



共享航空航天事业的辉煌

愿景

Honeywell

Continuous Journey: Safety and Efficiency
Innovation

持续改进：安全与效率

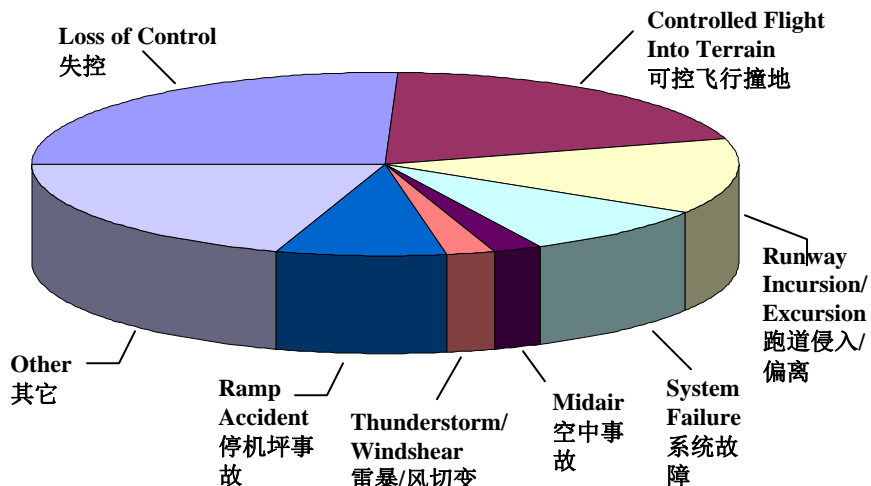
CCADF, May 2011

Safety Risks are a Reality

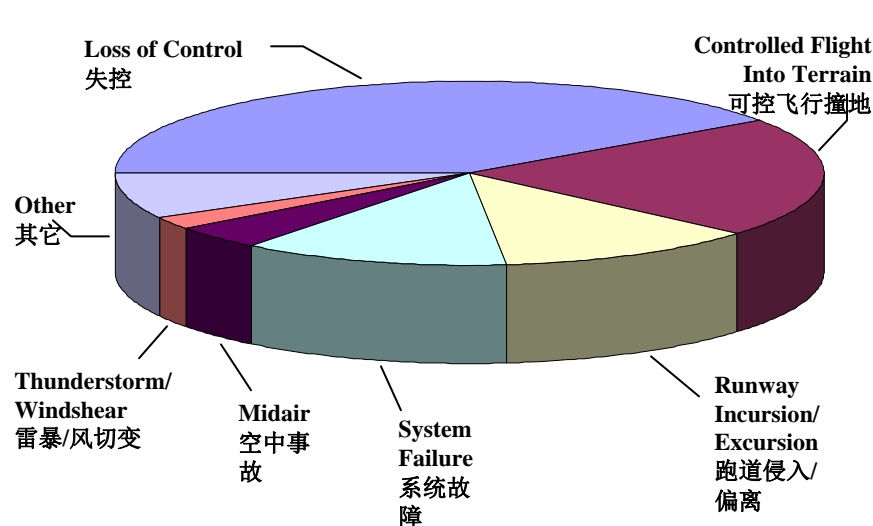
安全风险确实存在

Fatal Accidents – Worldwide Commercial Jet Fleet – 1998-2007

致命事故 – 全球商用喷气机队 – 1998-2007



90 Total Accidents by Cause
共导致90起事故



5408 Total Fatalities by Cause
共导致5408起事故

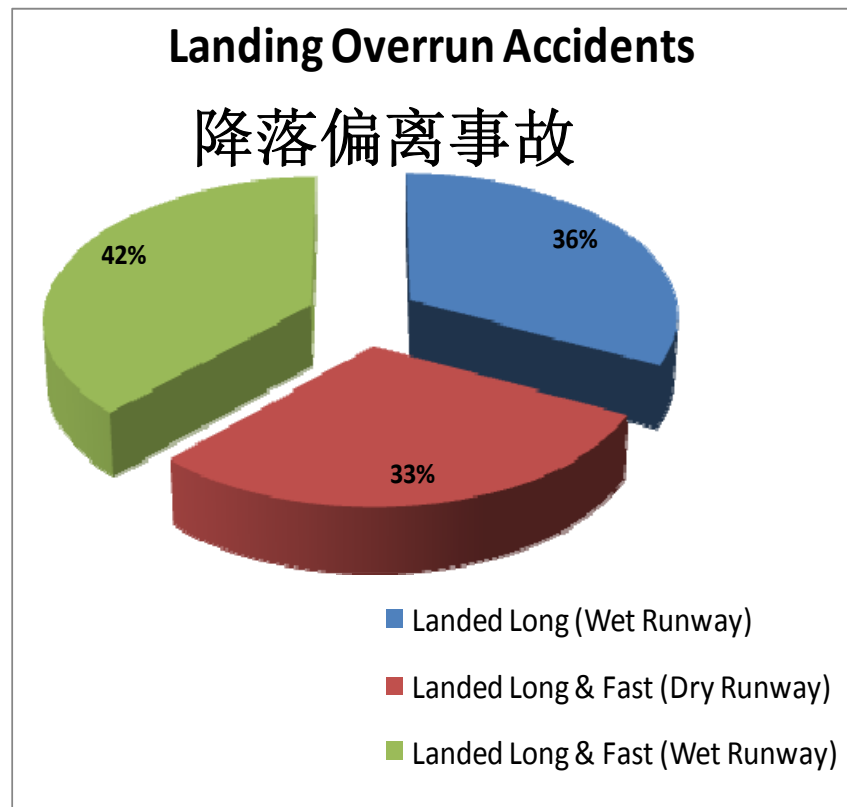
Source: Boeing 2007
Statistical Study
来源: 波音2007统计
研究

- Many accidents associated with situational awareness
- 多数事故与情境识别有关
- Existing and emerging technology can be used to mitigate risks
- 目前以及将来的技术可以帮助降低风险

More Work Remains 任重道远

Runway Excursion 跑道偏离

- Historically, there are 30 runway excursion accidents per year costing the industry approx \$1 Billion a year.
- 历史上每年要发生30起跑道偏离事故，造成航空业每年损失约10亿美元
- A leading contributor to overruns is excessive energy on approach caused by:
- 跑道偏离事故的主要原因是以下因素致使着陆能量过大：
 - Air Traffic Control 空中交通控制
 - Poor planning and late letdown by pilots 飞行员计划不当且延误降落
 - Poor pilot technique 飞行员技术不过关
 - Landing long 降落距离过长
 - Floating on landing flare 在着陆照明灯上降落
 - Tailwind 顺风
 - “Saving fuel” policies 为省油

