

HELICOPTERS

Aviation Safety 航空安全

Risk Management and Safety Assurance in Helicopters Operations

直升机运行中的风险管理和安全保证

- an AIRBUS HELICOPTERS perspective 来自空客直升机的解决之道

Thomas Gogel, Head of Aviation Safety Network

31. July 2017

AIRBUS

Content

- Introduction

介绍

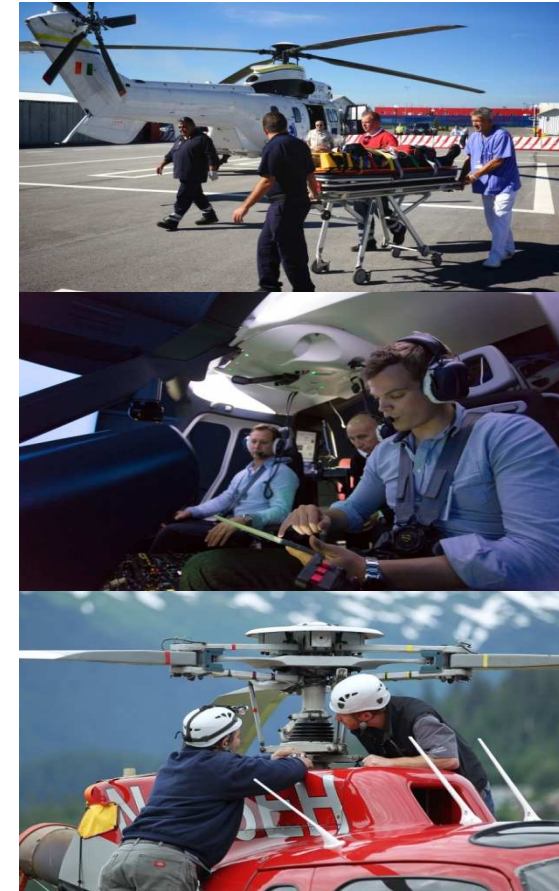
- Living by example: Airbus Helicopters' internal Risk Management and Safety Assurance

以身作则：空客直升机的内部风险管理和安全保证

- Airbus Helicopters – committed to our customer's Risk Management and Flight Safety

- 空客直升机 – 致力于我们客户的风险管理和飞行安全

- Conclusion 结论



Introduction

介绍



HELICOPTERS

A global fleet

全球机队

18 751 Built helicopters

制造直升机18751架

11 732 In-service helicopters

在役11732架

In 152 Operating Countries

运行于152个国家

92 291 000 Total FH cumulated as of the 12/31/2016

截至2016年12月31日累计飞行92 291 000飞行小时

Mastering the complete helicopter value chain

掌控完整的直升机价值链



Conception & Development

概念&研发



Industry & Production

工业&制造



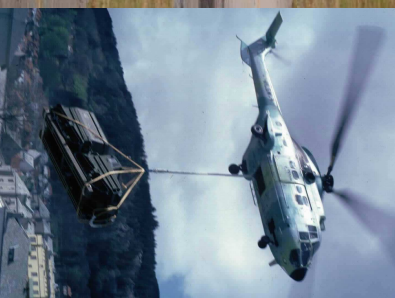
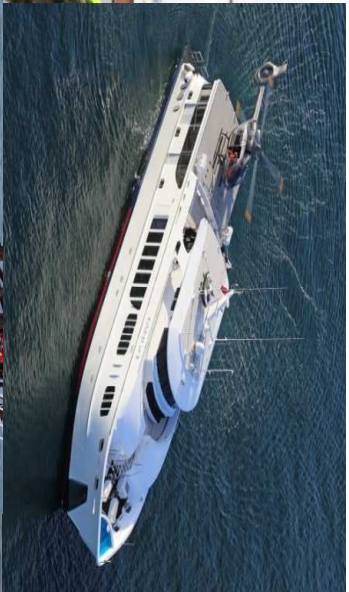
Support & Services

支援&服务

HELICOPTERS

AIRBUS HELICOPTERS – Covering all Mission Profiles

空中客车直升机 – 覆盖全部任务类型



Living by example:

Airbus Helicopters' internal Risk Management and Safety Assurance

以身作则：

空客直升机的内部风险管理和安全保证



HELICOPTERS

Safety starts from the Top: Airbus Helicopters' Chief Priority 安全始于顶层：空客直升机的首要关注

**“The only
acceptable
objective
is ZERO
accidents.”**

Guillaume Faury

唯一能接受的目标就是零事故

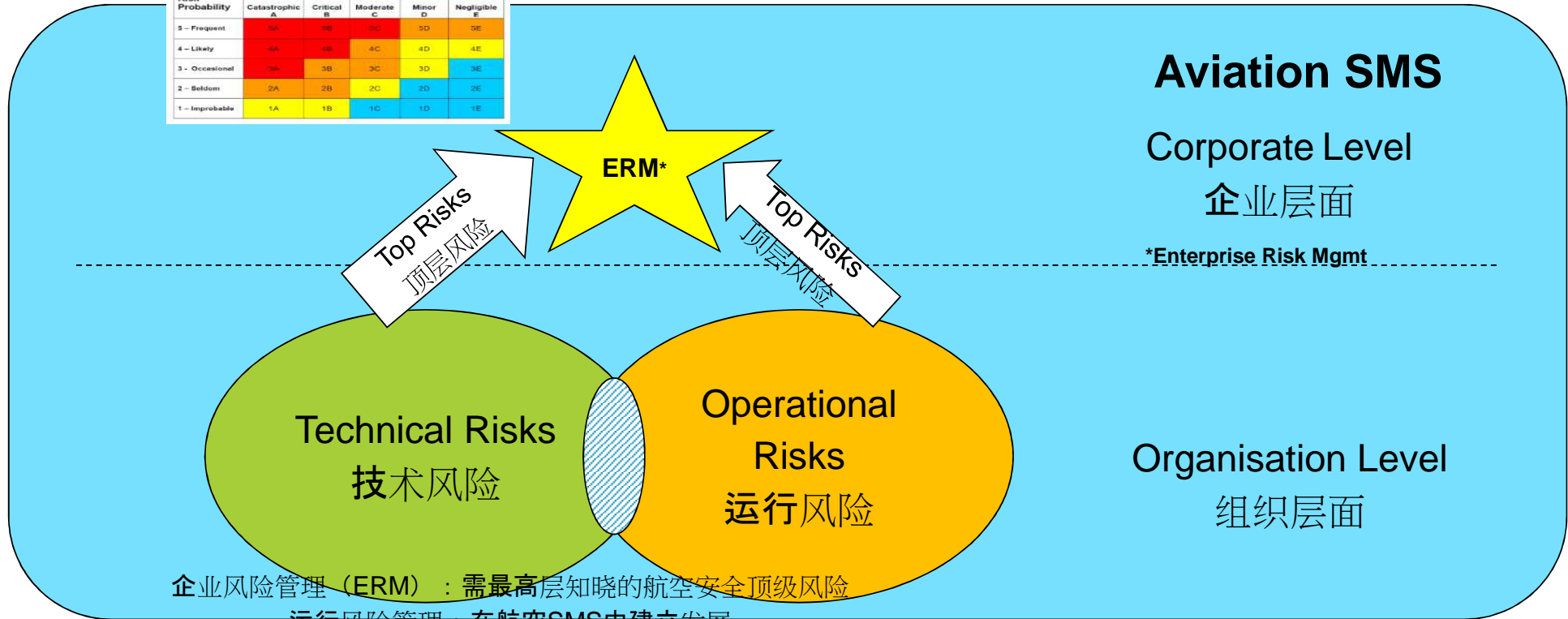


© Lorette Fabre

AIRBUS

Top Level - Enterprise Risk Management 顶层 – 企业风险管理

Risk Probability	Risk Severity				
	Catastrophic A	Critical B	Moderate C	Minor D	Negligible E
5 - Frequent	5A	5B	5C	5D	5E
4 - Likely	4A	4B	4C	4D	4E
3 - Occasional	3A	3B	3C	3D	3E
2 - Seldom	2A	2B	2C	2D	2E
1 - Improbable	1A	1B	1C	1D	1E



企业风险管理 (ERM) : 需最高层知晓的航空安全顶级风险

运行风险管理 : 在航空SMS中建立发展

技术风险管理 : 稳定成熟的风险管理 (持续适航)

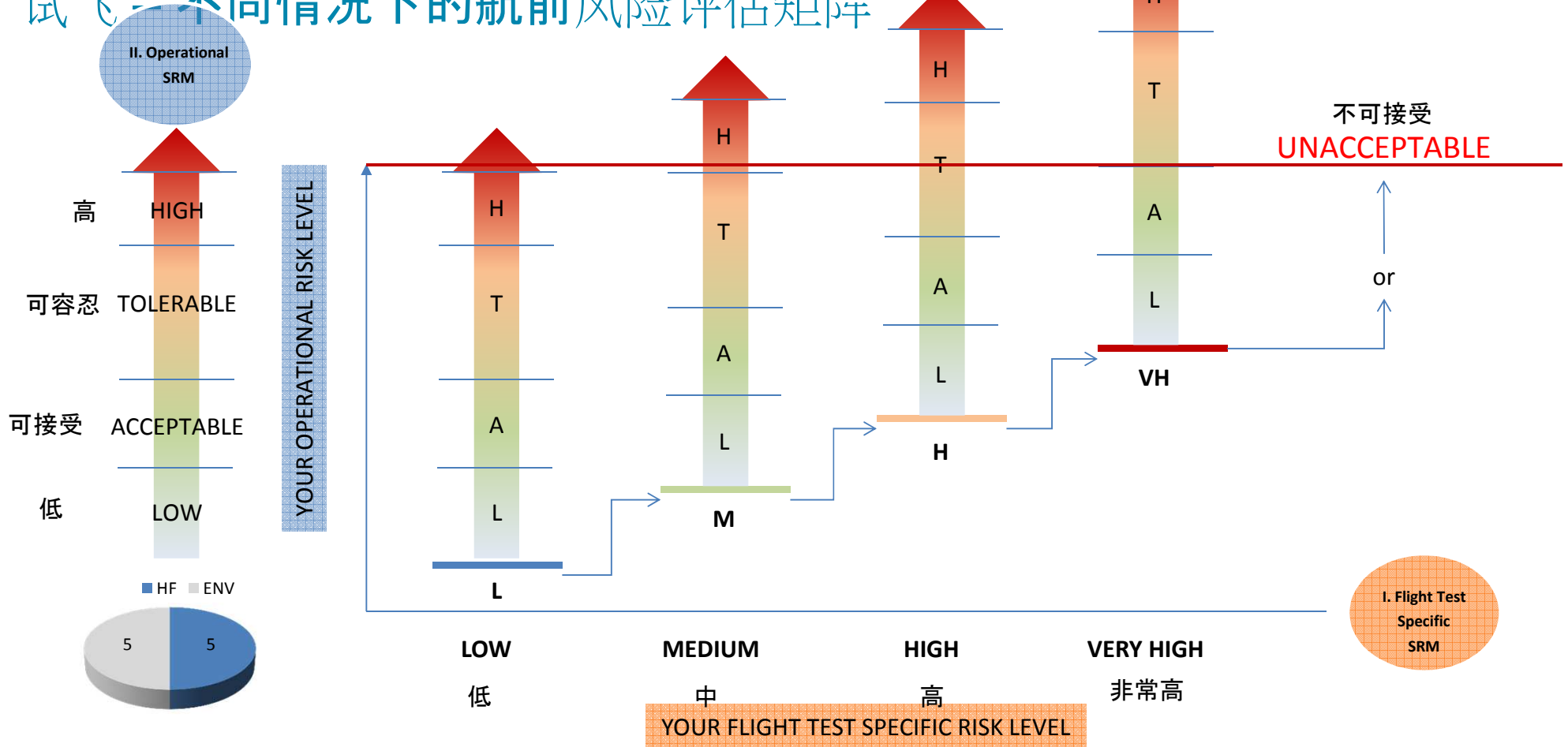
Enterprise Risk Mgmt (ERM): Top risks for Aviation Safety transparent for top level

Operational Risk Mgmt: developed within the Aviation SMS

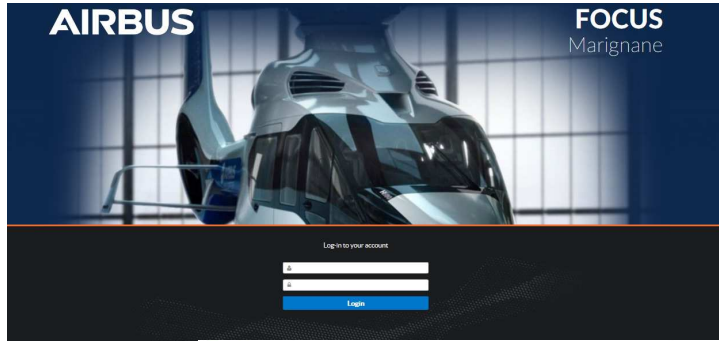
Technical Risk Mgmt: stable, mature risk management (Continoued Airworthiness...)

