



# China Civil Aviation Report

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# 民航报导

## AVIC International Successfully Acquired Continental Motors 中航国际成功收购美国大陆发动机公司



## China Independently Developed Modern Ark 600 Aircraft was Put into Use 中国自主研发的新舟600飞机投入使用

## First Joint Venture for China's Large Aircraft Project Got Approved and Announced Its Establishment 中国大飞机项目第一家获批合资企业宣布成立

## Seven Industrial Standards Passed CAAC Validation 民航二所七项行业标准通过民航局审定

## 值得关注的 [ADS-B 1090ES数据解决方案]

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Publisher 发行人  
Francis Chao 赵嘉国

Chief Editor 总编辑  
Lili Wang 汪莉莉

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To contact CCAR or subscribe to CCAR, please send your email to: [Info@ChinaCivilAviation.com](mailto:Info@ChinaCivilAviation.com) or visit: [www.ChinaCivilAviation.com](http://www.ChinaCivilAviation.com)  
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China Civil Aviation Report  
c/o Uniworld LLC  
690 Garcia Ave, Ste. A  
Pittsburg, CA 94565  
Tel: 925-439-3799 ext. 12#  
Fax: 925-439-3268  
北京联系电话：86-10-8559 0830  
传真：86-10-8559 0830 ext. 215

## Li Jiexiang Met Raymond Benjamin, the Secretary General of the ICAO

### 李家祥会见国际民航组织秘书长雷蒙·邦雅曼

May 10th, Li Jiexiang, Minister of the CAAC met with Raymond Benjamin, the Secretary General of the ICAO in Beijing. The two exchanged further on deepening the cooperation between the CAAC and the ICAO.

Li Jiexiang introduced the current developments of the CAAC to Raymond Benjamin, and thanked the ICAO's concerns and support for the CAAC. Li Jiexiang wished to enhance the connections and cooperation between the CAAC and the ICAO for improving international competitiveness, providing the references and help for the development of regional aviation and general aviation.

Raymond Benjamin thanked China and the CAAC for the support and cooperation with the ICAO, confirmed the achievements of the CAAC's rapid progress, and appreciated the help from the CAAC for the staff of the ICAO.

Both sides also exchanged ideas regarding other concerned questions.

5月10日，民航局局长李家祥在北京会见了国际民航组织（ICAO）秘书长雷蒙·邦雅曼先生。双方就进一步深化中国民航与国际民航组织的合作等问题交换了意见。

李家祥向雷蒙·邦雅曼介绍了中国民航的发展情况，并对国际民航组织对中国民航发展给予的关注和支持表示感谢。李家祥希望能够加强中国民航与国际民航组织的联系与合作，为中国民航在提高国际竞争力、发展支线航空和通用航空方面提供有益的借鉴和帮助。

雷蒙·邦雅曼感谢中国和中国民航对国际民航组织的支持与合作，肯定了中国民航快速发展所取得的成绩，并对中国民航选派借调国际民航组织的人员的工作表示赞赏。

双方还就其他关心的问题交换了意见。

## Shanghai Civil Aviation Air Traffic Control Altitude Lowered by 600 Meters

### 上海民航空管高度下调600米

At midnight in Beijing Time on April 7th, the implementation of Air Traffic Management's Eastern Region Airspace Consolidation Program started; the air traffic control altitude of Shanghai area under the management of East China ATMB, CAAC, would lower to 7,800m (not including 7,800m) from the original 8,400m. Air Traffic Management Bureau stated that such measure could gradually improve eastern region's airspace flight environment to minimize flight delays.

At present, the daily average flight flow over Shanghai reaches 3,800 plus movements, and the daily average of movements was more than 4,000 during Shanghai World Expo last year. ATMB indicated the flight activities within Shanghai's civil aviation airspace have increased rapidly in recent years, demands become increasingly urgent that by adjusting the lower limit of air control altitude would ease the pressure over the airspace tension. At the same time, Shanghai Regional Control Center of East China ATMB, CAAC, would take over the command of Hefei, Nanchang and Xiamen's flight activities above 7,800m to gradually consolidate the high altitude airspace resources of the eastern areas.

4月7日，北京时间零时整，民航空管东部地区空域整合方案开始实施，华东空管上海区域管制高度层将由原来8400米（不含）往下调整至7800米（不含）。空管部门表示，此举可逐步改善东部地区空域飞行环境，减少航班延误。

目前上海高空日均飞行流量达到3800余架次，去年上海世博会期间日均高达4000多架次。空管部门表示，近年来上海民航空域范围内飞行活动迅猛增长，需求日益迫切，空管高度下限调整后，上海上空紧张的压力将有所缓解。同时华东空管局上海区域管制中心将接管指挥合肥、南昌、厦门等地的7800米（不含）以上的高空飞行，逐步整合东部地区高空空域资源。



天津滨海国际机场航站楼实景图

## The Phase II of Tianjin Airport Received Approval, 42 Gate Position Increased

### 天津机场二期扩建工程获批 将新增机位42个

A few days ago, the National Development and Reform Commission gave a written reply in regards to the feasibility study report of the expansion of the Phase II project of the Tianjin Binhai International Airport (hereinafter referred to as the Tianjin Airport).

The Civil Aviation Administration of China and the Tianjin Municipal People's Government decided to submit a report to the Central Government asking for approval for starting the expansion of the Phase II project of the Tianjin Airport. In this project, a new terminal stretching 248 thousand sqm, with aprons taking up 322 thousand sqm and supporting services and facilities taking up 42.3 thousand sqm will be built; 42 new gate positions and 3 rapid exit taxiways will be constructed and projects including fuel supply, air traffic control and auxiliary projects around the airport perimeter will be synchronously established. When all finished, Tianjin Airport can meet the transport capability of annual passenger throughput of 25 million persons and cargo & mail throughput of 1.7 million tons.

日前，国家发展改革委批复天津滨海国际机场（简称“天津机场”）二期扩建工程项目可行性研究报告。

中国民用航空局与天津市政府决定报请国家批准启动天津机场二期扩建工程。该工程拟新建航站楼24.8万平方米、站坪32.2万平方米、配套服务设施4.23万平方米，新增机位42个、快速出口滑行道3条，并同步实施供油工程、空管工程、机场外围配套工程。建成后，能满足旅客吞吐量2500万人次、货邮吞吐量170万吨的运输能力。

## Seven Industrial Standards Passed CAAC Validation 民航二所七项行业标准通过民航局审定

In March, the Review Conference of two industrial standards, "The General Aviation Terminology" and "Measurement of the Spraying Rate and Distribution Pattern of Aviation Spraying Equipments" written by The Second Research Institute of the CAAC, was held in Chengdu.

The Review Conference was presided by the Airworthiness Department of the CAAC; the Review Committee was made up by specialists from Airworthiness Department of the CAAC, Transportation Department of the CAAC, China Academy of Civil Aviation Science and Technology, GA Office of the CAAC Southwest Regional Administration, GA College of Civil Aviation University of China, Beidahuang General Aviation Company, Taiyuan Aviation Photography Co. Ltd., Xinjiang Tongyong Airline Co. Ltd. and The Second Research Institute of the CAAC.

The standards written in "Measurement of the Spraying Rate and Distribution Pattern of Aviation Spraying Equipments" were based on references by the American Society for Testing and Materials (ASTM) and the American Society of Agricultural Engineers (ASAE) standards (ASTM E 642-1991 & ASAE S386.2 FEB04), combined with China's Current Works of Agricultural Aviation Spraying; with stronger practicality and feasibility, the established standards would benefit better quality inspection of aviation spraying equipments, specifically the detection process, and improve the quality and efficiency of aviation spraying.

In aspect of aircraft security, the written "Test Methods of Stress Corrosion of Aircraft Engine Cleaning Agents on Titanium" and "Mezzanine Corrosion Test Methods" by The Second Research Institute of the CAAC passed CAAC validation. The implementation of these two standards effectively specify the testing of stress corrosion of aircraft engine cleaning agents on titanium and stress corrosion of aircraft maintenance chemicals on laminated aluminum aircraft structures, which will play an important role on safeguarding the safe operation of aircraft.

In the area of aircraft maintenance, the standards written by The Second Research Institute of the CAAC including "Chlorine-free epoxy and polyurethane paint solvent and paint remover for aircraft", "Cockpit glass cleaner" and "Airplane glue remover" were also passed by the CAAC. These three standards are practical and feasible to fill the gap; they have an important role in guiding the product development, technology level and product quality of the mentioned products.



3月，由中国民航局第二研究所承担编写的《通用航空术语》、《航空喷施设备喷施率和分布模式的测定》两项行业标准审查会在成都召开。

审查会由民航局航空器适航审定司主持，来自民航局航空器适航审定司、运输司、中国民航科学技术研究院、民航西南管理局通用航空处、中国民航大学通用航空学院、北大荒通用航空公司、太原航空摄影有限公司、新疆通用航空有限责任公司和中国民航局第二研究所等单位的专家组成审查委员会。

《航空喷施设备喷施率和分布模式的测定》标准是在参考美国材料与试验协会（ASTM）和美国农业工程师协会（ASAE）标准（ASTM E 642-1991；ASAE S386.2 FEB04）的基础上，结合中国农用航空喷施作业现状编制的，具有较强的实用性和可操作性，该标准的制定将有利于加强航空喷施设备的质量检测，规范航空喷施设备的检测程序，提高航空喷施作业的质量和效率。

在飞行器安全保障领域，民航二所承担编写的《飞机发动机清洗用品对钛合金应力腐蚀的试验方法》、《夹层腐蚀试验方法》行业标准顺利通过民航局审定。两项标准的实施有效地规范了飞机发动机清洗用品对钛合金应力腐蚀的试验方法，有效地规范了飞机维护用化学品对飞机结构铝合金夹层腐蚀试验方法，对航空器的安全运行将起到重要的保障作用。

在飞机维护领域，民航二所承担编写的《飞机环氧和聚氨酯漆无氯溶剂脱漆剂》、《飞机驾驶舱玻璃清洗剂》、《飞机黏胶去除剂》行业标准也顺利通过了民航局审定。这3项标准均具有实用性和可操作性，均填补了国内空白，它们对飞机环氧和聚氨酯漆无氯溶剂脱漆剂、飞机驾驶舱玻璃清洗剂和飞机黏胶去除剂产品的开发、技术水平及产品品质提升具有重要的指导作用。



## Home-made Aviation Seats Received the Pass from the United States for the First Time 国产航空座椅首获美国“通行证”

KKY400 series aviation seats produced by AVIC Aerospace Life-Support Industries, Ltd. received the FAA-TSO Design Approval (airworthiness certificate) issued by the FAA. May 6th, Zhang Hongying, Director General of the Airworthiness Dept. of the CAAC, issued the Technical Standard Order (TSO) Design Approval of the aviation seats to Ma Yongsheng, Chairman of AVIC Aerospace Life-Support Industries, Ltd. This marks the first time that domestic aviation seats obtained the pass to enter the US market, which gives the China civil aviation industry the wings for flying to the international market.

The successful obtaining of the FAA-TSO Design Approval for KKY400 series aviation seats will assist AVIC Aerospace Life-Support Industries, Ltd. to access this application into both domestic and international airlines. At the same time, it makes it a possibility to be the seat supplier to Boeing for the orders from domestic airlines. It also means that the airborne products and equipments for ARJ21-700 has fully passed the international airworthiness certification, which will benefit the airworthiness certification for ARJ21-700.

中航工业旗下的航宇救生装备有限公司生产的KKY400系列航空座椅取得美国联邦航空局（FAA）签发的《FAA-TSO设计批准函》（适航证件）。5月6日，民航局适航审定司司长张红鹰在北京将该款座椅的《技术标准规定项目设计批准函》颁发到中航工业航宇公司董事长马永胜手中。这标志着国产航空座椅首次获得了进入美国市场的通行证，为中国民航业“飞”向国际市场插上了翅膀。

KKY400系列航空旅客座椅成功争取FAA-TSO设计批准函将有助于航宇公司座椅产品在国内国际航空公司的应用，同时也为航宇公司成为波音飞机座椅供应商打通了道路，使得国内航空公司直接选择航宇公司座椅在国外配装新引进的波音飞机成为可能。也标志着ARJ21-700飞机单独取证的机载成品和设备全面通过了国际适航认证，将有助于ARJ21-700飞机的FAA取证工作。

## CAAC and U.S. Trade Development Agency Signed an Agreement 民航局与美国贸易发展署签订协议

On April 19th, in Beijing, Deputy Minister of the CAAC, Xia Xinghua, met with Director of U.S. Trade Development Agency, Ms. Lee Zak. The two signed an agreement on launching the U.S.-Sino Aviation Cooperation Program in 2011. Through negotiation by related units of the two parties, concerned U.S. government units and aviation enterprises intended to offer the CAAC 880 thousand US dollars for three U.S.-Sino aviation cooperation programs, including training senior civil aviation management personnel and senior air traffic management personnel, improving China's ATC flow to reduce flight delays and reducing the impact on the environment.

On April 6, 2004, the CAAC and U.S. Trade Development Agency signed the Wright Brothers US-China Aviation Cooperation Program (ACP) at the China-U.S. Aviation Cooperation Forum, which marked the official establishment of the program. The established ACP aims at providing professional training for China's aviation professionals in China and America, boosting broad cooperation between China and U.S. in the aviation industry, and assisting China's aviation professionals to establish and operate safe and effective aviation framework.

From 2004 to 2010, U.S. Trade Development Agency had granted China civil aviation 6 times with a total of 6.99 million US dollars for Sino-U.S. aviation cooperation programs in civil aviation personnel training, aircraft airworthiness, flight standards management, ATC and airport management, etc., and had achieved good results.