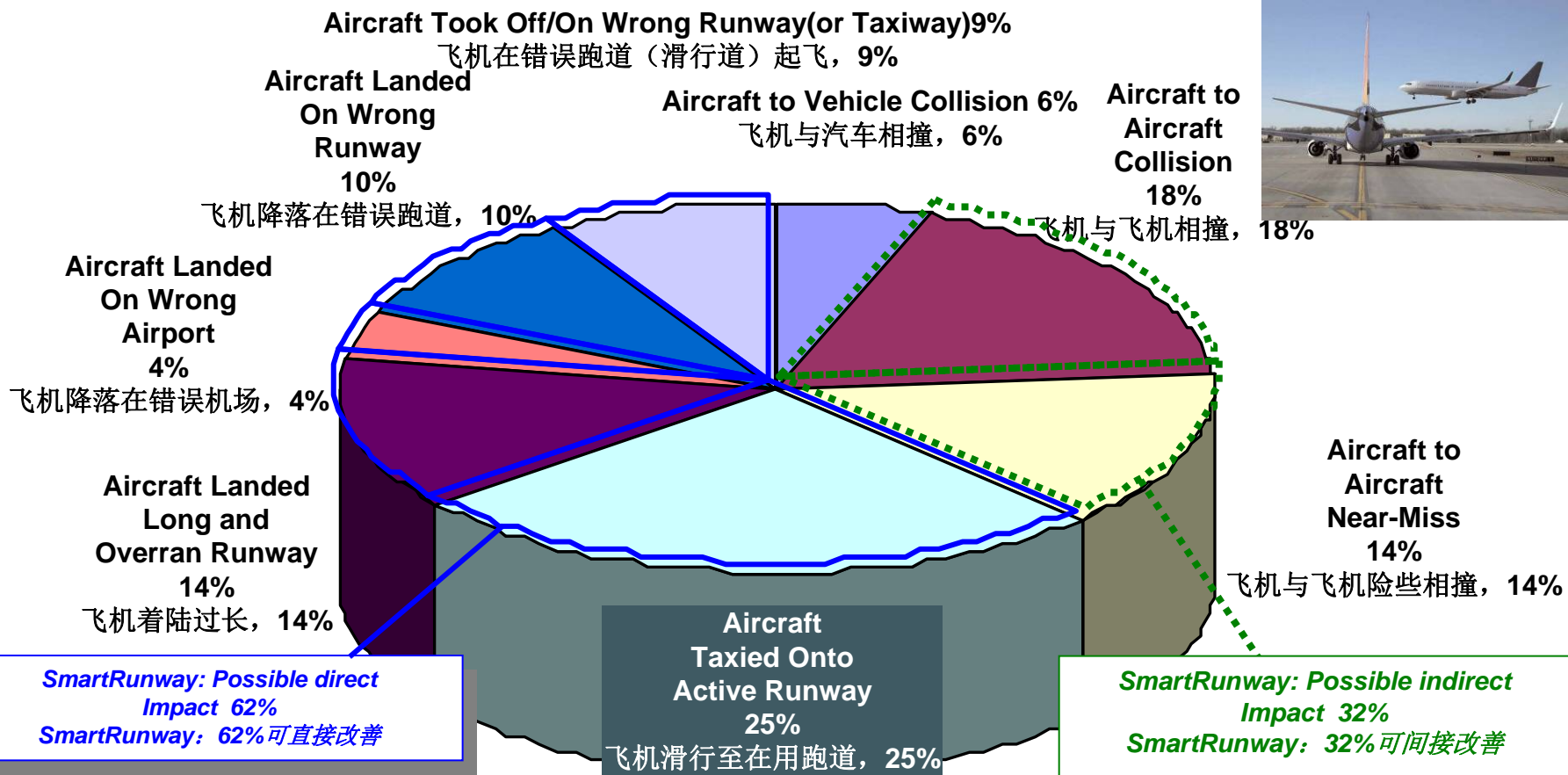


Source: Australian Transportation Safety Board
来源：澳大利亚交通安全委员会

75 Aircraft (68%) Landed Long and Fast!

75架飞机 (68%) 降落距离长、速度快!

Runway Incursions 跑道侵入



At least 1 Occurrence every day and 1 Close Call every 10 days!
至少每天一起，每10天一次险情

Technology Upgrades – Can Improve Safety

技术升级帮助提升安全

SmartView™



- Increases **Safety & Situational Awareness**
- 提高安全&环境识别
- **Proven Synthetic Vision System** - Combining EGPWS and Advanced Display Technologies
- 成熟的综合视觉系统 – 结合增强型近地警告系统与先进显示技术
- Provides **Natural & Intuitive 3D Terrain** - 'Daytime Out The Window' View
- 提供自然、直观的3D地形 – 视图中窗外一如白昼
- **Improves Airport Access** – Reduced Minimums and Pilot Training
- 改善机场交通组织 - 减少起降限制与飞行员培训

SmartRunway®/ SmartLanding™



- Runway Incidents Cost Airlines **\$1B annually** – in direct costs; much more in Delays, Repairs and Injuries
- 跑道事故每年花费航空公司10亿美元 - 这仅是直接花费，延误、修理及人员伤害的花费还要多得多
- **NTSB Top 10 Global Safety Concerns**
- NTSB所列全球10大安全问题之一
- **SmartRunway® - Reduce Incursions** - 减少入侵
- **SmartLanding™ - Reduce Excursions** - 减少偏离
- Software Updates to **Existing Equipment**; Less Than **One Hour** Installation
- 对**现有设备**进行软件升级；安装不超过一小时

Improving Situational Awareness – Increases Safety

改善环境识别 - 提高安全

Integrated SVS/EVS Display 集成式SVS/EVS显示

- Honeywell SVS and EVS integrated display
- 集成综合视景系统（SVS）与视景增强系统（EVS）的霍尼韦尔显示系统
- Honeywell R&D to provide means of lowering takeoff and landing minimums for Part 23 and Part 25 Operators.
- 霍尼韦尔所开发工具可降低对23类与25类飞机操作员的起降限制