Flight Test – Adapted PRE-FLIGHT RISK ASSESSMENT MATRIX

试飞 - 不同情况下的航前风险评估矩阵



HELICOPTERS



Daily Flights
Date: Thu 13.04.2017

C/S	Reg.	Serial No.	Customer No.	Type	PPHs	Mission	Test Area	SE	TLM	Org.	CDB	CPL	Crew	PX
-	F-ZWDU	2549	CAR104	EC725		Essais B -	-	-	-	M			SKO/PCV	
-	F-ZWTF	1005	TFAI01	NH90	D5	-	-	-	-	P			-	
A	F-MBHC	2013	HAP2013	EC665	D1	Reception -	Ste victoire	-	-	M	BGS		HMG	
-	F-MCHC	2373	GAM101	AS332	D6	Point Fixe - PF1	-	-	-	M			DEC	
-	F-MCQN	2303	FAR107	AS332	P4	Point Fixe - PF1	-	-	-	M			MTN	
-	F-WWDN	3028	PT004	AS332	P1	Point Fixe - PF1	-	-	-	S			DEC	
-	F-ZWCT	6023	HAD0023	EC665		Vol CEV -	ITR S CTA F/B	-	-	C			-	
-	F-WWPK	5021	MIL104	EC175	P1	Point Fixe - PF1	-	-	-	S			MTN	
AZ	F-ZKBO	1336	TFR023	NH90	D1	Vol CEV -	ITR S CTA F/B	-	-	C	AZ		-	
R	F-WCEI	5003	UTR001	EC175	C3	Ecole/Training -	La Fare	-	-	E			LST	1
O	F-WWKN	8171	PF004	EC190	D4	Point Fixe - PF1	-	-	-	P	GSE		-	2
H	F-WWKA	2338	SOC009	EC225	D5	Essais A -	LOCAL	-	-	P	VIN		SKO/CBI	
-	F-WWDQ	7009	SP803	AS305	P3	Point Fixe - PF1	-	-	-	S			PER	
A	F-WWPC	8393	IA042	AS350		Reception - T2	ITR S CTA F/B - WRh	X	-	H	BGS		KTR	
Q	F-ZKCM	1337	TFR024	NH90		Reception - VSO	Ste victoire	-	-	S	FDY		HMG	
J	F-WWPK	5021	MIL104	EC175	P1	Reception - CTL	Ste victoire	-	-	S	JMC		BCA	
V	F-WWLD	5017	RTP202	EC175	C2	Reception - T3	ITR S CTA F/B	-	-	S	VCI		DLV/PTE	
				EC175	C3	Ecole/Training -	La Fare - Pertuis	-	-	E	LST		-	1
				EC175	C3	Ecole/Training -	La Fare - Pertuis	-	-	E	LST		-	2
				AS350	P3	Point Fixe - PF1	-	-	-	H			-	
				AS350	P3	Point Fixe - PF1	-	-	-	S			-	
				EC175	C3	Ecole/Training -	La Fare	-	-	E	BEL		-	
				EC175	C2	Reception - T3	ITR S CTA F/B	-	-	S			-	
				AS355	P2	Point Fixe - PF1	-	-	-	S			-	

AIRBUS HELICOPTERS
FOCUS - Flight Planning Tool
With PRE-FLIGHT
RISK ASSESSMENT MATRIX

空客直升机关注点 - 带有航前风险
评估矩阵的飞行计划工具

Flight Order: 12.04.2017 16:03 H. JAMMAYRAC

Creator: I. MINNAU Last Modified By/On: F. CHALOT - 13.04.2017 12:30:25

Type: Helicopter

Flight: Reg./Permit to Fly: F-WWKA/DOA

Responsibility: AH

Flight Date: 13.04.2017

Status: BKED

Risk Assessment: Add Risk Assessment

Mission / Permitted to Fly: P-PROTO

Ground Crew: CANSEL Laurent, CHOLLEY David, SECOURAND Serge

Mission / Project Nbr.: 1

ETD (Planned T/O): 1400

Dep. Aerodrome: LFML - Marignane

PPHs: DS

Flight Personnel: CDB: VINCENT Eric, CPL: none, Expt: BRISA Laurent, BRACA Philippe, CADICHON Richard, CEV/CEV: EASA/PROTO, Engineer: BRACA Philippe, BART Arnan, BRESLIN Carole, CERTAIN Nicolas, EASA/PROTO, Mechanic: BRICA F/ Pascal, ROSTANG F/ François, UNWING Dominique

Profile: Test Flight

FLIGHT TEST RISK CLASSIFICATION: Low Medium High Very High

Operational Risks

Task Knowledge: Expert, Low, Familiar, Normal, Unfamiliar, First Time, Extreme

Stress Factor: Normal, High, First Time

Crew Composition: Dedicated, Usual, Unusual, First Time

Altitude Profile: Medium > 499 ft, High / Oxygen Flight, Low 250 - 499 ft, Terrain Flight < 250 ft

Day / Night: Day, Night unaided, Night NVG, Night FLIR

Weather: Not a factor, To be monitored, Impact on test and flight, Marginal

Crew Fatigue Status: Excellent, Normal, Still acceptable, Fatigue

Operating Area: Dedicated, Usual, Unknown

Other POB: None, Technicians/Observers, Passengers, VIP

Flight Monitoring: Real Time, Dedicated ATC, Controlled Airspace, Uncontrolled

FSM Notification: NOT APPLICABLE

FLIGHT TEST RISK CLASSIFICATION Indicator: Very High, High, Medium, Low

Operational Risks: 0 POINTS

Instructions: none

Information: none

AH PFRA

Profile: Test Flight

Print

FLIGHT TEST RISK CLASSIFICATION Low Medium High Very High

Operational Risks

Task Knowledge Expert Familiar Unfamiliar First Time

Stress Factor Low Normal High Extreme

Crew Composition Dedicated Usual Unusual First Time

Altitude Profile Medium > 499 ft High / Oxygen Flight Low 250 - 499 ft Terrain Flight < 250 ft

Day / Night Day Night unaided Night NVG Night FLIR

Weather Not a factor To be monitored Impact on test and flight Marginal

Crew Fatigue Status Excellent Normal Still acceptable Fatigue

Operating Area Dedicated Usual Unusual Unknown

Other POR None Technicians/Observers Passengers VIP

Flight Monitoring Real Time Dedicated ATC Controlled Airspace Uncontrolled

Comment

FSM Notification

REQUIRED



Operational Risks

147
POINTS

Instructions

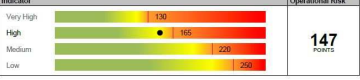
- none

- Information**
- OPERATIONAL RISK: TOLERABLE - CAUTION !
 - ATTENTION: Flight Test Risk and Crew Composition is less-than-ideal.