4月19日，民航局副局长夏兴华在京会见了美国贸易发展署署长Lee Zak女士，双方就2011年开展美中航空合作项目签订了协议。

经中美双方有关部门协商，美国有关政府部门和航空企业有意在2011年度向民航局提供88万美元，用于开展民航高级管理人员培训、空管人员高级管理培训，以及提高中国空管流量以减少航班延误和降低对环境的影响等三个美中航空合作项目。

2004年4月6日，民航局和美国贸易发展署在中美航空合作论坛上签署了莱特兄弟美中航空合作项目（ACP）备忘录，正式宣布该项目成立。莱特兄弟美中航空合作项目（ACP）的成立，旨在为中国航空专业人士在中国或美国提供专业培训，促进美中两国在航空业的广泛合作，协助中国航空专家建立和运行安全有效的航空构架。

从2004年到2010年，美国贸易发展署已经6次向中国民航提供了共计699万美元的赠款，用于民航系统人员培训、航空器适航审定、飞行标准管理、空中交通管理、机场管理等方面的中美航空合作项目，并取得了良好效果。

## Li Jian Met with Ramon Gutierrez and Delegates from the Philippines 李健会见菲律宾民航局长GUTIERREZ一行

In the morning of April 26, 2011, Li Jian, Deputy Minister of the CAAC, met with Ramon S. Gutierrez, Director General of Civil Aviation Authority of the Philippines, and delegation. Both parties participated in the friendly and sincere exchange, recognized the achievement in airworthiness cooperation for MA60 aircraft exporting to the Philippines, and expressed the common will of unfolding cooperation in more aspects of civil aviation.

4月26日上午，李健副局长在民航局会见了菲律宾民航局长GUTIERREZ一行，双方进行了坦诚友好的交流，肯定了MA60飞机出口菲律宾适航合作方面取得的成果，并表达了将在民航更多领域开展合作的共同意愿。



## Global Aviation Standard Parts Giant Stationed in Zhuhai Aviation Industrial Park 全球航空标准件巨头进驻珠海航空产业园

March, AVIC International Zhuhai Company Limited and Canada Interfast Group held a Joint Venture Intent signing ceremony in Hong Kong during the Asian Aerospace 2011. Both sides determined to establish a joint venture in Zhuhai City, a joint investment of US \$10,000,000, to setup in Zhuhai Free Trade Zone the aviation standard parts (fasteners) bonded warehousing integrated supply base.

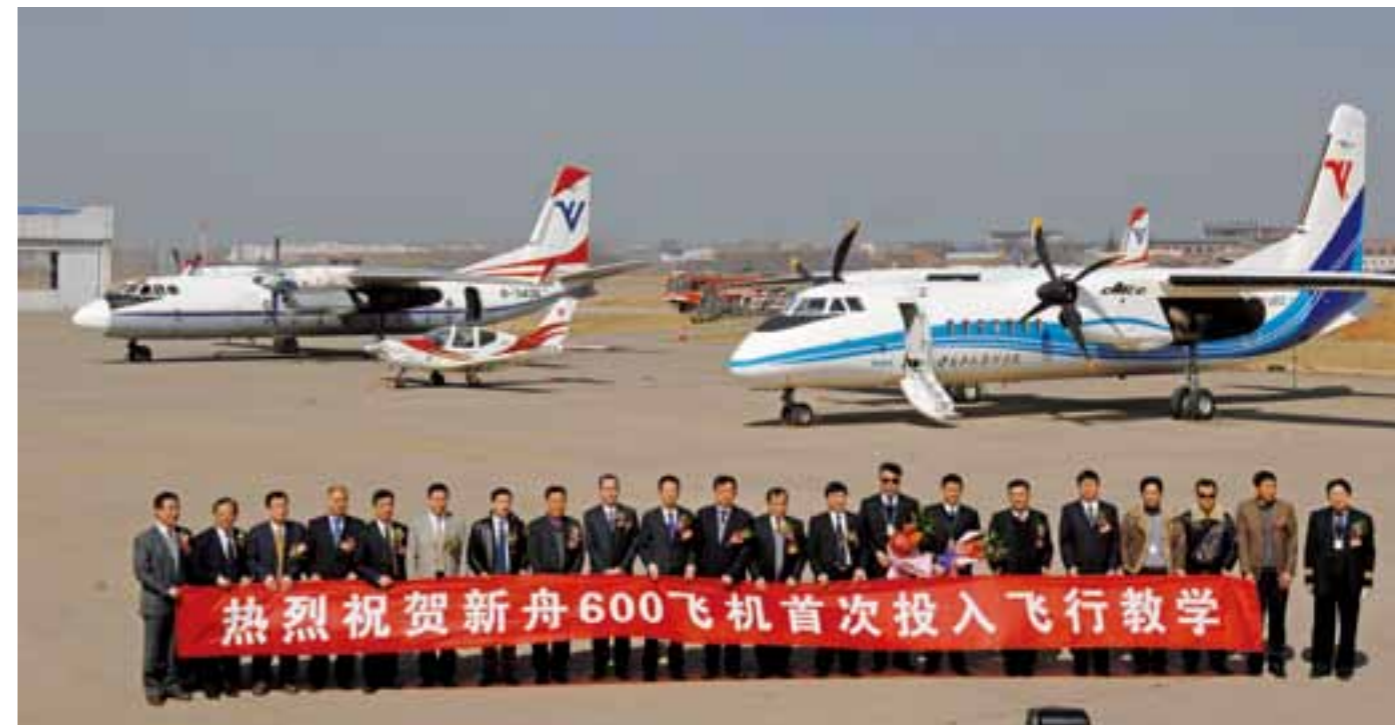
Canada Interfast Group is a leading global supplier of integrated aviation standard parts, has a unique business model, in particular, being the only worldwide supplier with an extensively experienced team of engineers and designers whom can provide customers a full range of supply chain management service from product design, consultation to solving special problems. The unique work package facilities, fine products and services of Interfast earn trust from Boeing, Airbus, Bombardier and Chinese aviation manufacturers.

The partnership will also actively promote the integration of China's aviation standard parts into the global aviation industry chain. The cooperating partners will complete within three months the related feasibility study and business plan, build efficient teams as soon as possible, and carefully manage and operate to ensure commercial success. Follow by further increase investment and integration of industrial chain, the joint venture is built as a world-class aviation standard parts supplier that will greatly enrich the contents of Zhuhai Aviation Industry and promote the development of aviation industry.

3月，中国航空技术珠海有限公司与加拿大Interfast公司，在香港2011亚洲航展期间举行了合资意向签字仪式，双方确定将在珠海市成立合资公司，共同投资1000万美元，在珠海保税区设立航空标准件（紧固件）保税仓储集成供应基地。

加拿大Interfast公司是全球领先的航空标准件集成供应商，具有独特的商业模式，特别是作为全球唯一拥有一资深经验的工程师和设计团队的航空紧固件供应商，可以为客户提供从产品设计、咨询到特殊问题解决等全套的供应链管理服务。该公司独特的工作包配套、精益的产品和服务得到波音、空客、庞巴迪及中国航空制造企业等信赖。

这项合作也将积极推动中国航空标准件融入全球航空产业链，合作双方将在三个月内完成相关的可行性论证和商业计划书，尽快组建高效团队，精心管理和运营，确保商业成功。随后通过进一步加大投入和整合产业链，把合资公司打造成为世界一流的航空标准件供应商，将极大地丰富珠海航空产业的内容，促进航空产业的发展。



## China's Independently Developed Modern Ark 600 Aircraft was Put into Use 中国自主研发的新舟600飞机投入使用

On March 26th, the first "Made in China" new turboprop regional aircraft MA 600 (Modern Ark 600) replaced the Y7-100, an aircraft which has served 20 years with nearly 20,000 hours of safe flight for training China's civil aviation pilots, in Luoyang College of Civil Aviation Flight University of China (the cradle of civil aviation pilots) to assume the mission of the Civil Aviation Advanced Trainer. The retired #B3435 Y7 aircraft symbolizes China's independently developed third generation regional aircraft, the MA 600, enters the civil aviation market.

Jiang Jianjun, General Manager of AVIC Xi'an Aircraft Industry (Group) Co., Ltd. introduced that MA 600, subsequent to MA 60, is the third generation new turboprop regional aircraft developed by AVIC Xi'an Aircraft Industry with independent intellectual property rights. The MA 600 can accommodate 60 passengers; besides using the most advanced electronic displays in the cockpit, many new technologies and new materials are being used. The MA 600 uses only 700 kg of fuel per hour, lower than other similar international products, and needs only 30 seconds from start to roll off, while international same type of aircraft required 35 seconds.

After #B-3435 Y7 aircraft served its purpose as flight trainer, it will soon fly to China Civil Aviation Flight University at Guanghan Airport and takes the role as training aircraft for civil aircraft maintenance to continue its contribution in building the powerful civil aviation nation.

3月26日，首架“中国造”新型涡桨支线客机新舟600飞机，在被誉为“民航飞行员摇篮”的中国民航飞行学院洛阳分院接替了另一架为培养中国民航飞行员服务长达20年，安全飞行近2万小时的运七-100飞机，担当起民航高级教练机的使命。这架编号为B3435号运七飞机退役，标志着我国自行研制的第三代支线客机——新舟600进入民用航空市场。

中航工业西飞国际总经理蒋建军介绍，新舟600是继新舟60之后，西飞国际研制的拥有自主知识产权的第三代新型涡桨支线客机。该型飞机载客60人，除驾驶舱采用最先进的电子显示屏外，还大量采用了新技术、新材料，新舟600每小时耗油仅700公斤，低于国际同类产品，从开车起步到滑跑升空，只需30秒，而国际同类型飞机需要35秒。

B-3435号运七飞机功成身退后，将于近日飞往中国民航飞行学院广汉机场，并以民航机务维修实习飞机的角色，继续为民航强国建设发挥余热。



合资双方于2009年12月签订合资框架协议

## First Joint Venture for China's Large Aircraft Project Got Approved and Announced Its Establishment

### 中国大飞机项目第一家获批合资企业宣布成立

The world's leading power management company, Eaton, announced on April 6th that it has officially set up in Shanghai a joint venture with COMAC Shanghai Aircraft Manufacturing Company Ltd., a subsidiary of Commercial Aircraft Corporation of China, Ltd., to support Commercial Aircraft Corporation of China's C919 large aircraft project. The newly formed Eaton Shangfei (Shanghai) Air Conveyance Manufacture Co., Ltd. will become the first joint venture enterprise obtaining the business license among many that were to be set up for the large aircraft project.

At present, this is also the first time for Commercial Aircraft Corporation of China to organize a joint venture with a foreign company directly. The new joint venture will design, develop and manufacture the fuel and hydraulic conveyance system for civil aviation market worldwide, and provides after-sales supports.

It is understood that the joint venture partners signed the joint venture framework agreement in December, 2009. Within the new joint venture, COMAC Shanghai Aircraft Manufacturing Company Limited holds 51% stocks while Eaton holds 49%.

全球领先的动力管理公司伊顿公司4月6日宣布，已与中国商用飞机有限责任公司（简称“中国商飞”）下属的上海飞机制造有限公司（简称“上飞”）正式在上海成立合资公司，以支持中国商飞C919大型客机项目。新成立的伊顿上飞（上海）航空管路制造有限公司将成为多家为国产大飞机项目设立的合资公司中首家获得营业执照的企业。

同时，这也是中国商飞首次直接与外资公司联合组建的合资公司。新合资公司将为全球民航市场设计、开发和制造燃油液压管路系统，并提供售后支持。

据了解，合资双方于2009年12月签订了合资框架协议。新合资公司中，上飞持股51%，伊顿持股49%。

## Li Jian Led Delegation to USA to Study New Aviation Technology

### 民航局副局长李健率团赴美国考察航行新技术

On March 16-20, Li Jian, Deputy Minister of the CAAC, led the Flight Standards Department, ATMB and other related department representatives to the United States to study the construction situation of Automatic Dependent Surveillance-Broadcast (ADS-B), and listened to the current progress of ADS-B construction from Federal Aviation Administration (FAA) and ITT. They visited the FAA Control Center in Philadelphia, and attended the Pudong-New York route ADS-B inspection flight of China Eastern Airlines Corporation Limited.

Deputy Minister Li Jian emphasized that the whole industry needed to value highly the important supports of new technology application towards civil aviation backed powerful nation. He said that ICAO has confirmed ADS-B as the main direction of future monitoring technology development; aviation industries worldwide have actively promote such technology application, and it has significant effect in ensuring China civil aviation's continued security as well as improved airspace utilization. He requested relevant departments to use China Eastern Airlines' Pudong-New York route ADS-B inspection flight as an opportunity to speed up the building of relevant regulations, standards, procedures and controls pertaining to ADS-B, making effective, progressive promotion of new technology.

FAA officials introduced to Deputy Minister Li and delegates the overall situation of the ADS-B project. In order to handle the aviation growth for the next 20 years, the United States suggests building the new generation aviation transport system (NexGen), and ADS-B is one of the core technologies. FAA has asked that beginning from January 1, 2020, all aircraft must install ADS-B electronic equipments as required to achieve ADS-B monitoring feature. 300 stations have been constructed at present that can track nearly over half of the transport aircraft within US. Among them, the Philadelphia Terminal Control Centre, as the pre-pilot, has fused the ADS-B signal and radar signal for the actual control command.