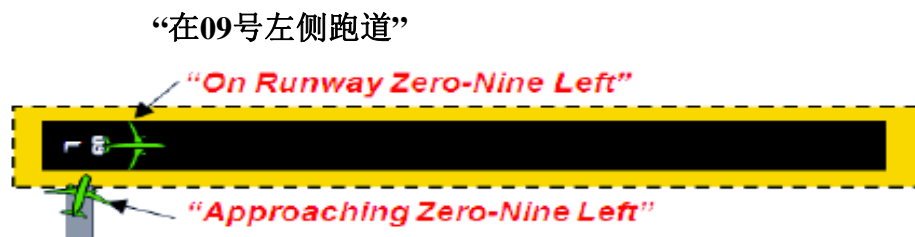


SmartRunway™ and Smart Landing™

SmartRunway™ and SmartLanding™

SmartRunway - Focused to reduce **Runway Incursions** 主要为减少跑道侵入
SmartLanding - Focused to reduce **Runway Excursions** 主要为减少跑道偏离

SmartRunway



“进近09号左侧跑道”

“目视高”

SmartLanding



Reduce the Probability of Runway Incursions & Excursions
减少跑道侵入&偏离的机率

Efficiency – Key to Future 效率决定未来成败

Industry Needs 行业需求

Flight Efficiency 航班效率

Improved Turbine Technology 改进涡轮机技术

Lower Weight 减轻重量

Reduced NOx Emissions 减少氮氧化物排放

Reduced Fuel Burn and Emissions
减少燃油消耗与排放

Honeywell Focus 主要方案

- **Air Traffic Modernization**
空中交通现代化
- **Large Aircraft: APU Technology**
大型飞机: APU (辅助动力装置) 技术
- **Small Aircraft: Propulsion Engine Technology**
小型飞机: 推进引擎技术
- **Lower Weight Avionics (e.g. integration)**
更轻的航电设备 (如集成)
- **Better Mechanical Integration**
更好的机械集成
- **Fly by Wire Flight Controls**
电传操纵飞行控制
- **Improved Combustion (APU and Propulsion engines) – Honeywell’s SABER program**
改善燃烧过程 (APU及推进引擎) - 霍尼韦尔 SABER项目

Air Traffic Modernization

空中交通现代化

Key Elements 主要模块

Ground Station

- SmartPath GBAS
- Turnkey Install, Support, Training
- Lifecycle Logistics
- 地面站
- SmartPath GBAS
- 项目筹划安装、支持和培训
- 项目周期物流

Navigation

- Inertial Navigation
- Global Positioning
- 导航
- 惯性导航
- 全球定位

System Integration 系统集成

Flight Mgmt

- Next Gen Upgrades
- 4D Trajectories
- Data Routing
- NextGen升级
- 飞行管理
- 4D轨迹
- 数据路由

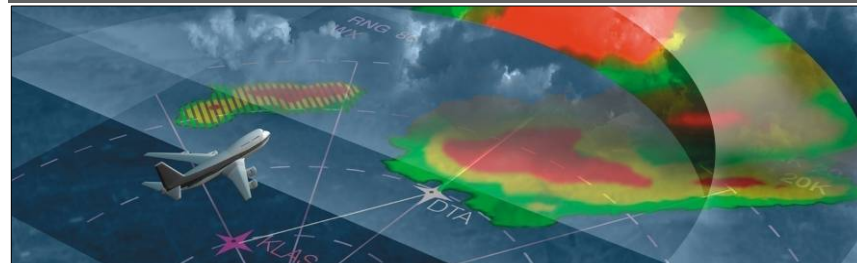
Data Link

- Traffic & Weather
- ADS-B
- Multi-Mode Data Link
- SATCOM
- 数据链
- 交通&气象
- ADS-B
- 多模式数据链
- SATCOM

Displays

- ADS-B Display
- Advanced Weather
- Airport Surface Mgmt
- 显示
- ADS-B显示
- 先进气象显示
- 机场地面管理

Solutions 解决方案



- Legacy System Inefficient – Upgrade
- 老旧系统不敷使用 - 升级
 - Precision Navigation / Surveillance
 - 精确导航/监控
 - Advanced Flight Planning / Controls
 - 先进飞进计划/控制
 - Data Communications / Displays
 - 数据通信/显示
- ~\$6B Annual Industry Value Created
- 每年创造约60亿美元产业价值
 - Reduced Fuel and Emissions
 - 减少燃油消耗与排放
 - Improved Schedule Certainty
 - 航班更加准时