AIRBUS Risk Assessment

Flight Date: 26.04.2017
Mission: Essels A - EA
Signature / ATD: J - -
PIC: JAMMAYRAC, Hervé
HC Type: EC225
HC Serial No.: 2338
Flight Registration: F-WJKA

Flight Test Risk Classification	Low	Medium	High	Very High
Task Knowledge	Expert	Familiar	Unfamiliar	First Time
Stress Factor	Low	Normal	High	Extreme
Crew Composition	Dedicated	Usual	Unusual	First Time
Altitude Profile	Medium > 499 ft	High / Oxygen Flight	Low 250 - 499 ft	Terrain Flight < 250 ft
Day / Night	Day	Night unaided	Night NVG	Night FLIR
Weather	Not a factor	To be monitored	Impact on test and flight	Marginal
Crew Fatigue Status	Excellent	Normal	Still acceptable	Fatigue
Operating Area	Dedicated	Usual	Unusual	Unknown
Other POR	None	Technicians/Observers	Passengers	VIP
Flight Monitoring	Real Time	Dedicated ATC	Controlled Airspace	Uncontrolled



Instructions

Information

- OPERATIONAL RISK: TOLERABLE - CAUTION !
- ATTENTION: Flight Test Risk and Crew Composition is less-than-ideal.

Comment

试飞风险分类

FLIGHT TEST RISK CLASSIFICATION

AIRBUS HELICOPTERS FLIGHT TEST RISK CLASSIFICATION Date: Mar 30th, 2017

FLIGHT TEST RISK CLASSIFICATION - LIST ETK

AIRBUS HELICOPTERS FLIGHT TEST RISK CLASSIFICATION Date: Mar 30th, 2017

AIRBUS HELICOPTERS FLIGHT TEST RISK CLASSIFICATION Date: Mar 30th, 2017

AIRBUS HELICOPTERS FLIGHT TEST RISK CLASSIFICATION Date: Mar 30th, 2017

AIRBUS HELICOPTERS FLIGHT TEST RISK CLASSIFICATION Date: Mar 30th, 2017

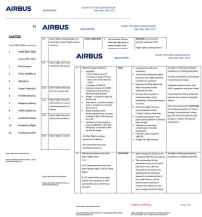
Management Information for HIGH and VERY HIGH FLIGHT TEST RISK

向高层通报的高和极高试飞风险



HELICOPTERS

- Links to References 参考链接
- FLIGHT TEST RISK CLASSIFICATION 试飞风险分类
 - FLIGHT OPERATIONS MANUAL 飞行操作手册
 - SAFETY MANAGEMENT MANUAL 安全管理手册



AIRBUS HELICOPTERS FLIGHT OPERATIONS MANUAL
 Part Transport Category
 Date: 04/19/2017

FLIGHT OPERATIONS MANUAL VERSION 1

Excerpt

1.2 Minimum height above ground

VFR test flights should, whenever possible, be conducted above 2000 ft AGL, in order to reduce emergency descent rates.

Except during the maneuvers required for take-off, landing or hovering, an authorized landing site, flight crew (CF) shall show the highest obstacle with a distance equivalent to 1/3 of flight may only be authorized when there is a probable reason to do so and when such operation is permitted by local regulations. The reason must be entered in the document opening the flight.

Passengers are not permitted on board during such flights.

When the helicopter is equipped with a cabin altitude, the corresponding alert must be set at a suitable altitude.

10.3.4 Oxygen

All crewmembers must have an oxygen supply approved for use in aircraft whenever operating above a certain altitude of 10,000 ft (3000 m). Operation without oxygen is permitted up to 10,000 ft if appropriate authorization has been performed and local regulations permit it.

More stringent rules may be applicable (e.g. 10,000 ft for German military aircraft).

Page 11

Profile: Test Flight Print

FLIGHT TEST RISK CLASSIFICATION Low Medium High Very High

Operational Risks

Task Knowledge	<input type="radio"/> Expert	<input checked="" type="radio"/> Familiar	<input type="radio"/> Unfamiliar	<input type="radio"/> First Time
Stress Factor	<input checked="" type="radio"/> Low	<input type="radio"/> Normal	<input type="radio"/> High	<input type="radio"/> Extreme
Crew Composition	<input type="radio"/> Dedicated	<input checked="" type="radio"/> Usual	<input type="radio"/> Unusual	<input type="radio"/> First Time
Altitude Profile	<input checked="" type="radio"/> Medium > 499 ft	<input type="radio"/> High / Oxygen Flight	<input type="radio"/> Low 250 - 499 ft	<input type="radio"/> Terrain Flight < 250 ft
Day / Night	<input type="radio"/> Day	<input type="radio"/> Night unaided	<input checked="" type="radio"/> Night NVG	<input type="radio"/> Night FLIR
Weather	<input type="radio"/> Not a factor	<input checked="" type="radio"/> To be monitored	<input type="radio"/> Impact on test and flight	<input type="radio"/> Marginal
Crew Fatigue Status	<input checked="" type="radio"/> Excellent	<input type="radio"/> Normal	<input type="radio"/> Still acceptable	<input type="radio"/> Fatigue
Operating Area	<input type="radio"/> Dedicated	<input type="radio"/> Usual	<input checked="" type="radio"/> Unusual	<input type="radio"/> Unknown
Other POB	<input type="radio"/> None	<input checked="" type="radio"/> Technicians/Observers	<input type="radio"/> Passengers	<input type="radio"/> VIP
Flight Monitoring	<input type="radio"/> Real Time	<input type="radio"/> Dedicated ATC	<input checked="" type="radio"/> Controlled Airspace	<input type="radio"/> Uncontrolled

NO-GO!