3月16日至20日，李健副局长率飞行标、空管局等有关部门考察了美国广播式自动相关监视（ADS-B）建设情况，听取了美国联邦航空局（FAA）及美国ITT公司有关美国ADS-B建设进展情况的介绍，参观了FAA费城管制中心，并参加了中国东方航空股份有限公司（简称“东航”）浦东——纽约航线ADS-B验证飞行。

李健副局长强调，全行业要高度重视新技术运用对民航强国建设的重要支撑作用。他说，国际民航组织（ICAO）已将ADS-B确定为未来监视技术发展的主要方向，国际航空界正在积极推进这项技术的应用，这项技术在确保中国民航持续安全和提高空域利用率等方面具有显著作用，他要求相关部门以东航浦东——纽约航线ADS-B验证飞行为契机，加快ADS-B相关规章、标准、程序、管制等方面的建设，使新技术有序、高效推进。

FAA官员向李健副局长一行介绍了美国ADS-B建设总体情况。为应对未来20年航空量的增长，美国提出了建设新一代航空运输系统（NexGen），ADS-B是其核心技术之一。FAA已要求从2020年1月1日起，所有航空器都必须强制安装ADS-B电子设备，实现ADS-B OUT监视功能，目前已完成300个台站的建设，可追踪国内近半数以上的运输飞机。其中，费城终端管制中心作为先期试点，已将ADS-B信号与雷达信号融合，用于实际的管制指挥。

## Li Jian Met with CEO of Honeywell Aerospace

### 李健会见霍尼韦尔公司总裁

On April 12th, in Beijing, Li Jian, Deputy Minister of the CAAC, met with Tim Mahoney, President and CEO of Honeywell Aerospace, and exchanged in-depth the opinions toward the communication and cooperation between the CAAC and Honeywell Aerospace.

4月12日，民航局副局长李健在北京会见了霍尼韦尔全球总裁兼首席执行官马天明（Tim Mahoney），就双方之间的交流与合作深入交换了意见。



## Commercial Aircraft Corporation of China and Pratt & Whitney Signed a Memorandum of Training Cooperation

### 中国商飞与普惠公司签署培训合作备忘录

On April 27, Pratt & Whitney, representing United Technologies Corporation, signed at Beijing a Memorandum of Understanding on Training Cooperation with Commercial Aircraft Corporation of China.

According to the Memorandum, United Technologies Corporation and Commercial Aircraft Corp. of China are working together in high level training aspects such as leadership development for mid to high level management staffs, project management and Achieving Competitive Excellence (ACE). The training plan is carried out by Pratt & Whitney Training Center, with supports from Hamilton Sundstrand Corporation and Sikorsky Aircraft Corporation, to provide the unique training courses for high management groups, mid-level leaders and high potential workers. The training plan starts in mid-year. Pratt & Whitney is a subsidiary of United Technologies Corporation.

4月27日，普惠公司代表联合技术公司与中国商用飞机有限责任公司在京签署了培训合作谅解备忘录。

根据该合作谅解备忘录，联合技术公司与中国商飞在中高级管理人员领导力培养、项目管理、获取竞争优势 (ACE) 等高层培训方面进行合作。该培训计划由普惠培训中心实施、汉胜公司和西科斯基公司协助，提供针对高级管理层、中层领导和高潜力员工的专属培训课程。培训计划于今年中开始。普惠公司是联合技术公司的子公司。



## CDB Leasing Co. (CLC) Ordered 30 E190 jets, to be operated by China Southern Airlines

### 国银租赁订购30架E190喷气飞机 由南航运营

On April 12th, Embraer S.A., CDB Leasing Co. (CLC) and China Southern Airlines Company Limited hosted a signing ceremony in Beijing. CDB Leasing Co. (CLC) confirmed the increase purchase of 10 E-190 jets as the follow-up order for the purchase of 10 E190s earlier this year. At the signing ceremony, the three parties signed the letter of intent for another 10 E190s. Once the letter of intent becomes the firm order, the total purchase number of CDB Leasing Co. (CLC) will reach 30, at list price, will total 1.25 billion US dollars.

The 30 E-190 purchased by CDB Leasing Co. (CLC) will be operated by China Southern Airlines.

4月12日，巴西航空工业公司 (Embraer S.A.) 与中国国银金融租赁有限公司和中国南方航空股份有限公司在北京举行三方签约仪式。国银金融租赁有限公司确认增购十架E-190喷气飞机，做为今年年初签署的十架E-190飞机购买协议的后续订单。在该签约仪式上，三方还签署了购买另外十架E-190飞机的意向书。若未来意向购买顺利转为确定订单，则国银金融租赁订购的E-190飞机数量将达30架，目录价格总值达12.5亿美元。

由国银金融租赁订购的30架E-190喷气飞机将全部由中国南方航空公司运营。

## China and The Republic of Cameroon Signed Flight Agreement Between Governments

### 中国与喀麦隆签署政府间航班协定

CAAC Minister Li Jiayang and Minister of State, Minister of Transport of The Republic of Cameroon, Mr. Bello Boubu Maigari, representing his government respectively, signed in Beijing the official "Agreement on Establishing Regular Flights on Lands Between and Beyond The People's Republic of China & The Republic of Cameroon".

According to the Agreement, both parties can appoint several airlines to open flights between the two nations with origins from their own country, through any mid-point to any 3 chosen destinations of the counterpart as well as any points beyond. The transport capacity is 7 flights weekly, and airlines can conduct domestic and bilateral code-sharing. Cameroon Airlines Corporation plans to open flight route from Cameroon to China after signing the Agreement.

At the signing ceremony, Li Jiayang and Mr. Maigari exchanged their opinions on concerned topics of civil aviation of China and Cameroon. Li Jiayang welcomed Mr. Maigari and his delegation, said the Agreement signing had a special meaning at the 40th Anniversary of China-Cameroon diplomatic relations. At present, air transportation has become the most convenient means connecting China and Africa; the China-Cameroon flight agreement and the opening future flight routes have a positive meaning in promoting bilateral relations between the two countries and further strengthening the cooperation between the two countries.

Mr. Maigari stated that the Agreement marked the entry of a new stage for communications and cooperation between Cameroon and China. The signed agreement and the future opening of China-Cameroon flight routes can better serve Cameroon's economy while having positive significance toward its neighboring countries.

China and Cameroon established diplomatic relations in 1971. As understood, the civil aviation authorities of the two nations had held in Beijing an aviation forum in 2009; both primarily agreed and signed the memorandum of understanding on air transportation draft agreement and related flight rights arrangement between the governments of China and Cameroon.

Until now, China has signed the official aviation transportation agreements with 16 African nations, and signed the initial air transportation agreements with 6 African nations, a legal foundation laid for the development of civil aviation relations between China and African countries.

4月21日，民航局局长李家祥与喀麦隆交通部长马伊加里分别代表中喀两国政府在北京正式签署了《中华人民共和国政府与喀麦隆共和国政府关于在两国领土之间及其以远地区建立定期航班的航班协定》。

根据航班协定，双方可指定多家航空公司在两国间开通从本国境内地点起飞，经过任何中间点至对方任意自选的3个目的点以及任何以远地区的航线。双方运力为每周7班，航空公司可以进行本国及双边代号共享。航班协定签署后，喀麦隆航空公司计划开通喀麦隆至中国的航线。

签字仪式上，李家祥与马伊加里就中喀两国民航领域关心的话题交换了意见。李家祥首先对马伊加里部长一行的到来表示欢迎。他说，在中喀两国建交40周年之际，两国签署航班协定有着特殊的意义。目前，航空运输已经成为连接中国和非洲之间最便捷的交通工具，中喀航班协定的签署和未来航线的开通对于促进两国之间的双边关系以及进一步加强两国之间的合作有着积极的意义。

马伊加里表示，中喀航班协定的签署标志着双方交流与合作进入了一个新的时代。中喀航班协定的签署以及未来中喀航线的开通不仅能更好地服务于喀麦隆本国的经济，对于喀麦隆的邻国也有着积极的意义。

中国与喀麦隆于1971年建交。据了解，2009年，两国民航当局在北京举行了航空会谈，就中喀两国政府间航空运输协定文本草案及相关航权安排初步达成了一致，并签署了谅解备忘录。

截至目前，我国已与16个非洲国家正式签署了政府间航空运输协定，与6个非洲国家草签了航空运输协定，为我国与非洲国家民航关系的发展奠定了法律基础。

## China and US Established the High-level Officials Dialogue Mechanism for the Civil Aviation Development Policy

### 中美建立民航发展政策高官对话机制

On May 11th, the CAAC and the US Department of Transportation signed an agreement on the establishment of the high-level officials dialogue mechanism for the civil aviation development policy in Beijing. Xia Xinghua, Deputy Minister, and Susan Kurland, the Assistant Secretary for Aviation and International Affairs signed the agreement on behalf of the two sides.

According to this mechanism, China side assigned the International Dept. of the CAAC, and US side assigned the Aviation and International Affairs of the DOT to be their respective liaisons, discuss the details of the dialogue mechanism. It is understood that the two sides will hold the first meeting soon.

Before signing the agreement, Xia Xinghua and Susan Kurland met each other, and reached a consensus on enhancing the exchange of aviation transportation policies and management, prompting the further development of the two sides' civil aviation relationship.

5月11日，中国民用航空局与美国运输部在北京签署了关于建立中美民航发展政策高官对话机制的协议。中国民用航空局副局长夏兴华与美国运输部助理部长苏珊·科兰德代表双方在协议上签字。

根据中美民航发展政策高管对话机制，中方将指定中国民用航空局国际合作司、美方将指定运输部航空与国际事务办公室作为各自的联络人，就对话机制的具体事务开展讨论。据了解，双方将于近期召开高管对话机制的第一次会议。

协议签署前，夏兴华与苏珊·科兰德举行会谈，就加强交流航空运输领域政策和管理制度、促进两国民航关系的进一步发展达成一致意见。

## Increasing Temporary Flight Routes Become the Major Means for Solving Civil Aviation Flight Congestion

### 增加临时航线成为民航解决航班拥堵主要手段

As flight delays become routine in civil aviation industry, increasing temporary flight routes become the major means of solving flight congestion. Temporary routes account for nearly 20% of the nation's total route distance.

Up to the end of 2010, China had a total of 93 announced code-named temporary routes, a total distance of 29,000 km and 18% of the nation's total route distance.

Wang Wei, Director of Airspace Division of Air Traffic Management Bureau of the CAAC said that if airspace is compared as a piece of cake, there is almost nothing left for further dividing cut, a major cause of difficulty in opening more fixed routes.

At the panel discussion during the annual sessions of the National People's Congress (NPC) and the Chinese People's Political Consultative Conference (CPPCC) National Committee, Su Ling, Chairman of Labor Union and Party Committee Member of CAAC/ATMB, stated that opening temporary flight routes has become the major means to solve flight delays problem in civil aviation at present. Su Ling revealed that during the World Expo 2010 Shanghai, the People's Liberation Army Air Force had released some of the temporary airspace so that East China Region's flight delays were not significant even though the air transport passengers were numerous.

在航班延误成为家常便饭的民航业，增加临时航线成为解决航班拥堵的主要手段，临时航线占全国航线总距离近20%。

截至2010年年底，全国公布代号的临时航线共93条，总距离2.9万公里，占全国航路航线总距离的18%。

中国民用航空局空中交通管理局（简称“民航局空管局”）空域部部长王伟称，如果将空域比作一块蛋糕，目前可够分割的部分几乎已经没有了，这也就造成了开辟固定航线的困难较多。

在“两会”小组讨论上，政协委员、民航局空管局工会主席苏玲表示，目前，开辟临时航线已经成为民航治理航班延误问题的主要手段了。苏玲透露，2010年世博会期间，空军释放了部分临时空域，因此尽管航空输送人数众多，华东地区航班延误却不明显。





## MTU Zhuhai Celebrated 10th Anniversary of Establishment 珠海MTU庆祝成立十周年

"After a decade of development, MTU Maintenance Zhuhai Co. Ltd. has become China's largest, highest-ranking civil aviation engine maintenance base." Praised Yang Xinguo, Deputy Chief Director of the CAAC Central and Southern Regional Administration, at the 10th anniversary of establishment and the 1000th engine maintenance celebration held at Zhuhai Free Trade Zone on April 6 by MTU Aero Engines Maintenance Co., Ltd., marking the birth of China's largest aviation engine maintenance base at Zhuhai.

Ten years ago, China Southern Airlines Co. Ltd. and MTU Aero Engines jointly invested the establishment of MTU Maintenance Zhuhai Co. Ltd. at Zhuhai Free Trade Zone. In 2003, the company officially put into production operation with an annual business volume growth at 35% average. Last year alone, 166 engines were repaired and maintained. Besides servicing China Southern Airlines, the company's third party business is rising yearly, reaching 52% at present, especially the international business which accounts for more than 22% of the total. In just ten years, MTU Zhuhai has become China No.1 aviation engine maintenance base.

"经过十年的发展，珠海摩天宇已经成为国内规模最大、维修等级最高的民航发动机维修基地。" 4月6日，在珠海保税区摩天宇航空发动机维修有限公司举行的成立十周年暨维修1000台发动机庆典仪式上，民航中南管理局杨新国副局长如此称赞珠海摩天宇，标志着中国最大航空发动机维修基地在珠海诞生！

十年前，南航和德国MTU航空发动机公司在珠海保税区联合投资组建了珠海摩天宇。2003年，公司正式投入生产运营，业务量平均每年以35%的速度增长，仅去年一年就完成166台发动机维修。除了服务南航之外，公司第三方业务逐年上升，目前达到52%，尤其是国际业务占到总量的22%以上。仅仅用了十年时间，珠海摩天宇就成为中国第一的航空发动机维修基地。

## Expansion Project for Shenzhen Bao'an Airport Passed Flight Test

### 深圳宝安机场扩建工程顺利通过局方试飞验证

On the 24th of May, CAAC Central and Southern Regional Administration organized its units and successfully accomplished the flight test of the expansion project of the Shenzhen Bao'an International Airport.

The flight zone expansion & reconstruction and navigation equipments of the expansion project of Shenzhen Airport had passed inspection & acceptance on May 10th. The newly built 2nd runway of Shenzhen Airport will go into service on June 30th to meet the ever growing air transportation volume of the airport.

