk



# Implementing and monitoring effective risk mitigations

Can we measure some kind of a success factor after implementation of what we see as effective risk mitigations?

**Yes**, currently to a certain level, but there is still some way to go before we can say we are predictive.



2 samples of what we describe as success



# Event case no.1

- Recurring events on offshore helidecks with engine surge / flame out, during lift off and in hover
- Investigation conducted and assisted by FDM animation

Offshore installations is powered by Gas turbines with hot gas flowing into Helidecks in adverse wind speed and directions



During Take off from the rig, the crew heard a loud bang from behind the cockpit, right after CDP. Crew observed engine surges and NR surges, as the AC accelerated through 40 Kias. The HLO reported seeing smoke briefly exit exhaust. The pilots confirmed that the wind direction may have carried some hot gases from the rig turbine exhaust stack.



# Methodology

The investigation result led to collaboration with the oil & gas industry:



DET NORSKE VERITAS

Report  
Kvitebjørn Helicopter deck flow study

Statoil Petroleum AS

Report no/DNV Reg No.: 2010-0703/ 12M7PPM-3  
Rev A, 2010-03-25

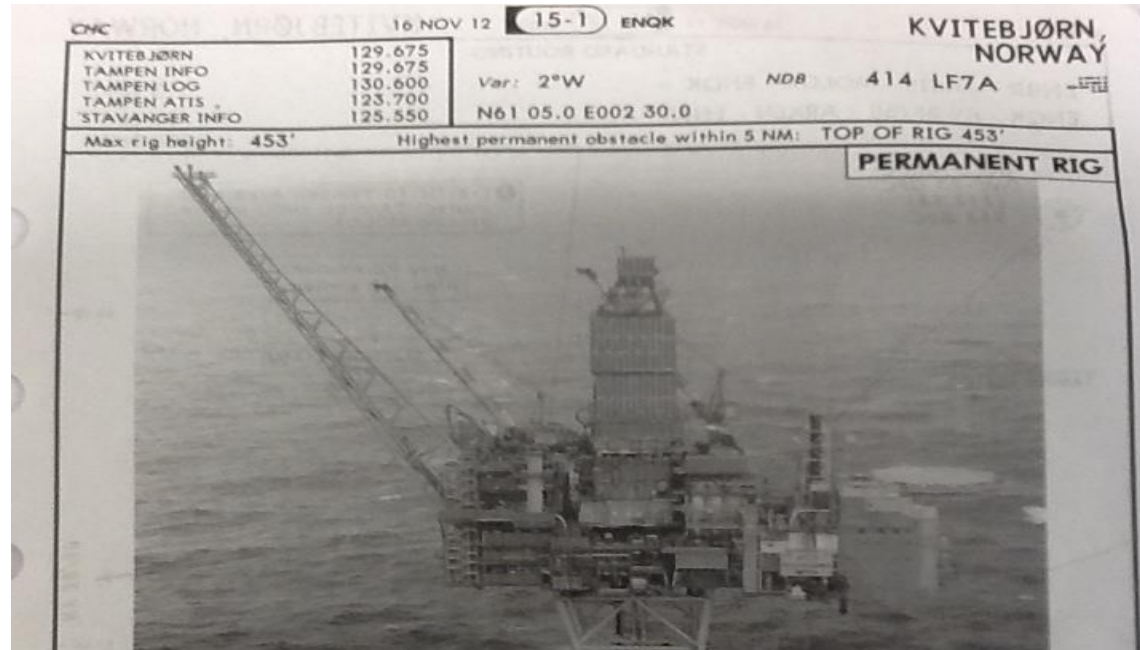


# Risk mitigating measures

## Differentiate limitations:

Hot gas from turbine exhaust outlets

Turbulence caused by structures



### Limitation/Comment:

Limitations due to hot gas from turbine exhaust outlets:

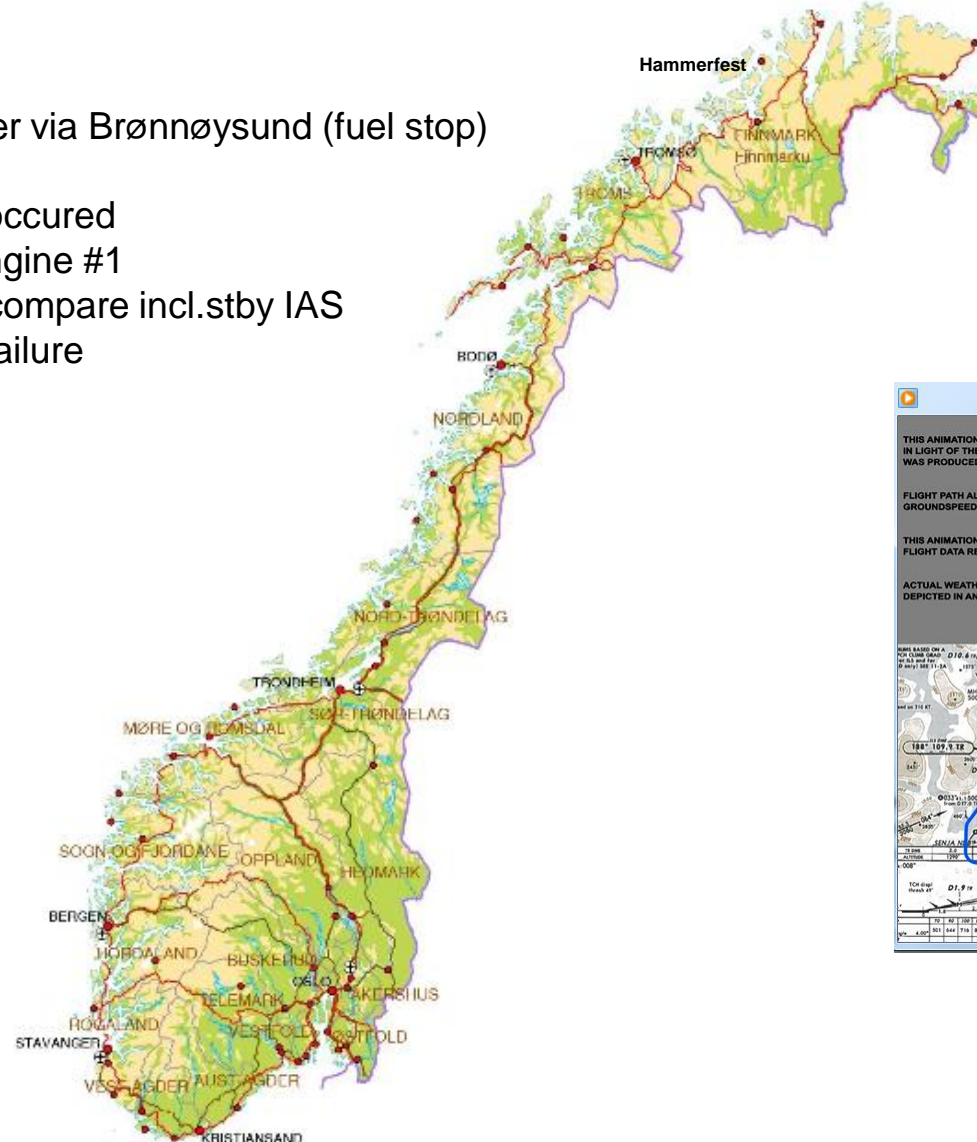
- sector 325°-040°, - use caution,
- sector 330°-035°, - winds above 35 kts, - no operations (2 turbines normal operations),
- no restrictions during "revisionsstans" (turbines with max. 1x12MV output).

Limitations due to turbulence from structures:

- sector 000°-060°, - winds 15-35 kts, - HLL Table 2 (L&T), all types,
- winds above 35 kts, - no operations.

# Event case no.2

- Position flight Hammerfest-Stavanger via Brønnøysund (fuel stop)
- >1500 NM
- FL090 several abnormal indications occurred
  - Fluctuating engine #1
  - Airspeed miscompare incl.stby IAS
  - Rotor de-ice failure
- Diverted to Tromsø
- ATC single controller with high traffic
- Disoriented crew
- Mayday call
- Recover aircraft in VMC at 2500`





# Investigation results

- Investigation required
- Use of FDM to understand what happened
- Revealed several learning points for improvements such as:
  - Moisture drainage procedures
  - Cold weather operations
  - Lack of system knowledge
  - Moisture penetration protection