Comment

FSM Notification

NOT APPLICABLE

FLIGHT TEST RISK CLASSIFICATION Indicator

Operational Risks

97

POINTS

Instructions

- STOP - Impossible to have a Fatigue Status EXCELLENT during Night

Information

- none

Save
Back
Delete

Night-flight and FATIGUE Status « Excellent »

夜航和疲劳状态

Airbus Helicopters:

Committed to our Customer's Risk Management and Safety Assurance

空客直升机：

致力于我们客户的风险管理和飞行安全

Aviation Safety: Airbus Helicopters' chief priority 航空安全：空客直升机的首要关注

Supporting flight safety for the thousands of women & men around the world who are flying in our aircraft every day.

为全球每天驾驶我们的航空器的数以千计的女人和男人们提供飞行安全支持

Safety by 安全来自

- Aviation Safety Management System (SMS)

航空安全管理体系

- Training & support to flight operations

- 对飞行的培训和支持

- Maintenance and CAMO

- 维修和CAMO

- Design

- 设计

- Cooperation

合作

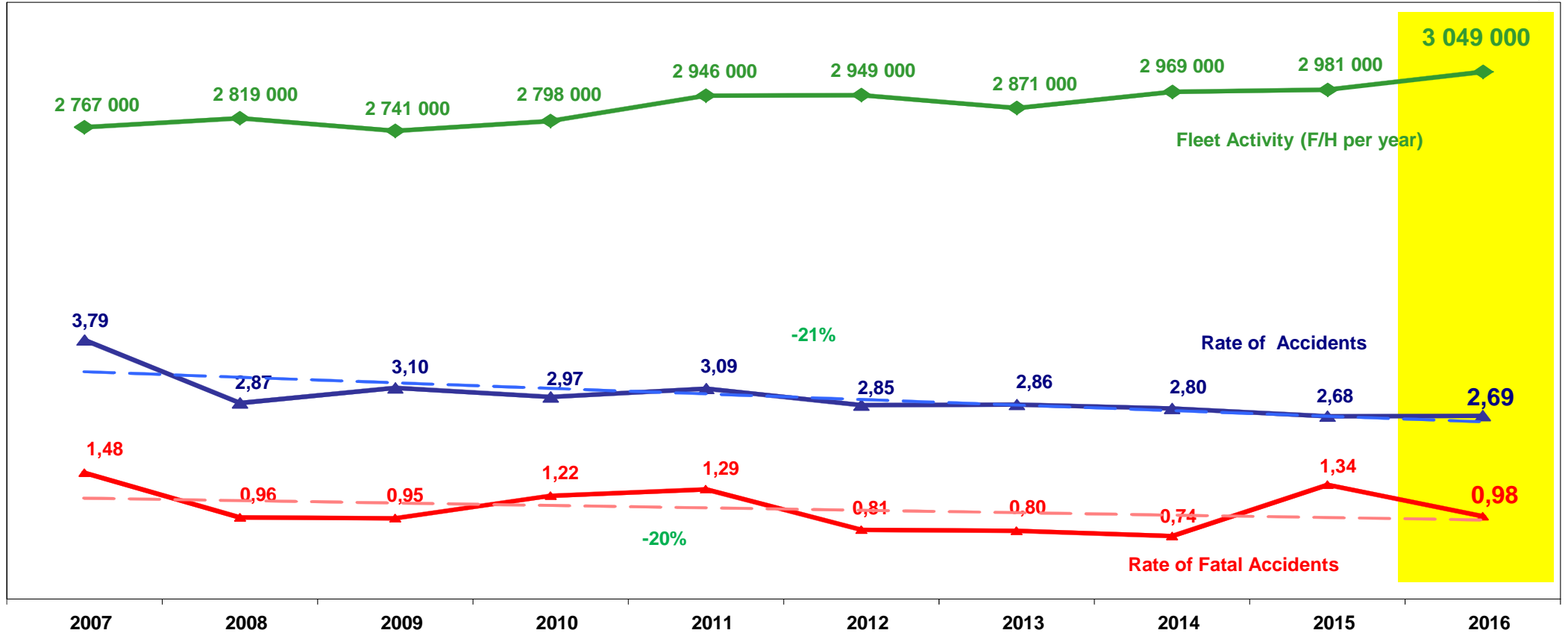


The Facts – Accident rates

事实 – 事故率

Accidents per 100,000 F/H 每100,000小时事故

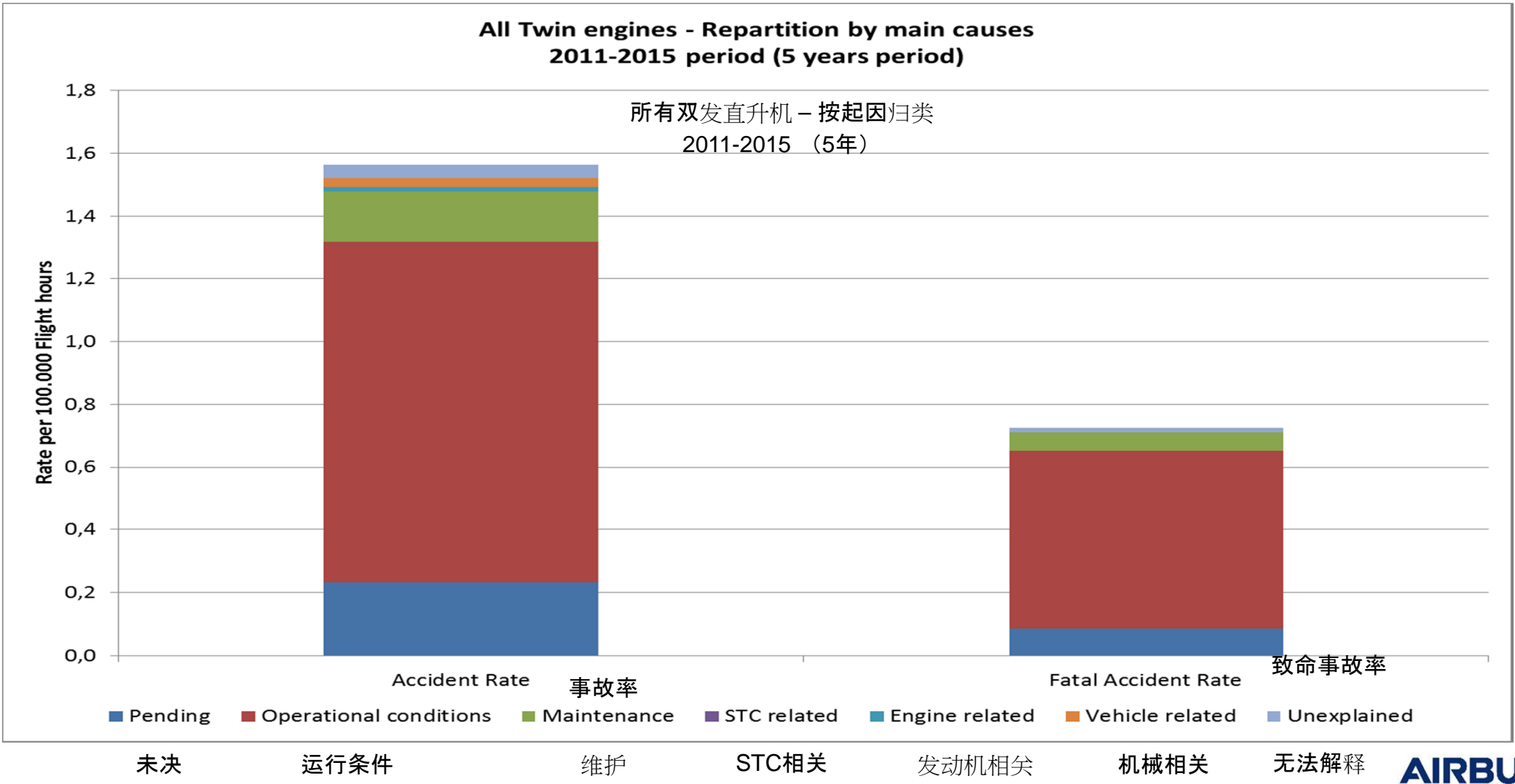