5月24日，中国民用航空中南地区管理局组织辖区单位，顺利完成了深圳宝安国际机场（简称“深圳机场”）扩建工程试飞验证工作。

深圳机场扩建工程项目飞行区扩建改造工程和导航设施设备已于5月10日通过竣工验收。新建成的深圳机场二跑道将于6月30日投入使用，以满足深圳机场航空运输量日益增长的需求。



起飞



机组抵达



过水门

## AVIC International Successfully Acquired Continental Motors

### 中航国际成功收购美国大陆发动机公司

AVIC International Holding Corporation announced on April 20 that it had accomplished the equity settlement for the acquisition of Continental Motors with Teledyne Technologies Incorporated at Mobile City, Alabama, USA. This marked AVIC International's formal completion of the entire acquisition program, owning 100% stake of Continental Motors and Maintenance Services Company.

中国航空技术国际控股有限公司（简称“中航国际”）20日宣布，中航国际已与美国德立达技术公司在美国阿拉巴马州莫比尔市完成了收购美国大陆航空活塞发动机公司（简称“大陆发动机公司”）的股权交割，此举标志着中航国际正式完成了全部的收购程序，拥有了大陆发动机公司及维修服务公司的100%股权。

## Air China Southwest Branch Introduced Their 2nd A330-300 into the Fleet

### 国航西南引进第二架空客A330-300新机

In the morning of April 8th, an A330-300 (Registration No. B6530) printed with the phoenix logo for Air China's Southwest Branch, landed in Chengdu Shuangliu International Airport smoothly, officially joining the fleet of Air China's Southwest Branch. This is the 2nd A330-300 for the company, and Air China's Chengdu Branch is looking forward to building Chengdu into an aviation hub by increasing its capacities.

The aircraft took off at the final assembly line in Toulouse, France, and transferred at Beijing for landing in Chengdu. Upon its arrival, the scale of the fleet at Air China's Chengdu Branch reached 62 aircraft. The number of aircraft that are in the Airbus series are 46, 6 of them are A330 series jumbo passenger: 2 are A330-300s, and 4 are A330-200s. As planned, by the end of this year, Air China's Chengdu Branch will introduce another 8 Airbus series aircraft in order to play a greater role in the process of building up the Chengdu hub, and bringing a newer and more comfortable traveling experience to their passengers.

4月8日上午，喷涂中国国际航空股份有限公司凤凰标志的B-6530号空中客车A330-300新机平稳降落在成都双流国际机场（简称“成都机场”），正式加盟国航西南分公司机队，这是该公司新引进的第二架此型号客机，国航加大运力投入打造成都航空枢纽迈出新步伐。

这架飞机是从空中客车公司法国图鲁兹总装基地起飞、经停北京飞抵成都的，是西南分公司今年引进的第二架空客A330-300飞机。新飞机的到来，使国航西南分公司机队规模达到62架，空中客车系列机队数量达到46架，宽体客机A330系列客机达到6架，其中A330-300型2架，A330-200型4架，根据计划，到今年年底，西南分公司还将引进空中客车系列飞机8架，将在打造成都航空枢纽的过程中发挥更大的作用，给旅客带来更新、更舒适的旅行体验。



国航B6530号A330-300新机内部“超级经济舱”



国航西南分公司迎接新A330-300加盟

## Introduction on the Extraction Technology of ADS-B Data

### ADS-B 1090ES数据提取技术介绍

In recent years, more and more aircraft are being equipped with GPS based navigation tools. This implies that the standard Mode-S reply is enhanced with GPS-based positional information like longitude, latitude and true height; as well as identification information of the targets (downlink format DF17 and DF18).

近年来，越来越多的飞行器开始装备以GPS为基础的导航工具，这意味着配有GPS的标准S模式应答增强了位置信息，例如，经度、纬度和真实高度以及目标的识别信息（下行格式DF17和DF18）。



**ADS-B Extended Squitter (ES)** is transmitted on 1090MHz according to the DO-260/ED102 MOPS. ADS-B signals can easily be received on RF using an **omni-directional antenna** which is placed at sufficient height to avoid screening from the environment nearby (i.e. buildings, obstacles).

ADS-B can for example be received by the **SLS-antenna** when this has a video output on the radar receiver. This video signal can be connected to Intersoft Electronics' Radar Interface Module or RIM782 to extract the pulses and to make ASTERIX CAT021 data.

In case there is no omni-channel available on the radar receiver -or there is even no radar (yet)- you can simply use a **portable setup of ADS-B Receiver (ARF800) and associated antenna** in combination with the same RIM782. Dependent on height and screening, a maximum range of 300NM can be obtained, while 120NM range is sufficient for analysis in the Radar Comparator Dual.

ADS-B data is an interesting alternative source for situational awareness (**Multi Radar Display MRD3**) and can be used as a separate source of target position information. This source of data can be used as the reference data for comparison with radar data (PSR, SSR, Mode-S), which will be under test. In this way, ADS-B data can assist to calculate the radar's Accuracy and Biases by comparing the radar data to this ADS-B data.

Other Intersoft Electronics ADS-B test tools exist, for example an ADS-B target generator (based on the Radar Environment Simulator or RES). This tool generates the ADS-B 1090ES messages at RF for more than 1024 targets simultaneously, including garbling replies which are always present in the heavily loaded 1090MHz environment. The description of this tool is not part of this article.

This article focuses on examples of field applications and methods to record ADS-B data for further use, The **required equipment for extraction of ADS-B replies** and creation of plots from these squitters are listed below:

- **ARF800** and GP-1090 Antenna (in case no SLS-channel of the SSR receiver can be used)
- **RIM782** for sampling of video data, connected with **GPS450** for UTC time synchronization
- **RASS-R Data Handling Module (DHM)** with ADS-B extraction module
- **RASS-R Multi Radar Display 3 (MRD3)** to visualize the extracted ADS-B plots
- High end PC or Laptop

The two key elements of ADS-B plot extraction are the RASS-R DHM software module and the RIM782 video recording device. Besides these, an ADS-B receiver and antenna is required to detect ADS-B messages and convert them into video. Examples of various implementation are discussed below:

### 1. Extraction of ADS-B on SLS channel of SSR radar

The **Side Lobe Suppression channel (SLS or  $\Omega$ )** of a Secondary Surveillance Radar (SSR) can be used to detect the ADS-B messages and convert them to video.

根据DO-260/ED102MOPS文件中的相关协议和标准，ADS-B ES下行传输频率是1090MHz，ADS-B信号可以使用全向天线很容易地接收，但天线放置地点要足够高来避免附近环境的影响（例如高大建筑或障碍物）。

雷达SLS天线可以接收ADS-B数据，雷达接收机可以输出视频信号，视频信号可以和IE的雷达接口模块（RIM782）连接来提取脉冲生成ASTERIX CAT021数据。

如果没有雷达接收机和通道可用或甚至没有雷达，你可以用简单的便携式ADS-B接收机（ARF800）和相关天线接合雷达接口模块（RIM782），根据天线的高度和周围的屏蔽环境，最大的接收范围300海里，然而对于双雷达比较工具来说，用120海里作分析已经足够了。

ADS-B 数据是多雷达显示工具（MRD3）令人感兴趣的可选择数据源，目标的方位信息可以分开使用。这个数据源可以用于雷达测试中（PSR, SSR, MODE-S）的参考数据，这样，基本雷达数据与ADS-B数据进行比较可帮助计算雷达的精准度。

IE其它的ADS-B测试工具，比如ADS-B目标发生器（以雷达环境模拟器为基础），这个工具至少同时产生1024个ADS-B射频目标。包括杂乱的应答环境。这部分的内容不在本文中描述。

本文主要举例描述将来在外场记录ADS-B数据的应用和方法，ADS-B应答的提取和情景的创建所需要的设备为：

- ARF800和GP-1090天线（如果没有二次雷达的SLS通道接收）
- RIM782抽取视频数据连接到GPS450获得精密时间基准
- RASS-R数据处理模块和ADS-B提取模块
- RASS-R 多雷达显示模块显示提取的ADS-B情景
- 高性能的电脑工作站

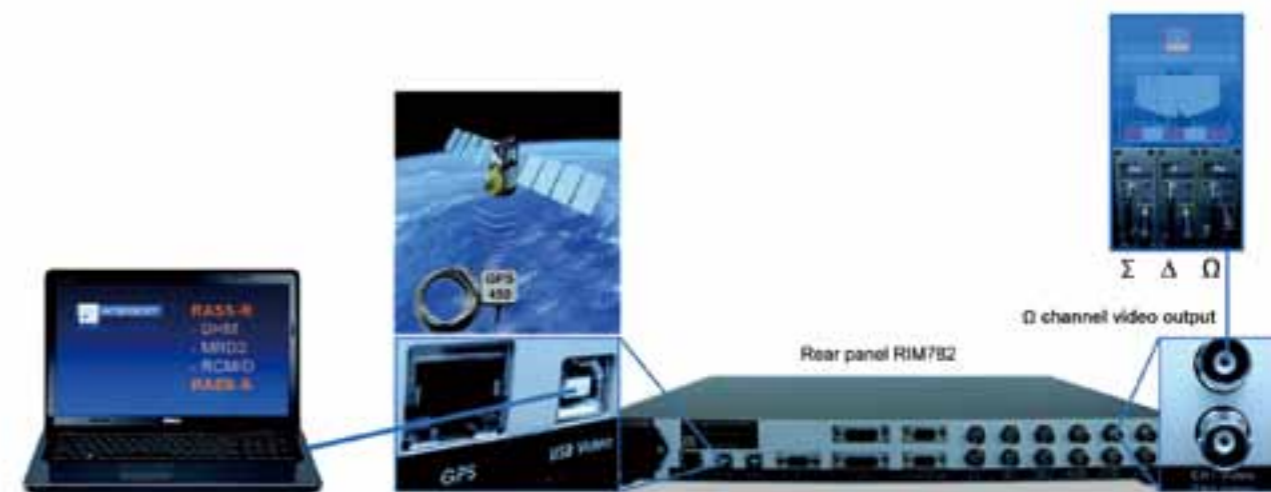
在外场主要有两个ADS-B情景提取工具：RASS-R 数据处理软件模块和视频记录设备RIM782。除了这些，ADS-B 接收机和天线需要检测到ADS-B信息，转换成视频数据、实现方法讨论如下：

### 1. 在二次雷达（SSR）SLS 通道提取ADS-B数据

二次监视雷达（SSR）的SLS（或者 $\Omega$ ）可以用来检测ADS-B信号并转换为视频。

- The SSR (SLS or  $\Omega$ ) receiver channel output has to be connected to the RIM782, for example video channel 1
- The RIM782 can have a GPS450 connected for UTC time synchronization
- The RIM782 is connected to the PC (laptop or desktop), via a USB-2 cable
- This PC requires as a minimum the RASS-R DHM software to be installed, which will retrieve the video of the ADS-B via the setup as defined in paragraph 2.3. Optionally, the MRD3 and the RCM/D, as well as the RASS-S toolbox, can be installed on the PC.

- 二次雷达（SSR）SLS接收机的输出连接到RIM782的通道
- RIM782连接GPS450精密时间基准
- RIM782经过USB线连接到电脑
- 电脑工作站需要安装RASS-R 数据处理模块（DHM），ADS-B，多雷达显示（RMD3）雷达比较（RCM/D）设置以及RASS-S工具箱。



### 2. Extraction of ADS-B data by ARF800 and GP-1090 antenna

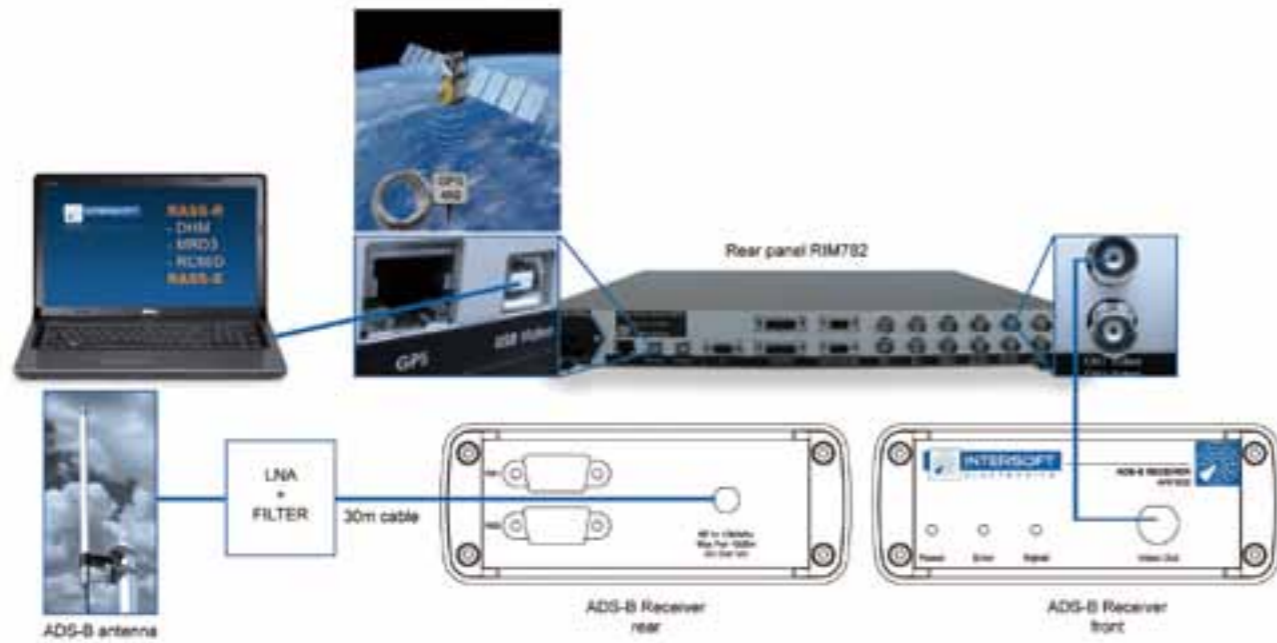
In case there is **no omni-channel** and receiver available on the radar, one can use the **portable setup** consisting of the **ARF800 and GP-1090 antenna**. The GP-1090 is an omni-directional antenna and a horizontal coverage of 360 degrees is predicted. Similarly to when an omni-channel is available on the radar, the RIM782 is used to perform the ADS-B extraction.