Significant Value in Improving Safety, Efficiency, Capacity

在提高安全、效率及容量方面有巨大价值

Honeywell NextGen 4D FMS

霍尼韦尔NextGen 4D FMS

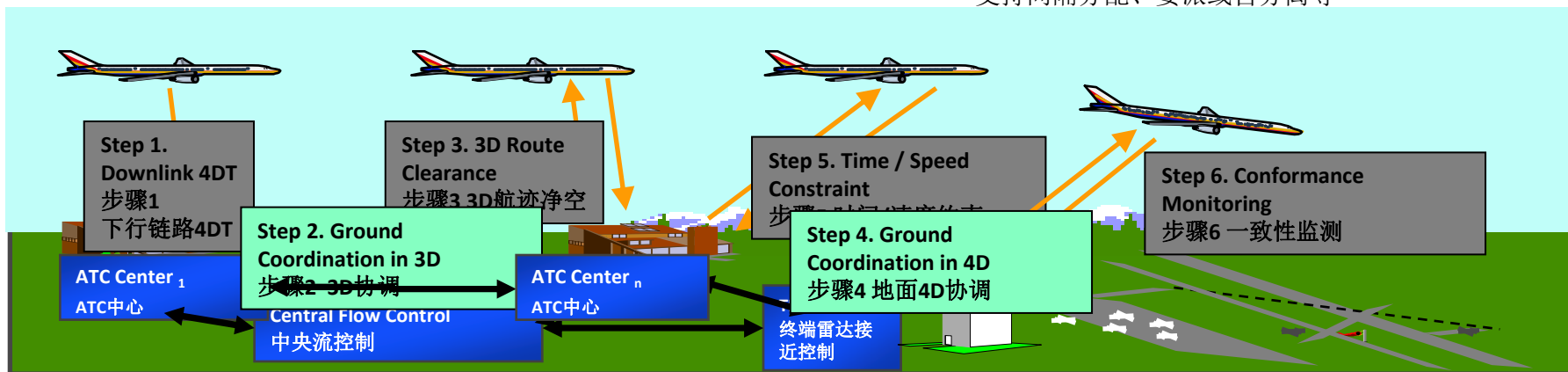
– Analyze, negotiate and execute User preferred trajectories

- 分析、协商、执行用户喜欢的航迹
 - Dynamic 4D flight planning & negotiations
 - 动态4D飞行计划&协商
 - Time Of Arrival Control (TOAC) in taxi, climb, cruise and descent
 - 滑行、爬升、巡航及下降中的到达时间控制 (TOAC)
 - Graphical flight planning 图形化飞行计划

– Reduced emissions flights

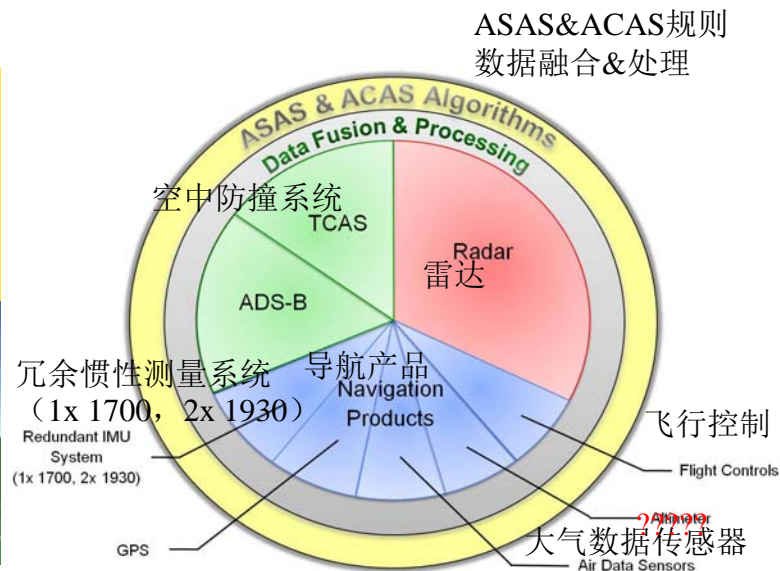
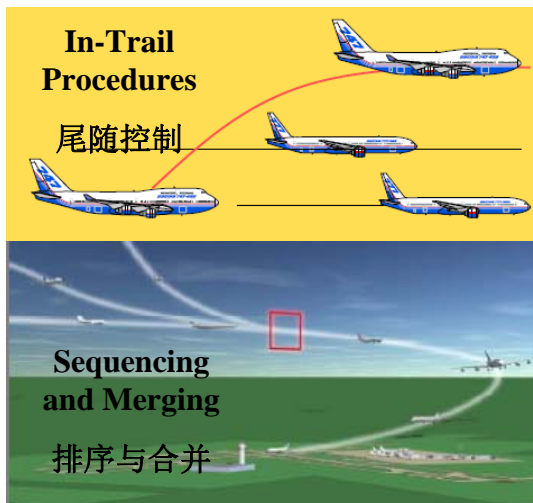
- 减少航班排放
 - Enhanced CDA's 增强型CDA
 - Continuous climbing cruise 连续爬升巡航