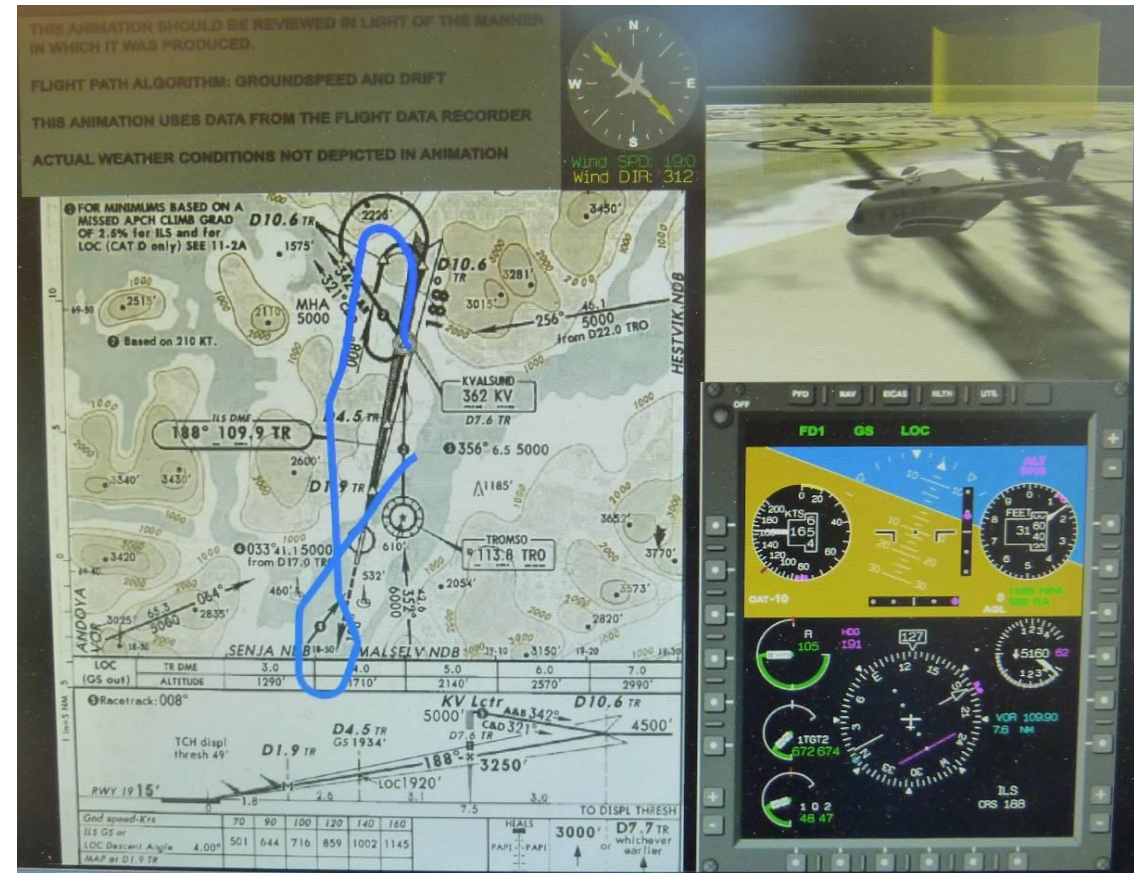


Bristow Norway:

Internal investigation report: LN-ONR: Pitot-static problem.

Reference: IIR/2012/03/BHL31F, revision 2 25<sup>th</sup> June 2012.

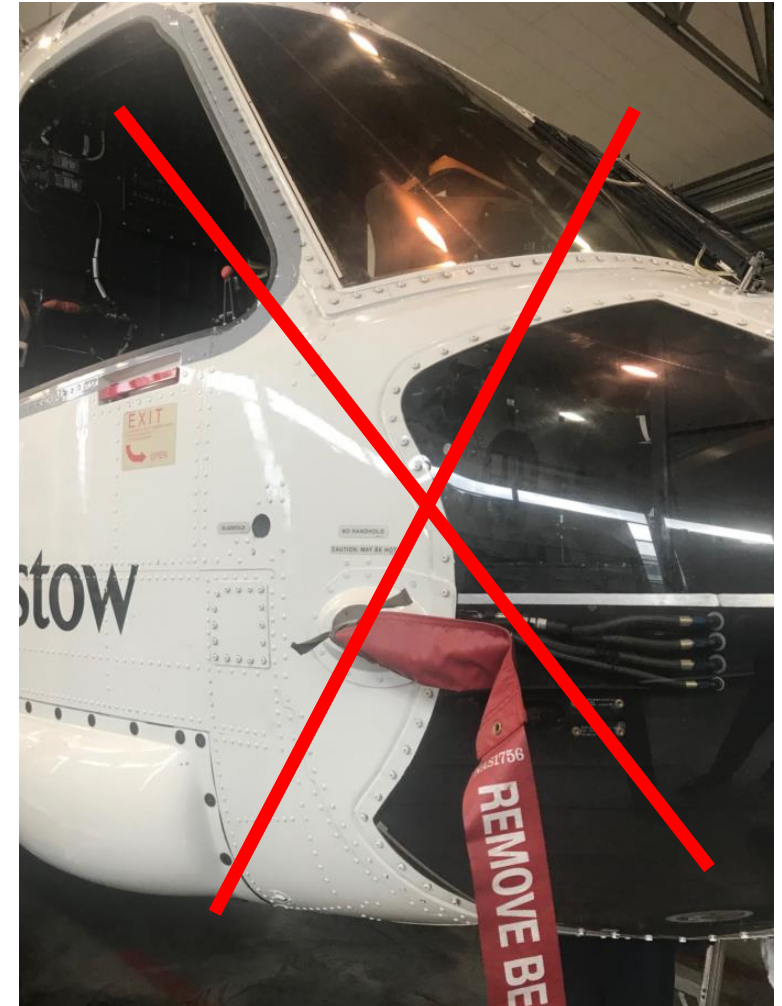
One Mission. One World. One Team





# Risk mitigating measures

- Effective risk reduction measures:
  - ✓ New designed pitot covers
  - ✓ Pitot covers on between flights
  - ✓ More frequent drainage of P/S syst
  - ✓ Improved system knowledge
  - ✓ Simulator training





Thank you for your attention!

Questions?