- Connect the GP-1090 ADS-B antenna to the Low Noise Amplifier (LNA) and Filter module.
- From the LNA&Filter module, there is 30m coax cable that must be connected to the ARF800 RF input
- Connect the video-output of the ARF800 to one of the video channels of the RIM782 (preferably channel 1)
- The RIM782 requires a GPS450 connected for UTC synchronous time of detection timestamping of the data
- The RIM782 is connected to the PC (laptop or desktop), via USB2 cable
- This PC requires as a minimum the RASS-R DHM software to be installed, which will retrieve the video of the ADS-B. Optionally, the MRD3 and the RCM/D, as well as the RASS-S toolbox, can be installed on the PC

### 2. 利用ARF800和GP-1090天线提取ADS-B数据

如果雷达上没有全向通道和接收机可用，可以使用由ARF800和GP-1090天线组合成的便携式设备。GP-1090是一个全向天线，可以在水平方向进行360度预报。就像雷达上的全向天线的使用一样，RIM782是用来提取ADS-B信号的。

- 连接GP-1090 ADS-B全向天线到低噪声放大器和过滤模块
- 将放大器和过滤模块经30M线缆连接到ARF800的射频输入端
- 连接ARF800视频输出通道到RIM782通道1
- RIM782需要GPS450精密时间基准
- RIM782经USB线缆连接到电脑工作站
- 电脑工作站需要安装RASS-R 数据处理模块（DHM），用以接受ADS-B视频信号。作为备选，多雷达显示（RMD3），雷达比较（RCM/D）以及RASS-S工具箱，都可以安装到电脑工作站上。



### 3. Configuration of the Data Handling Manager

### 3. 数据处理模块的配置

First launch the RASS-R toolbox. The RASS-R Toolbox window will open.

首先连接到RASS-R工具箱，RASS-R工具箱窗口将会打开。



From the RASS-R Toolbox, launch the Data Handling Module. The DHM Configuration Manager window will open.

从RASS-R工具箱运行数据处理模块，DHM配置管理窗口将会打开。



Connect to the localhost DHM Background server, to create a session.

在这一步中，连接本地DHM后台服务器，建立需要的情景编辑模块。



### 4. Configuration of the ADS-B Session

### 4. ADS-B 情景编辑的设置

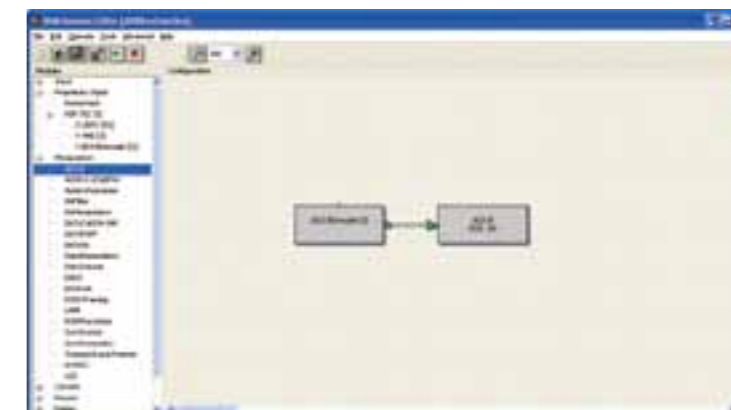
When the DHM Session Editor window is open, the ADS-BDecoder modules is the first module to be added for this setup. This module can be located under the "Proprietary Input" list, as part of the "RIM 782" submenu and is called the "V ADS-BDecoder[43]". Double click on the menu to add the module.

当DHM情景编辑窗口打开以后，ADS-B编码器是第一个需要为这个设备增加模块的模块组。需要增加的模块可以放置在Proprietary Input 目录下，作为RIM782子菜单的一部分，并被称为 "V ADS-BDecoder[43]"。双击菜单来增加模块。



After entering the parameters, the ADS-B Decoder module sends the extracted pulses as a bitstream to the ADS-B module. This module will code the individual bits into meaningful data items as described in ASTERIXCAT021.

键入参数之后，ADS-B解码器模块发送提取的脉冲比特数据流到ADS-B模块。这个模块将对每个数据流进行编码，并存进ASTERIXCAT021所描述的有意义的数据项目里。



The remaining modules to be included within the session will depend on the Users requirements.

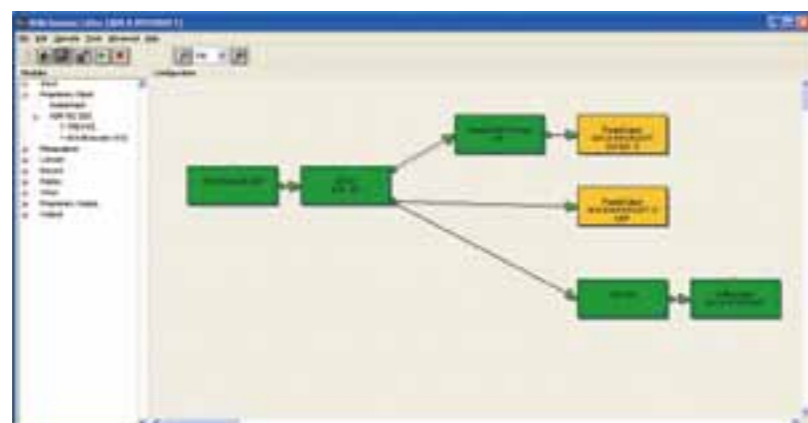
1) The ADS-B decoder module can be setup to **output EDR format**. This EDR format contains ASTERIX CAT021. To convert the ASTERIX CAT021 reformated data again, an AsterixCat021Convert module is required and can be located under the "Convert" list. Double click on the menu to select the module. To define the parameters for the AsterixCat021Convert module, refer to the DHM User Manual. **To display this data on a MRD3**, a RadarOutput module is required and can be located under the "Proprietary Output" list. Double click on the menu to select the module. To define the parameters for the RadarOutput module, refer to the DHM User Manual.

2) The ADS-B module can be setup to **output D6 format**. D6 format is the internal data format used by RASS-R to transport any plot related data (such as target range, azimuth, XY position, longitude,latitude, A-code, S-address, etc) to a client, such as a **MRD3**. To display the data on a MRD3, a RadarOutput module is required and can be located under the "Proprietary Output" list. Double click on the menu to select the module. To define the parameters for the RadarOutput module, refer to the DHM User Manual. With this configuration, the MRD3 will not provide any ASTERIX CAT021 data in the display info window.

3) To be able to **analyse** the ADS-B data via tools like for example the **Radar Comparator Mono/Dual** or the **RASS-S Inventory tool**, an S4 file (or D6, see remark below) is required to be recorded. To perform this, the D6 output of the ADS-B module must first be converted to S4 format. A D6ToS4 module is required to perform this convert and can be located under the "Manipulation" list. Double click on the menu to select the module. To define the parameters for the D6ToS4 module. This S4 output can then be recorded. A S4Recorder module is required to perform this recording and can be located under the "Record" list.

4) For analysis purposes, it is strongly recommended to record the D6 data directly from the ADS-B module. D6 data fields have more accuracy and resolution than the ASTERIX CAT021 data. RASS-S the Inventory tool, as well as the Radar Comparator, can both input S4 and D6 data. The user is free to choose for a D6Recorder module or a combination of the D6ToS4 module.

Once your session has been defined, click the "Play" Button to play your session.



其余的模块包括在情景设置里面取决于用户的需求。

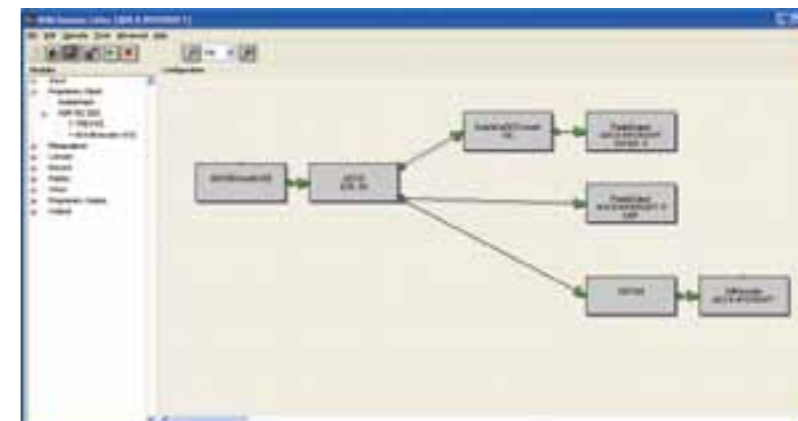
1) ADS-B 解码器模块可以设置为 Output EDR 格式, 这个EDR格式包括 ASTERIXCAT021。转换ASTERIXCAT21数据需要运行AsterixCat021Convert模块, 该模块可能在Convert列表下面。双击菜单选择模块。设置ASTERIXCAT021转换模块可参考DHM用户手册, 数据可在MRD3工具中显示, 雷达数据输出模块可以在Proprietary output菜单栏中找到, 双击所选择的模块, 设置相关参数。

2) ADS-B模块可以设置D6格式的输出, D6格式是RASS-R传输相关数据的内部数据格式, 例如, 目标范围, 方位, XY位置, 经度, 纬度, ID信息和S模式地址等。数据的显示可以在多雷达显示工具中实现这个设置需要雷达数据输出模块, 该模块可在Proprietary Output菜单下找到。由于MRD3不能直接显示 ASTERIXCAT021数据。因此要把此数据转换成D6格式才可以在多雷达显示工具MRD3中显示。

3) ADS-B数据的分析要由雷达比较工具RCM或RASS-S中的Inventory工具来完成, 已记录的S4或D6数据, 需要把D6格式的文件转换为S4格式的文件。这样S4文件可以在RASS-S工具中进行分析。

4) 为了分析的目的, 强烈推荐直接从ADS-B模块记录D6数据, D6数据比ASTERIXCAT021具有高的准确性和分辨率。比如经/纬度。IE的RASS-S Inventory工具, 以及雷达比较工具可以输入S4或D6数据。用户可以自由选择D6记录模块或D6ToS4模块。

一旦你的情景编辑完成设置以后, 就可以运行这个任务。



Finally, the user can inspect the running session.

最后用户可检查各个情景编辑模块的状态。



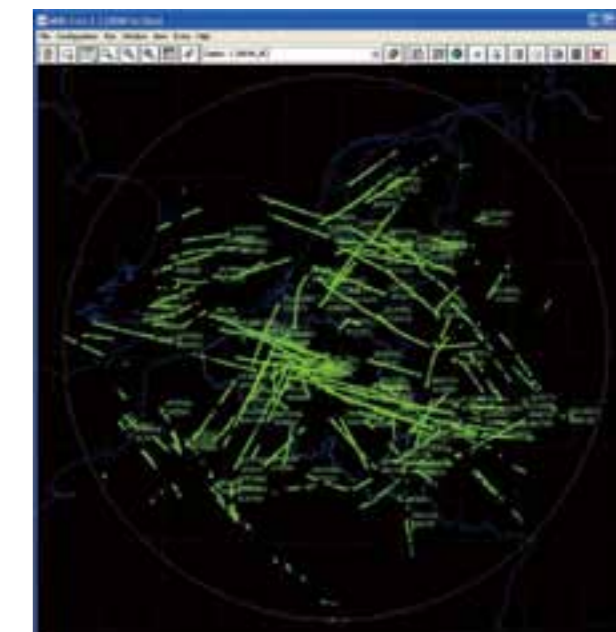
### 5. Examples of extracted data in MRD3

Refer to the MRD3 user manual for further information on setting up the MRD3. The figure below shows the results of extracted ADS-B data as derived from the above mentioned methods. A GP-1090 antenna is located at 10m height, the obtained range is almost 180NM. The other figure (right) shows the Display Info dialog of a selected target in the MRD3, on the condition that an AsterixCat021Convert is used.



### 5.应用多雷达显示工具实现ADS-B数据的可视化

参考多雷达显示MRD3的用户手册为更深层次信息在MRD3上的设置, 下面的图形显示的是在上面的理论方法而导出的ADS-B数据的结果, GP-1090天线位于是10M高的地方, 可探测的范围大约是180海里。另一个图片(右)显示的是ADS-B目标信息在多雷达显示工具中显示的结果, 这是在使用了ASTERIXCAT021数据转换的。



# A Comparison of Noise Impacts of High Speed Rail and Short-Haul Air Service

## 高速铁路和短途航空服务之间噪声影响的比较

By Mary Ellen Eagan, President, Ruth Anne Mazur, Consultant  
作者: Mary Ellen Eagan, HMMH公司总裁; Ruth Anne Mazur, HMMH公司顾问

There is an ongoing debate in the United States about the environmental tradeoffs of aviation and High Speed Rail (HSR). Much of this debate involves discussion of the benefits of HSR service in terms of energy use and carbon emissions, but there has been very little discussion comparing the noise levels from HSR and aviation. This article describes some of the differences between the two and attempts to answer the following questions:

- What are the different sources of noise from aircraft and HSR?
- How do we currently assess noise from aircraft and HSR?
- How do people respond to noise from aircraft and HSR?
- How do the noise levels compare?