- Integration with Data Comm
 - 与数据通信集成
 - Trajectory intent data downlinks
 - 航迹目标数据下行链路
 - Time based trajectory clearance uplinks
 - 基于时间的航迹净空上行链路
- Integration with onboard and external weather sources
 - 与内置及外置气象源集成
 - Integration with 4D weather cube
 - 与4D气象导航立方体集成
 - Grid based weather modeling
 - 基于网格的气象建模
- Integration with Separation Management functionality
 - 与独立管理功能集成
 - Support Merging and spacing, delegated or self separation, ...
 - 支持间隔分配、委派或自分离等



Airborne Separation Assurance & Collision Avoidance Automatic Dependant Surveillance - Broadcast 空中隔离保障与防碰撞 广播式自动相关监控

- ADS-B Out
 - Augments Mode-S transmissions to include more detail and accuracy about aircraft position/velocity, based on GPS
基于GPS对S模式传输进行增强，使飞机位置/速度信息更详细、更准确
 - Hosted in the Mode-S Transponder (may also be UAT in the United States)
 - 集成在S模式转发器中（在美国也可作为UAT（通用访问收发器））
- ADS-B In
 - ADS-B traffic information is used by aircraft and ground stations to improve safety, efficiency, and capacity
 - 飞机及地面控制站可使用ADS-B交通信息来提高安全、效率与容量
 - Aircraft ADS-B In capability is typically hosted within the TCAS
 - 飞机ADS-B In功能通常集成在空中防撞系统中
 - Utilizes a traffic display (e.g. on aircraft Nav Display or EFB)
 - 有交通显示（如机载导航显示或电子飞行包）



Honeywell SmartTraffic™

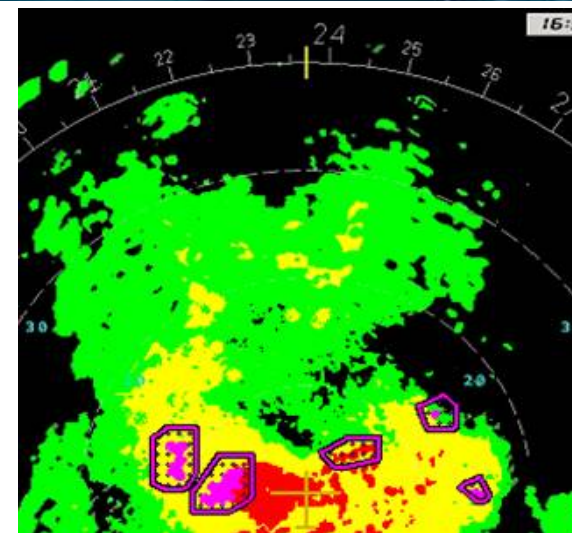
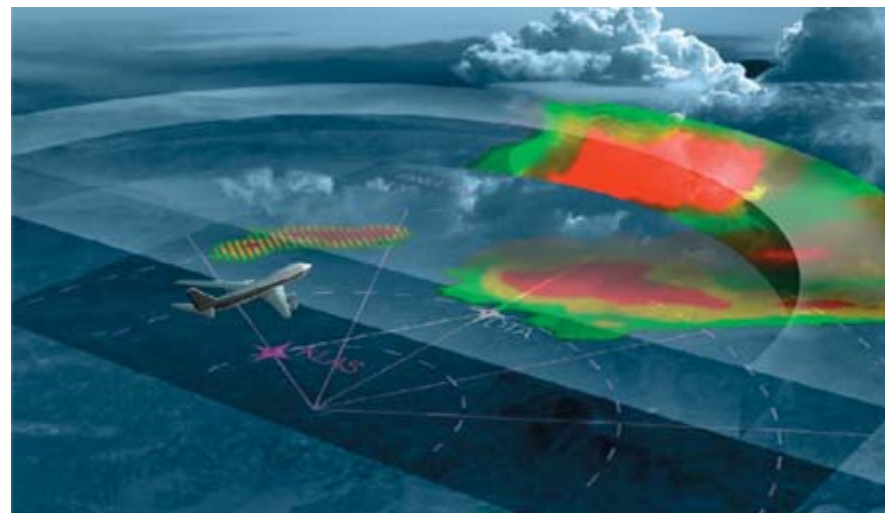
霍尼韦尔SmartTraffic™