w/o Tiger/NH90



Accidents – Repartition of Causes 事故 – 起因归类

All Twin engines - Repartition by main causes
2011-2015 period (5 years period)

所有双发直升机 – 按起因归类
2011-2015 (5年)

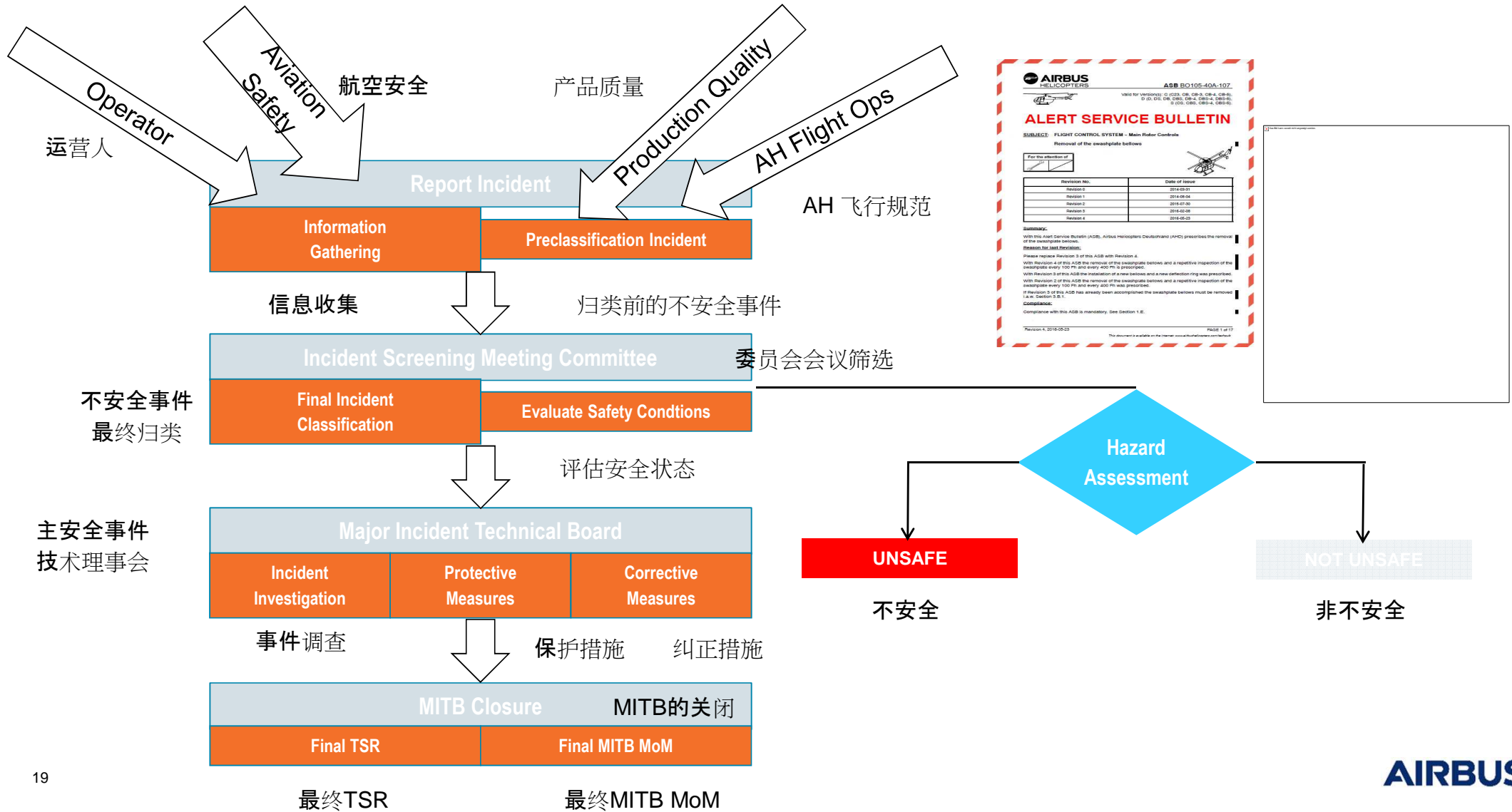


EAW/T. GOGEL / Risk Management and Safety Assurance in Helicopters Operations / 1, v.0 2017 © Airbus Helicopters rights reserved

Purpose of Continued Airworthiness 持续适航的目的

- **Prevention** of incidents, accidents and fatalities by encouraging the **reporting** of incidents and the consequent investigation and correction of the causes
通过鼓励报告不安全事件以及后续的调查和纠正措施，防止不安全事件、事故和灾难
- Provide **lessons learnt** from mishaps on former products into new designs
吸取由于以往设计原因造成不幸事件的教训，改进设计
- Done in close **cooperation** with civil / military, European / foreign Airworthiness Authorities.
通过与民航/军方，欧洲/外国适航当局通力合作而实现
- Insures that **customers expectations** are met in terms of flight safety.
保证满足客户对于飞行安全的期望
- Reflects the **safety culture of Airbus Helicopters**
反映了空客直升机的安全文化