### Noise Sources from Aircraft and HSR

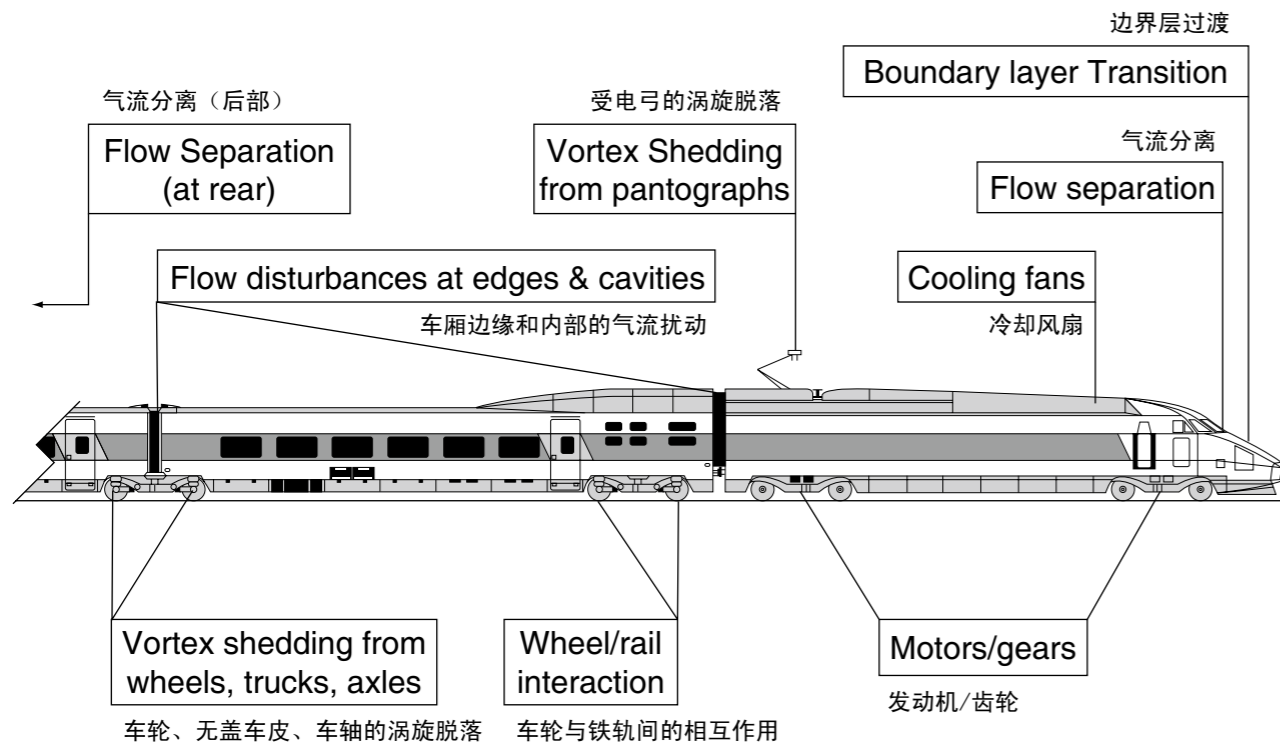
There are essentially three regimes for noise sources on a typical steel-wheeled high speed rail system that are highly speed dependent, and are illustrated in the figure below.

在美国有关航空和高速铁路的环境权衡问题一直是业界争论的热点。争论大多集中在高速铁路服务在能源使用和二氧化碳排放方面的效益问题。很少有人对高速铁路和航空服务的噪声级别问题进行比较。此文描述了高速铁路和航空运输的不同之处，并尝试回答如下问题：

- 飞行器和高速铁路的噪声源有什么不同？
- 我们一般怎样评估来自飞行器和高速铁路的噪声？
- 人们对来自飞行器和高速铁路噪声的反应各是怎样的？
- 怎样比较两者的噪声级别？

### 飞行器和高速铁路的噪声源

对于高度依赖速度的典型钢轮高速铁路系统，噪声源基本来自以下三个方面。



Source: HMMH, 2011  
图片来源: HMMH公司 2011年

**Propulsion Sources:** At low speeds, propulsion mechanisms are the predominant sound sources. Most high-speed trains are electrically powered; the propulsion noise sources are, depending on the technology, associated with electric traction motors or electromagnets, control units, and associated cooling fans.

**Mechanical/Structural Sources:** The effects of wheel-rail interaction of high-speed trains, guideway structural vibrations, and vehicle-body vibrations fall into the category of mechanical noise sources. These sources tend to dominate the total noise level at intermediate speeds, and cover the widest of the three speed regimes.

**Aerodynamic Sources:** Propulsion and rolling noise are generally sufficient to describe the total noise up to speeds of about 160 mph for steel-wheeled trains. Above this speed, however, aerodynamic noise sources tend to dominate the radiated noise levels. These sources begin to generate significant noise at speeds of about 180 mph, depending on the magnitude of the mechanical/structural noise.

Similarly, aircraft noise is generated from multiple sources, depending on the mode of operation, speed, and configuration of the aircraft. Below, the first photo shows noise sources such as the engine, flaps, slats, and landing gear. The second illustration shows the locations of sources such as air flows and vortices. Again, multiple noise sources exist in different regimes: during takeoff, engine noise is clearly dominant, whereas during landing, it can often be turbulent flow around gears or flaps and slats.

**推进力噪声源:** 低速运行时推进机制是主要的声音来源。大部分高速火车是电力驱动的；推进力噪声源取决于与电牵引电机、电磁、控制单元、冷却风扇等相关的技术。

**机械/结构噪声源:** 高速火车轮轨相互作用效果、导向槽结构振动和车辆自身的振动将机械噪声源分为了不同的种类。这些噪声源往往在中等速度产生的所有噪声级别上占支配地位，并在三种速度区域中占比最大。

**空气动力噪声源:** 通常情况下，推进力噪声和滚动噪声可以充分描述最高时速在160英里/小时的钢轨火车所产生的全部噪声。高于这个速度时，空气动力噪声源往往控制着辐射噪声的级别。当速度高于180英里/小时，这些噪声源开始产生巨大的噪声，噪声级别取决于机械/结构噪声的大小。

同样的，飞行器噪声由多种噪声源产生，并取决于飞行器的操作模式、飞行速度和其外形结构。图1展示了一系列噪声源，如引擎、襟翼、机翼前缘和起落架。图2展示了噪声源产生的位置，如气流和旋涡。此外，多噪声源存在于不同的状态下：起飞阶段，无疑发动机噪声是主要的，反之在降落期间，在起落架或襟翼和缝翼周围经常会产生紊流。



图1 Source: British Airways  
来源: 英国航空公司



图2 Source: British Airways  
来源：英国航空公司

### Noise Assessment for Aviation and HSR

Direct comparison of noise impact from HSR and aviation is also challenging because the assessment methods differ. In the U.S., the Federal Railroad Administration's (FRA's) High-Speed Ground Transportation Noise and Vibration Impact Assessment Manual determines impact on noise sensitive communities by comparing project levels to existing noise levels to determine two categories of impact (moderate and severe), while the Federal Aviation Administration's (FAA's) Order 1050.1E determines impact by identifying noise-sensitive land uses that are projected to experience an increase in noise of 1.5 dB or more in those areas already exceeding DNL 65. Analysis methods for each are summarized below:

### 航空噪声和高速铁路噪声的评估

直接对高速铁路噪声和航空噪声进行比较是很有挑战性的，这是由于两者的评估方法有所不同。在美国，联邦铁路管理局（FRA）高速地面交通噪声和震动影响评估手册规定：噪声敏感社区的影响要通过对项目级别和现存噪声级别的比较来界定为两种影响范畴（中等的和严重的）。然而联邦航空管理局（FAA）命令1050.1E规定：在已经超过DNL65分贝的区域，且噪声再增加1.5分贝或更多的情况下，辨别噪声对敏感土地的影响。每种情况的分析方法如下：

Comparison of Impact Assessment Methodologies  
影响评估方法比较

Aviation 航空	High Speed Rail 高速铁路
Identify areas of significant noise 确定主要噪声区域	Identify background noise 确定背景噪声
Evaluate changes in noise levels in areas of significant noise 评估主要噪声区域内的噪声变化情况	Identify project noise 确定工程项目的噪声
	Compare project noise with background noise to identify areas of moderate and severe impact 对比工程项目的噪声和背景噪声来确定该区域受到中等影响或严重影响

In preparing environmental assessments, aviation noise really only needs to be considered during takeoff and landing (i.e., at either end of the flight) because most of the noise is generated at altitudes that do not cause impact on people, whereas HSR generates noise the entire length of the rail corridor. On the other hand, because rail noise is at ground level, there is typically shielding from structures (either buildings or purpose-built barriers), whereas aircraft noise can propagate over longer distances.

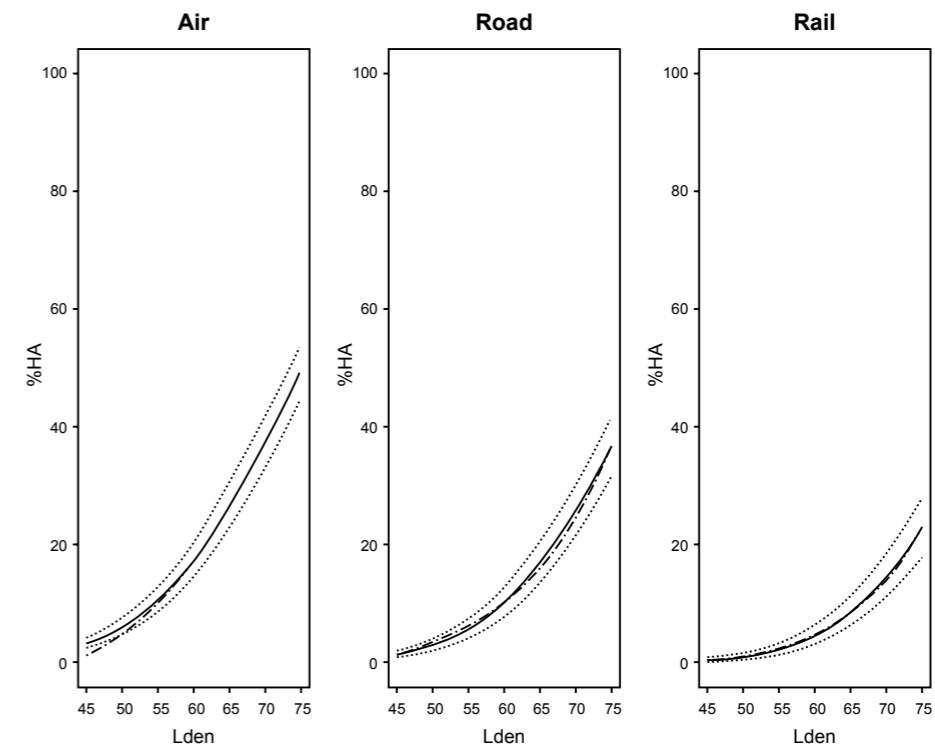
### Response to Noise from Aviation and High Speed Rail

Impact criteria for noise are based on human response to noise, particularly annoyance. Research indicates that people appear to respond differently to aircraft noise than rail noise (they are more annoyed by aircraft noise). On the other hand, if the rail vehicle in question is moving fast enough to cause startle, it's not clear whether annoyance reaction to HSR is more similar to annoyance reaction to aircraft than traditional rail.

环评准备阶段，航空噪声真正只需要考虑的是飞行器起飞和降落这两个阶段。（例如，航班起降的任一阶段）这是因为大部分噪声所产生的那个高度是不会对人们造成影响的。然而高速铁路产生的噪声产生于整个铁轨走廊。另一方面，由于铁路噪声是基于地面的，所以就会有典型的结构性屏蔽（建筑物或减噪栅栏）。反之，飞行器噪声传播的距离更远。

### 人们对航空噪声和高速铁路噪声的反应

噪声影响标准的界定取决于人们对噪声的反应，具体来说就是烦扰度。研究显示人们似乎对航空噪声和铁路噪声的反应有所不同（飞行器发出的噪声更令人烦扰）。另一方面，如果轨道车辆的速度快到足以引发人类惊恐的程度，我们尚不清楚届时人们对高速铁路的烦扰反应是否会更加类似于对航空器的烦扰反应。



Source: EU Position Paper on Dose Response Relationships between Transportation Noise and Annoyance, 2002  
来源：欧盟立场文件-交通工具噪声和烦扰度的剂量反应关系

**Case Study: Comparing Aircraft and HSR Noise Impact in the Boston - New York Corridor**

Harris Miller Miller & Hanson Inc. (HMMH) conducted a study comparing the noise impact from one round trip of an aircraft to one round trip of a HSR train traveling from Boston, Massachusetts to New York City. The analysis showed more impact from the rail vehicle than the aircraft; however, much of the rail impact occurred around grade crossings or close to the tracks. Depending on the rail line's right-of-way, many of these impacts could be eliminated. The study brought to light the variables and complications that come from comparing the two modes of travel. The results indicate that the subject needs to be further studied before any conclusions can be drawn about which mode of travel is better for the environment from a noise perspective.

**案例分析：波士顿-纽约走廊航空噪声和高速铁路噪声的影响比较**

HMMH公司进行的一项研究对比了马萨诸塞州波士顿和纽约之间单次往返的飞机和高速铁路的噪声影响。研究显示高速铁路产生的噪声影响要高于飞机；大部分铁路的噪声影响都发生在平交道或轨道附近。根据轨道线的优先使用权，大部分影响都可被消除。通过对这两种出行模式的对比研究，揭示出了这一问题的变量和复杂性。研究结果指出：从环境的角度出发，此议题还需经过进一步研究方可给出结论来判定哪个出行方式更加有益于环境。



HSR Noise from a single train in Northeast Corridor  
东北部走廊一列高速铁路列车产生的噪声



Aircraft Noise from a single operation at LaGuardia Airport (LGA)  
拉瓜迪亚机场单机运行产生的航空器噪声

**Comparison of HSR and Aviation between Boston and New York**  
波士顿和纽约区间的高速铁路和航空运输的比较

	Daily Operations 每日运营次数	Vehicle Capacity 车辆数量	Number of people exposed to SEL 85 dB per operation 暴露在SEL85分贝的人数
Shuttle BOS-LGA 航班-波士顿到拉瓜迪亚机场	29	124/80	1,005
Shuttle LGA-BOS 航班-瓜迪亚机场到波士顿	29	124/80	1,495
Daily capacity 每日航班量		5,916	
Acela BOS-NYC 阿西乐快线-波士顿到纽约	10	304	12,000
Acela NYC-BOS 阿西乐快线-纽约到波士顿	10	304	12,000
Daily capacity 每日班次		6,080	

Source: HMMH, 2011  
来源：HMMH公司 2011年



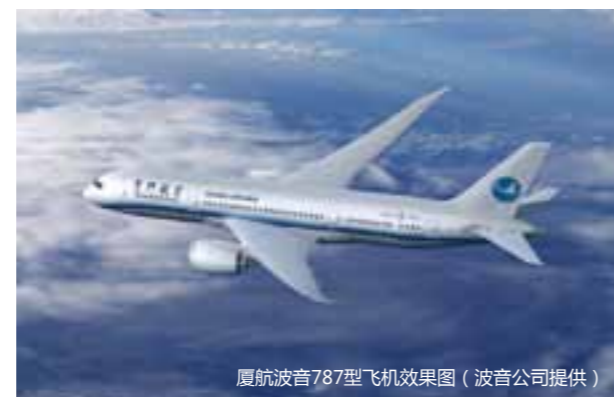
## Automatic ATM System of Harbin Passed Factory Acceptance Smoothly

### 哈尔滨空管自动化系统工作顺利通过工厂验收



Recently, the Harbin Automatic ATM System, part of the polar routes radar control project organized by the Air Traffic Management Bureau of the Civil Aviation Administration of China, completed smoothly the Factory Acceptance task. Specialists and leaders from the CAAC Northeast ATMB, CAAC Air Traffic Management Heilongjiang Branch, and Chengdu Civil Aviation ATM Technology Development Co. Ltd. attended the factory acceptance meeting.