- SmartTraffic is the family name of ADS-B enabled functions hosted within Honeywell TCAS / Traffic Computers
- SmartTraffic是ADS-B系列的总称，可使用霍尼韦尔空中防撞系统/交通计算机内配置的功能
- SmartTraffic includes airborne ADS-B In applications such as:
- SmartTraffic包括以下空中ADS-B In应用：
 - Hybrid Surveillance 混合监控
 - Cockpit Display of Traffic Information (CDTI) 驾驶舱交通信息显示 (CDTI)
 - In-Trail Procedure (ITP) 尾随控制 (ITP)
 - Visual Separation on Approach (VSA) 视觉接近分离 (VSA)
 - Surface (SURF) and Surface Indications and Alerts (SURF IA) 地面 (SURF) 与地面指示及警告 (SURF IA)



Honeywell Advanced Cockpit Airborne Weather Products (RDR 4000) 霍尼韦尔先进驾驶舱空中气象产品 (RDR 4000)

- **Advanced weather decision-aiding for crews.**
- 机组人员先进气象决策及帮助系统
- **Vertical Profiling of Weather**
- 气象垂直廓线
- **Onboard Wx Radar Detection range**
- 机载Wx雷达探测范围
 - Weather and ground map: at least 320nm
 - 气象与地面地图：至少320nm
 - Turbulence: 40 nm or greater
 - 湍流：40nm或更大
 - Windshear: at least 5 nm
 - 风切变：至少5nm
- **Processing to determine “no-fly” areas**
- 帮助确定“禁飞”区
- **Display provides indication of type and severity of weather hazard**
- 可显示气绥危害的类型与严重程度
 - Turbulence 湍流
 - Lightning 闪电
 - Hail ... 冰雹
- **Wx radar R&D: 3D Cube Weather Integration**
- Wx雷达研发：3D立方体气象导航



SmartPath – GBAS

- Satellite Navigation for Aviation
- 卫星导航
- GBAS Architecture, Uses
- GBAS架构，用途
- Value of GBAS
- GBAS的作用
 - Increased safety
 - 增加安全性
 - Increase airport capacity
 - 提高机场容量
 - Increased availability
 - 提高可用性
 - Reduced cost
 - 减少成本



Runway Safety begins with Final Approach
五边近进是考验跑道安全的开始

Honeywell in NextGen and SESAR 霍尼韦尔参与NextGen与SESAR项目

- Honeywell active in multiple FAA NextGen projects
- 霍尼韦尔参与了多个FAA的NextGen项目
 - ADS-B Surface Indicating and Alerting
 - ADS-B地面指标与警告
 - ADS-B In Trail Procedures
 - ADS-B尾随控制
 - Data Communications Avionics
 - 数据通信航电设备
 - SE 2020 Boeing Team Member - \$1.7B Ceiling Value over 10 years
 - SE 2020波音团队成员 - 10年间创造了17亿美元的最高价值
- Honeywell active in multiple JPDO Working Groups
- 霍尼韦尔参与了多个JPDO工作组
 - Aircraft — Environmental — Network Centric Operations
 - 飞机 - 环境 - 网络化运营
- Honeywell roles in SESAR
- 霍尼韦尔在SESAR项目中的作用
 - Lead 7 aircraft projects
 - 主持7项飞机项目
 - Participating in 16 other projects
 - 参与16项其它项目
 - 40M€ over 8 years
 - 8年间4000万英镑
- Honeywell's international involvement will help harmonization between NextGen and SESAR
- 霍尼韦尔的国际经验将有助于协调NextGen与SESAR项目





Thank you for your time
感谢您的宝贵时间