Continued Airworthiness at Airbus Helicopters 空客直升机的持续适航



HELICOPTERS Assisting our Customers: Airbus Helicopters' Global Safety Network

 Alexandre Maugé Aviation Safety Network Manager	 Dr. Thomas Gogel Aviation Safety Network Director	 Paul Tebour Aviation Safety Asia Senior Advisor	 Patrick Hilbert Aviation Safety Russia Consultant
--	--	---	--

协助我们的客户：空客直升机的全球安全网络


 Richard Lajoie
 AHCL


 Manny Fera
 AHI


 Erico Perez
 AHMSA


 Antonio Mirodesto


 Fernando Perez
 AH Chile


 Steve Pickston
 AH UK


 Irmel Gomez
 AHE


 Angel Mompote
 AHE


 Radu Stefan
 AH Romania


 O Mourot
 AH China


 Leonie Loebner
 ECKE




 Dmitry Perempeskin
 AH Vostok


 Shigehiko Takauchi
 AH Japan


 Kazuichi Miya
 AH Japan


 Som Vutachart
 AH Thailand


 Kim Raakyun
 AH Korea


 Patrick Abana
 AH Philippines


 Shaun Leach
 AGAP


 Indram Nusantara
 SE Indonesia


 Alain Folcoire
 EC Indonesia


 Frédéric Malet
 AH Malaysia


 Yean Tse Tan
 AHSA


 Leo Jacob
 AHSA


 Biernis German
 AH Chile


 Saqwan Saqwan
 AHZA


 Luc Romo
 ECKSA

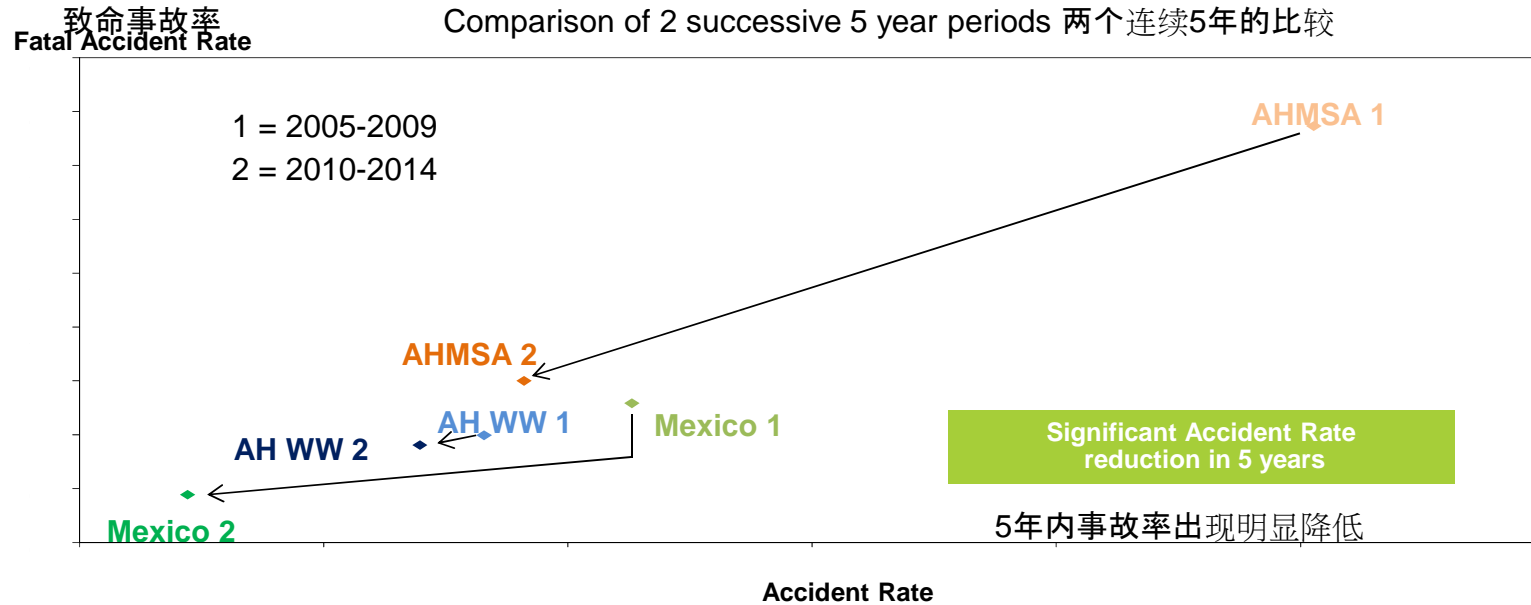

 Robert Pau
 ECKSA


 Rajan Raman
 EC India


 H Thirupugazhagan
 AH Malaysia

Assisting our Customers: 协助我们的客户

Safety Roadshows - The Latin America Experience 安全路演 – 拉丁美洲的经验



2010 : Creation of a Safety function in Mexico for Latin America 2010年 拉丁美洲墨西哥安全职能建立

AHMSA has been performing around 40 Safety roadshows, in 12 different countries: Mexico, Venezuela, Colombia, Guatemala, Ecuador, Bolivia, Chile, Brazil, Dominican Republic, Peru, Costa Rica and Panama. AHMSA已经在12个国家举办40余场安全路演，包括：墨西哥，委内瑞拉，危地马拉，厄瓜多尔，玻利维亚，智利，巴西，多米尼加共和国，秘鲁，哥斯达黎加和巴拿马。

Around 150 companies were reached, more than 1200 professionals Pilots, Mechanics, Owners, Managers...涉及150多公司，超过1200专业飞行员，机械员和管理者。

→ Training attendance has been multiplied by 5 in Latin America over the 2009-2014 period. 2009-2014阶段，拉丁美洲参训人数增加了5倍

→ Activity expanded WW in 2015/2016
→ 2015/2016全球扩展

Training and Human factors awareness are key to long term
Safety improvements 培训和人为因素意识是长期安全改进的关键

HELICOPTERS

Assisting our Customers: 协助我们的客户 Safety Roadshows – World Wide 全球安全路演

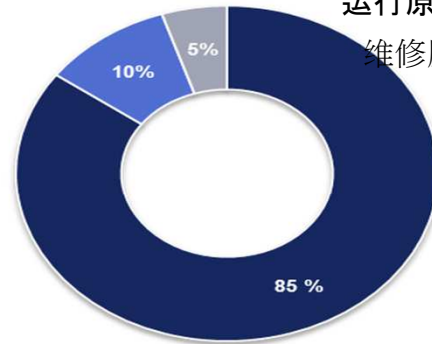
77 events performed in 2016. 在2016年举办了77场