近日，由中国民用航空局空中交通管理局组织的极地航路雷达管制工程中哈尔滨空管自动化系统工厂验收工作顺利完成，中国民用航空东北地区空中交通管理局、中国民用航空黑龙江空中交通管理分局和民航局第二研究所空管公司的专家和领导参加了工厂验收会。



厦航波音787型飞机效果图（波音公司提供）

## Xiamen Airlines Purchased 6 B787s

### 厦门航空购6架波音787飞机

On the 9th of May, Xiamen Airlines signed an Aircraft Purchasing Agreement with the Boeing Company to buy 6 Boeing 787s.

According to the contract, Boeing will deliver a total of 6 B787s to Xiamen Airlines between 2014 and 2015. The company announcement said the total market price for 6 B787s is US\$1.098 billion; but the actual purchase cost for Xiamen Airlines is lower than the above-mentioned price.

厦门航空有限公司5月9日与波音公司签订《飞机购买协议》向波音公司购买6架波音787系列飞机。

根据上述协议，波音公司将于2014年至2015年向厦航全部交付6架787系列飞机。公司公告称，6架787系列飞机的公开市场报价总计约为10.98亿美元；实际交易中波音公司给予厦航一定优惠，该等飞机的实际代价将低于上述价格。

## Newly Built North Apron of Xianyang International Airport Passed the Acceptance

### 咸阳机场新建北停机坪项目通过验收

Commissioned by the CAAC, the CAAC Northwest Regional Administration had organized relative units and departments to establish the industry acceptance inspection group on March 23, and conducted the acceptance inspection on the phase II expansion project of Xi'an Xianyang International Airport, particularly the newly built North Apron as well as the new East lighting station of the airfield. Civil Aviation Professional Engineering Quality Supervision Station leaders participated in the acceptance inspection and supervised the inspection work.

The new North Apron and the new East lighting station of the present airfield are important parts of Xi'an Xianyang International Airport's phase II expansion project, with pavement area of 310 thousand square meters having 29 aircraft stands (2E8D19C). The project started in August 2009 and finished construction on December 31, 2010. On January 11, 2011, the commanding office of airport expansion project organized the acceptance inspection of the quartet project, namely building, construction, supervision and design, of the second phase expansion of the airport north station site. China West Airport Group Co., Ltd. conducted the preliminary acceptance inspection on January 21, and at the end of January and early February, the Inspection Unit of the CAAC Northwest Regional Administration performed a special inspection of the project's test run.

受中国民用航空局（简称“民航局”）委托，中国民用航空西北地区管理局于3月23日组织有关单位及部门成立了行业验收组，对西安咸阳国际机场（简称“西安机场”）二期扩建工程新建北停机坪、现飞行区新建东灯光站等工程进行了行业验收。民航专业工程质量监督总站有关领导参加了验收和监督检查工作。

西安机场二期扩建工程新建北停机坪、现飞行区新建东灯光站等工程是二期扩建工程的重要组成部分。其中道面面积31万，设29个机位（2E8D19C）。工程于2009年8月开始施工，2010年12月31日完成施工任务。2011年1月11日机场扩建工程指挥部组织了西安机场二期工程扩建北站坪工程的四方验收，1月21日西部机场集团有限公司对该项目进行了初步验收。1月底和2月初管理局检查组对该工程项目试运行进行了专项检查。



新建中的咸阳机场北停机坪

## Sanya Area Control Center Signed the AIDC Coordination & Transfer Agreement with the Zhanjiang Area Control Office

### 三亚区管与湛江区管签订AIDC协调移交协议

On May 24th, the Sanya Area Control Center of the CAAC ATMB Hainan Branch signed the AIDC Coordination & Transfer Agreement with the Area Control Office of the Zhanjiang Air Traffic Management Station. According to this agreement, on June 1st, the coordination & transfer task between Sanya Area Control Center, the CAAC ATMB Hainan Branch and the Area Control Office of Zhanjiang Air Traffic Management Station will enter the per-operation phase of the AIDC transfer from the traditional phone transfer.

The per-operation of the AIDC will strongly promote the automation of communication between the two parties, decrease phone coordination & transfer, and improve efficiency. To promote this task, the Sanya Area Control Center of the CAAC ATMB Hainan Branch, did much preparatory work, such as establishing an AIDC work group in charge of control and technology support, escalating and transforming all of the equipments, training all the air traffic controllers in theory and so on. After this agreement, the coordination & transfer between the two parties will be based on AIDC coordination & transfer, supplemented by phone coordination and transfer.

As an efficient means of reducing air traffic controllers' workload and freeing them from busy coordination so that they can put more energy into tasks more closer related to air traffic, AIDC has entered the promotion & application stage in many areas of China in these years.

5月24日, 海南空管分局三亚区域管制中心与湛江空管站区域管制室在海口签订AIDC协调移交协议, 协议规定从6月1日起, 海南空管分局三亚区域管制中心和湛江空管站区域管制室的协调移交工作由传统的电话移交进入空中交通服务内部设备的数据通信(AIDC)移交试运行阶段。

AIDC的试运行, 将大大增加两个管制单位之间的自动化程度, 减少电话移交和协调, 提高工作效率。为了使这项工作顺利进行, 海南空管分局三亚区域管制中心做了大量前期准备工作, 于去年年底成立了管制和技术保障AIDC工作小组, 相继完成了设备升级改造和管制人员AIDC相关理论培训。此次签订的“三亚区管与湛江区管实施AIDC协调移交试运行管制协议”, 双方的地面协调移交以AIDC协调移交为主, 电话协调移交为辅。

AIDC (Air Traffic Services Inter-facility Data Communications) 作为减轻管制员工作负荷, 将管制员从繁忙的协调工作中解脱出来从而将精力更多的投入到与管制工作更为密切方面的一种有效手段, 近年来在国内很多地区都进入到推广使用阶段。

## New ILS for #5 Runway of Xi'an Xianyang International Airport Puts into Official Operation

### 咸阳机场05跑道新盲降设备日正式投入运行

At 0:00 on April 26, before the arrival of the International Horticultural Exposition 2011 in Xi'an China, the new ILS (instrument landing system) of the #05 runway monitored by the Navigation Office of the CAAC Northwest ATMB was put into official operation.

The new ILS is the Norway made NORMARC-7000B that has the advantages of easy operation, high integration and stable performance. The original U.S. made Mark II equipment was put into use in 1991, and decommission on March 20, 2011.

The utilization of the new ILS equipment enables smoother civil aviation transport and more efficient air traffic control; it provides better flight security at the arrival of the International Horticultural Exposition 2011 Xi'an China.

4月26日0:00, 中国民用航空西北地区空中交通管理局导航室05#跑道新盲降设备在西安世园盛会来临前正式开放。

此次投入使用的是挪威产NORMARC-7000B盲降设备, 它具有操作简便、集成化高、性能稳定等优点, 原来的美国产Mark II设备于1991年投入使用, 于2011年3月20日退出运行。

新型盲降设备投入运行, 让民航航空运输更加顺畅、空管运行更加高效, 在西安世园会到来之际为航班提供更好的保障。



## Tianjin Airlines Launched the Tianjin-Beijing Transfer Service to Create the New Service Model of Air-railway Coordinated Transport

### 天航推出“经津进京”产品 打造空铁联运新模式

May 8, Tianjin Airlines launched the Tianjin-Beijing transfer service with Tianjin Binhai International Airport and Beijing-Tianjin Intercity High-speed Railway to create the new service model air-railway coordinated transport.

Tianjin-Beijing transfer services are launched jointly by the three companies, the passengers who held the special tickets can enjoy the overall, seamless transportation service for both air and railway. One air ticket to Tianjin can provide the one-time free shuttle bus at the airport, and one-time free high-speed ticket to Beijing South Railway Station. It secures that no more expenditures for the passengers to Beijing and provide them the new travel experiences and more conveniences, and provide the travelers another option.

With the more and more saturation of the Beijing Capital International Airport, air space resources are becoming rare. The transfer services from Tianjin-Beijing are not only diverting the passenger at the Capital Airport for mitigating its pressure, but also realizing the real air-railway, and air-ground seamless connections.

5月8日天津航空联手天津滨海国际机场、京津城际高铁推出“经津进京”服务产品, 共同打造空铁联运新型服务模式。

“经津进京”产品由天津航空联合天津滨海国际机场、京津城际高铁联合推出, 持有“经津进京”机票的旅客可实现“一票通全关”, 享受空地一体化、无缝隙链接的空铁联运服务。一张到天津的机票就可以让旅客免费乘坐一次机场巴士以及一次京津城际高铁, 同时体验天上、地面最快的交通工具并实现一票直达北京南站的便捷性。这就保证了在不增加出行成本的前提下既可以为目的地为北京的旅客带来新颖的旅行体验和更多的便利, 同时广大旅客也有了更多选择航班的余地。

随着首都机场近几年日趋饱和, 空域资源日益稀缺, 天津航空联手天津滨海机场、京津城际高铁适时推出“经津进京”服务, 不但可以分流一部分首都机场的客源从而缓解首都机场的压力, 更为重要的是此项服务从真正意义上实现了空铁联运、空地无缝隙对接。

## Zhuhai ATC Terminal Center Adjustment 珠海终端区调整

April 7th is an important time node for Zhuhai Terminal Control Center which has been operating safely for eleven years. Starting now, Zhuhai ATC Terminal Center will expand 24km eastward and 15km northward on the base of its previous jurisdiction; the upper limit altitude is raised from 3,600m to 4,500m, and the control area under Zhuhai ATC Terminal Center is increased to 18,000 sq. km after the zone adjustment. Such action consolidates the airspace resource and raises the airspace usage rate that brings an active purpose of rational utilization of airspace on the South Pearl River Delta region as well as decreases flight delays.

"The adjustment of Zhuhai ATC Terminal Center makes a more rational use of the airspace resource of Pearl River Delta, will greatly ease the tense situation of PRD airspace, and lays a foundation for enhancing flight safety smoothly and reduces delays." said Wei Liang, Director of Zhuhai Terminal Control Center.

4月7日，对于已经安全运行11年的珠海进近管制中心来说，是一个重要的时间节点：此刻开始，珠海终端区在以前管辖区域的基础上东扩24km，北扩15km，区域上限高度由3600米抬高到4500米，区域调整后珠海终端区管制面积增大到1.8万平方公里，此举整合了空域资源，提高了空域使用率，对南珠三角空域合理使用，减少航班延误起到积极的作用。

“珠海终端区的调整，使珠三角空域资源得到更合理的利用，将极大的缓解珠三角空域紧张的局面，为提高航班安全顺畅和减少延误奠定基础。”该中心主任卫亮说。

## China Will Strive in Building Five Major Airport Groups in Next Five Years

### 未来5年 我国将着力构筑“五大机场群”

The all directional aviation network and fastly built regional airports are continuously crowding China's aviation network domain. In the next five years, China will continue to improve transport airports layout to accelerate the building of 'five major airport groups' as carriers of regional 'airport-related economy zone'.

The 12th Five-Year Plan of China Civil Aviation Development issued on April 7 indicated that China will speed up building five major 'airport group' in the next five years.

**Northern Airport Group:** Will build Beijing Capital International Airport as the more competitive international hub airport and construct a New Beijing Airport. Will speed up the development of regional hub airport to unleash the importance of Harbin Taiping International Airport, Shenyang Taoxian International Airport, Dalian Zhoushuizi International Airport, and Tianjin Binhai International Airport in the development of Northeast China Reival and Tianjin Binhai New Area. Cultivate Harbin Airport's gateway functions toward the

四通八达的航空网络和加速建设的支线机场，正在不断加密中国航空网络版图。未来5年，中国将不断优化运输机场布局，加速构筑“五大机场群”为载体的区域“临空经济带”。

4月7日发布的《中国民用航空发展“十二五”规划》显示，未来5年，中国将加速构筑五大“机场群”。

**北方机场群。**将北京首都机场建设成为具有较强竞争力的国际枢

纽机场，新建北京新机场。加快发展区域枢纽机场，发挥哈尔滨、沈阳、大连、天津机场分别在东北振兴和天津滨海新区发展中的重要作用。培育哈尔滨机场面向远东地区、东北亚地区的门户功能。发挥石家庄、太原、呼和浩特、长春等机场的骨干作用。发展漠河、大庆、二连浩特等支线机场，新增抚远等支线机场。

**Eastern China Airport Group:** Nurture Shanghai Pudong International Airport as a more competitive international hub airport. Speed up the development of regional hub airports such as Shanghai Hongqiao International Airport, Hangzhou Xiaoshan International Airport, Nanjing Lukou International Airport, Xiamen Gaoqi International Airport and Qingdao Liuting International Airport to satisfy the nation's regional development strategic needs of the Yangtze Delta Area, Shanghai Pudong New Area, Haixi Economic Zone and Shandong Peninsula Blue Economic Zone. Nurture Qingdao Liuting International Airport's gateway function towards Japan and Korea. Play out the backbone roles of Ji'nan Yaoqiang International Airport, Fuzhou Changle International Airport, Nanchang Changbei International Airport and Hefei Luogang International Airport. Develop other regional airports like Huaian Airport, and add new regional airport such as Chizhou Jiuhuashan Airport.