- Extension to Asia 扩展到亚洲
- China initiative launched in Beijing in November 2015 2015年11月北京举办
- Extension to Russia 扩展到俄罗斯



HELICOPTERS

Airbus Helicopters: Working on all aspect of aviation safety 空客直升机：航空安全面面俱到

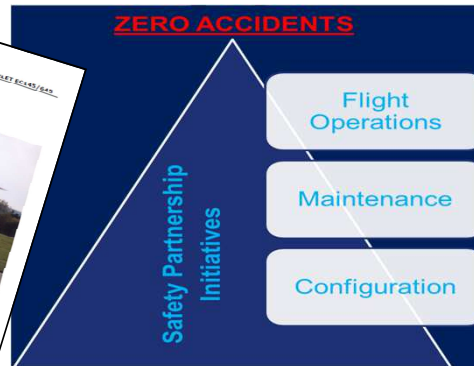
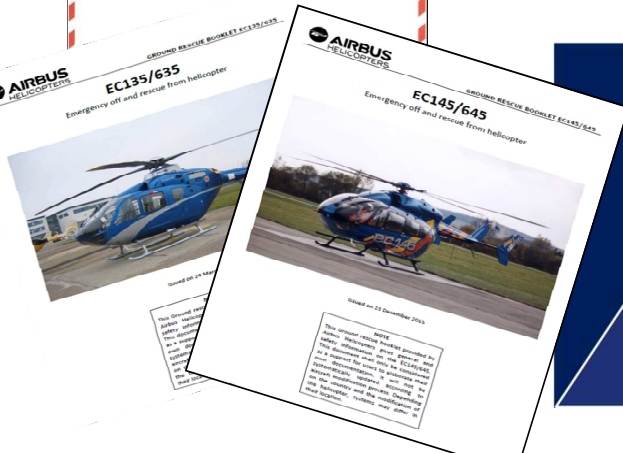


运行原因

维修原因

- Operational causes
- Maintenance causes
- Technical causes (engines&STC included)

技术原因) 包括发动机和STC)



自动化程序

Automation

Procedures

Standards

标准

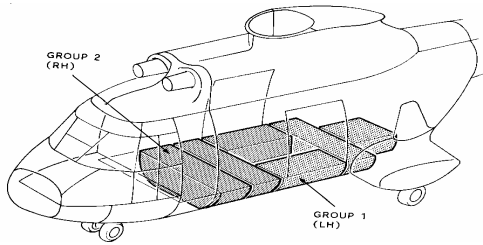
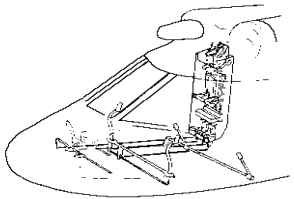


AIRBUS

Risk Mitigation: Safety by Design – Example H 215 通过设计缓解风险

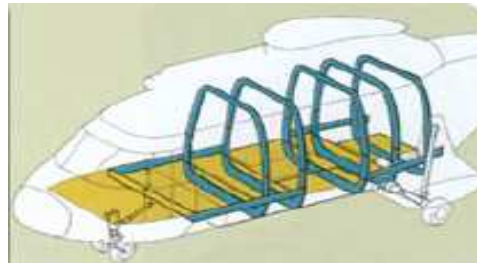
System design for safety 系统安全设计

- Dual, FAA & EASA certified crashworthy fuel system
FAA&EASA认证的双套防撞油箱
- Dual electrical system 双套电力系统
- Dual hydraulic system 双套液压系统
- Autoflight system, dual digital 双数字式自动飞行系统
- Redundant main computers 冗余主计算机



Airframe (central structure) 机身 (中央结构)

Rigid frame work to maximize crash survivability
坚固的机身能提供最大的失事生存



Cockpit doors 机舱门

Direct access and easy egress
直接进入撤离方便



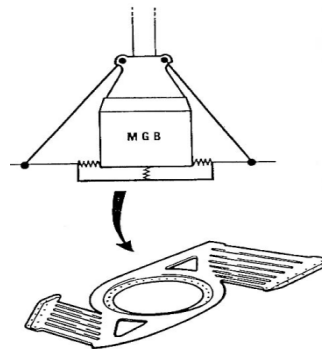
Avionics & Autopilot 电子和自动驾驶

- Highly integrated glass cockpit 高度集成的玻璃驾驶舱
- **4 axis autopilot** – vast increase in safety margin
- Reduced crew workload
- Improved mission management (FLIR, DMAP...)



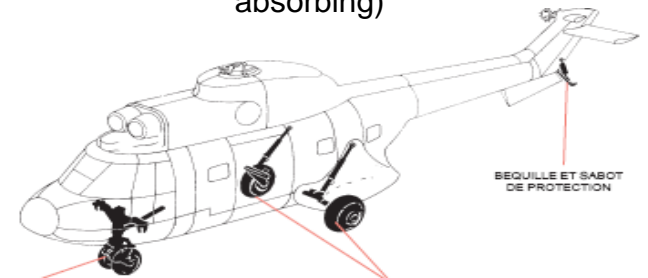
MGB suspension

Optimized for low vibration, reduction of crew fatigue



Landing gear

Retractable and crashworthy (energy absorbing)



Focus China – Potential Safety Enhancements

- Type rating on all turbine helicopters for pilots & technicians
 - Assures appropriate background and currency of knowledge

- Technical documentation – translation into Chinese
 - High quality and revised Technical Documentation are key for safe operation of the aircraft
 - Necessary for flight Crew (FLM, MMEL), and Maintenance (AMM etc.)
 - Mandate for translation should be on manufacturer, with obligation to operator and maintainer to use this documentation



Conclusion

总结



- Airbus Helicopters' is focusing internally on safety 空客直升机专注于其内部安全
 - risk management and safety assurance are becoming a 'way of living' 风险管理和安全保证正在成为一种“生活方式”
- Airbus Helicopters' is actively assisting our customers in their risk management, and their safety assurance - including technology and beyond 空客直升机正积极对客户的风险管理和安全保证提供协助，包括但不限于技术：
 - strong contribution and guidance to the **IHST** and regional initiatives 为IHST和区域内行动计划提供强有力的贡献和指导
 - direct, tailored **interaction with our customers** 与我们的客户进行直接的客户化的互动
 - providing **innovative safety technologies** and **services** to increase the basic level of safety embedded in our helicopters 提供创新的安全技术和服 务，以提升直升机内在安全基本标准

Thank you!



AIRBUS