**Central South Airport Group:** Cultivate Guangzhou Baiyun International Airport as a more competitive international hub airport. Perfect Shenzhen Bao'an International Airport, Wuhan Tianhe International Airport, Zhengzhou Xinzheng International Airport, Changsha Huanghua International Airport, Haikou Meilan International Airport and other regional hub airport function to meet the needs of the Pearl River Delta Area, the Rise of Central China, Guangxi Beibu Bay Area, Hainan International Tourism Island and others in national development strategies as well as international regions cooperation strategy. Strengthen Sanya Phoenix International Airport, Guilin Liangjiang International Airport and other tourism airport function. Develop Guangxi Baise Airport and add Hu'nan Hengyang Airport and other regional airports.

**Southwestern Airport Group:** Strengthen the regional hub airport functions of Chengdu Shuangliu International Airport, Chongqing Jiangbei International Airport, and Kunming Wujiaaba International Airport. Accelerate nurturing Kunming Wujiaaba International Airport's gateway function toward Southeast Asia and Southern Asia, and serve the development needs of Yunnan Qiaotoubao. Enhance Tibet Lhasa Gonggar Airport, Guiyang Longdongbao International Airport and other key airport functions to meet the nation's needs for accelerated development of Tibet and remote area development. Develop Yunnan Tengchong Airport and other regional airports, and add Daocheng Yading Airport and other regional airports.

**Northwestern Airport Group:** Strengthen Xi'an Xianyang International Airport and Urumqi International Airport's regional hub functions to satisfy Guanzhong-Tianshui Economic Zone and Xinjiang Uygur Autonomous Region's swift development needs. Nurture Urumqi International Airport's gateway functions toward Western Asia and Central Asia. Enhance Lanzhou Zhongchuan Airport, Yinchuan Hedong Airport and Xining Caojiapu Airport's mainstay functions. Accelerate development of Korla Airport and Kashi Airport as major airports of southern Xinjiang. Develop Qinghai Yushu Airport and other regional airports. Add Shihezi Airport and other regional airports.

纽机场，新建北京新机场。加快发展区域枢纽机场，发挥哈尔滨、沈阳、大连、天津机场分别在东北振兴和天津滨海新区发展中的重要作用。培育哈尔滨机场面向远东地区、东北亚地区的门户功能。发挥石家庄、太原、呼和浩特、长春等机场的骨干作用。发展漠河、大庆、二连浩特等支线机场，新增抚远等支线机场。

**华东机场群。**培育上海浦东机场成为具有较强竞争力的国际枢纽机场。加快发展上海虹桥、杭州、南京、厦门、青岛等区域枢纽机场，满足长三角、上海浦东新区、海西和山东半岛蓝色经济区等国家区域发展战略需要。培育青岛机场面向日韩地区的门户功能。发挥济南、福州、南昌、合肥等机场的骨干作用。发展淮安等支线机场，新增九华山等支线机场。

**中南机场群。**培育广州机场成为具有较强竞争力的国际枢纽机场。完善深圳、武汉、郑州、长沙、南宁、海口等机场区域枢纽功能，满足珠三角地区、中部崛起、北部湾地区、海南国际旅游岛等国家发展战略和国际区域合作战略需要。增强三亚、桂林等旅游机场功能。发展百色等支线机场，新增衡阳等支线机场。

**西南机场群。**强化成都、重庆、昆明机场的区域枢纽功能，加快培育昆明机场面向东南亚、南亚地区的门户功能，服务于云南桥头堡发展需要。提升拉萨、贵阳等机场的骨干功能，满足国家加快发展藏区和偏远地区发展需要。发展腾冲等支线机场，新增稻城等支线机场。

**西北机场群。**强化西安、乌鲁木齐机场区域枢纽功能，满足关中—天水经济区和新疆地区快速发展需要。培育乌鲁木齐机场面向西亚、中亚地区的门户功能。提升兰州、银川、西宁等机场的骨干功能。加快将库尔勒、喀什机场发展成为南疆主要机场，发展玉树等支线机场，新增石河子等支线机场。



## Urumqi International Airport T2 Terminal Opened Officially 乌鲁木齐国际机场T2航站楼正式启用

The T2 terminal of Urumqi International Airport was put into official use at 00:00 on April 23.

The external color matching and quality of the renovated T2 terminal fused harmoniously with the T1 and T3 terminal as a whole. The flight arrival hall is on the 1st floor while the passenger departure hall is located on the 2nd floor of the T2 terminal.

At the opening day of T2 terminal, more than 50 departing flights with 6,000 plus departing passengers were ensured with its services.



4月23日00:00, 乌鲁木齐国际机场T2航站楼正式投用。改造后的T2航站楼在外部色彩搭配和品质上与T1、T3航站楼互相融合, 形成一个整体。航站楼一楼为进港航班到达厅, 二楼为旅客出发厅。T2航站楼启用当日, 保障出港航班50多班次, 出港旅客六千余人。



## Xi'an Xianyang Airport Introduced the First aircraft Removal & Rescue Equipment 西安咸阳机场引进第一套航空器搬移救援设备

The first aircraft removal & rescue equipment, costing over 10 million yuan, by Xi'an Xianyang International Airport arrived. The equipment is the rescue equipment used for removing the disabled aircraft after the crash. On April 11th, the people from the manufacturer arrived at Xi'an Xianyang International Airport, started a 3-day training and exercise program for the related security department at the airport. The equipment can remove the disabled aircraft in a very short period of time from the scene, which makes for a very speedy restoration of airport operation and avoiding any further damage to the aircraft.

It has been learned that the purchased aircraft jacking air-bag devices can be used for the emergency rescue of B747 and other jumbo jets. The equipment lifts the disabled aircraft smoothly and safely, facilitating the process of moving the disabled aircraft to a safe location, and securing the restoration of normal airport operations. After the usage, it will further improve airport integrated security capabilities, and implement the rescue after the accident, i.e. jumbo jet deviation from the runway and etc.

由西安咸阳国际机场耗资千万元购进的西北首套应急救援设备抵达机场。该套设备是航空器发生事故后对残损航空器进行搬移的救援设备。4月11日, 生产厂家派专人抵达西安咸阳国际机场, 对机场各保障单位进行为期3天的设备培训与演练。该设备能在最短时间内将残损航空器搬离事故现场, 恢复机场运营, 避免对航空器造成二次损伤。

据了解, 斥巨资购买的这组飞机顶升气囊, 可以用于波音747等大型飞机的应急救援工作。其特点是能平稳、安全地将残损航空器顶起, 便于救援人员将残损航空器从出事地点移至安全地区, 保证机场能够恢复正常运作。该气囊启用后能进一步提高机场综合保障能力, 对大型飞机偏离跑道等意外事件发生后进行拯救。



## Hebei Airlines Co. Ltd. Ordered 10 E-190s 河北航空公司订购10架巴航工业E190喷气飞机

April 12th, Embraer S.A. and Hebei Airlines Co. Ltd. hosted a signing ceremony in Beijing for the confirmation order of 10 E-190s. The first jet is estimated to be delivered in September of 2012.

With the rapid economic development in Hebei Province in recent years, the demand for the air transport market enters the phase of accelerated growth. In view of this, the Hebei provincial government regards the development of air transport work as the first priority in their agenda. Back in June 2010, with the strong support of the Hebei provincial government, Hebei Airways Limited was established, with holding by Hebei Aviation Investment Group Co., Ltd., the state-owned core enterprise. Currently, Hebei Airlines operates a total of six aircraft, including two ERJ145 jets. The order of E-190 jets will assist Hebei Airlines in expanding their business in the near future.

巴西航空工业公司与河北航空有限公司4月12日在中国北京举行签约仪式，双方签署十架E-190喷气飞机的确认订单。首架飞机预计于2012年9月开始交付。

近年来随着河北省经济迅速发展，对航空运输市场的需求进入加速增长阶段。有鉴于此，河北省政府将发展航空运输业提上工作议程首位。2010年6月，在河北省政府的大力支持下，由河北省核心国有企业河北航空投资有限公司控股，河北航空有限公司成立。目前，河北航空公司共运营6架飞机，其中包括2架ERJ145喷气飞机。此次订购的E-190喷气飞机将协助河北航空公司在近期实现业务拓展。

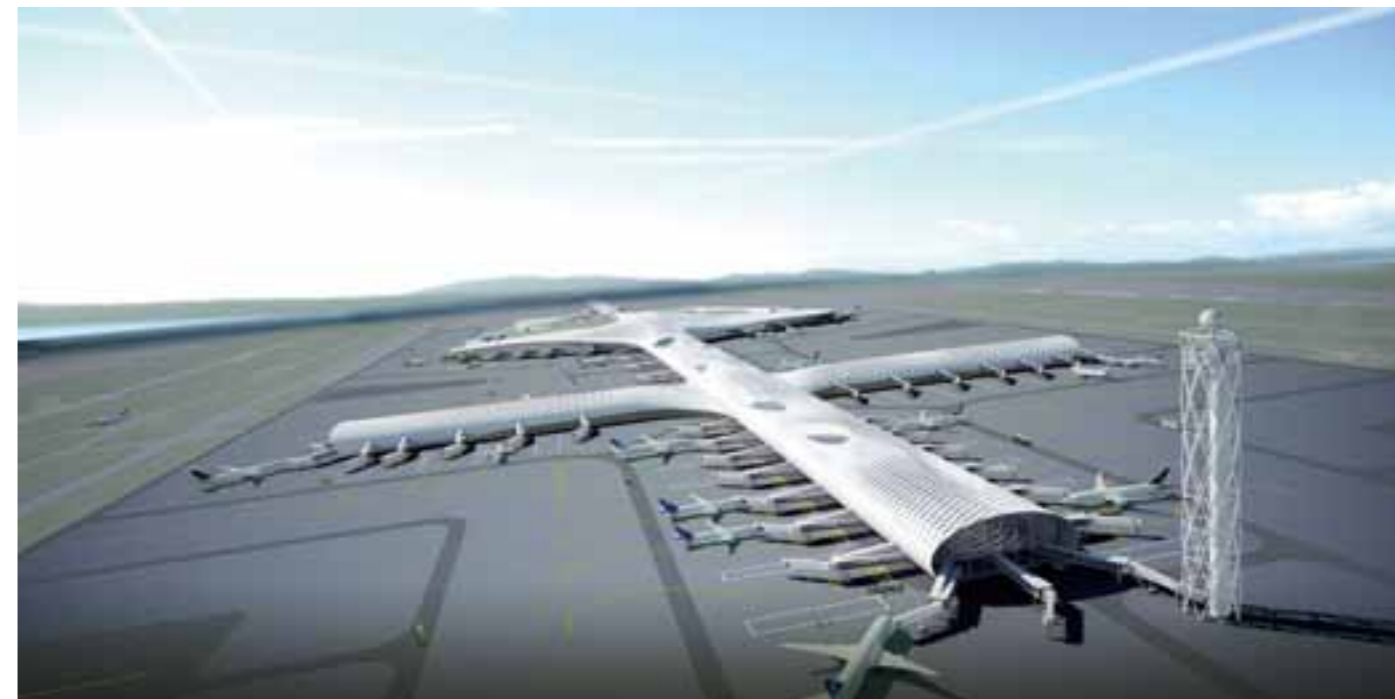
## Xia Xinghua Met with Chairman of The Emirates Group 夏兴华会见阿联酋航空集团主席

On April 28, Xia Xinghua, Deputy Minister of the CAAC, met upon invitation the visiting HH Sheikh Ahmed Bin Saeed Al Maktoum, Chairman and Chief Executive of The Emirates Airline & Group, in Beijing.

Both parties exchanged in-depth their opinions on concerned issues of the civil aviation arena.

4月28日，民航局副局长夏兴华在京应约会见了来访的阿联酋航空公司及集团主席兼首席执行官阿姆德·本·萨伊德·阿尔·马克图姆殿下。

双方就民航领域关心的问题深入交换了意见。



## Shenzhen Bao'an International Airport Terminal Expanded 深圳机场扩建航站楼

Shenzhen Bao'an International Airport terminal and supporting facilities expansion, an important construction project secondary to rail transport in Shenzhen City infrastructure, got approved recently by the National Development and Reform Commission. The new terminal facility is expected to be put into use at the end of 2012.

Shenzhen Airport was opened for operation in 1991. The passenger throughput volume breakthrough 10 and 20 millions respectively in 2003 and 2007, and reached 26.71 millions in 2010 while the existing A, B and International Terminal were designed for an annual passenger throughput of only 17.5 millions. In early 2003, Shenzhen Municipal Government started the feasibility studies and preliminary works for the airport expansion project. In 2006, the flight zone expansion project received approval first from National Development and Reform Commission and started construction; the 1st stage of 7 square kilometers land formation and soft ground treatment have been completed at present, and the basic construction of the 3,600 meters 2nd runway field has finished, expected to be in use this June.

The terminal and supporting facilities expansion project is the core project of Shenzhen Airport expansion. The construction area of the new terminal is 450,000 square meters; it can meet the usage demands of 2020 with 45 millions passenger throughput, 2.4 million tons cargo-mail and 370,000 aircraft movements. This January, the ceiling of the terminal's main structure was done. As planned, the terminal area and supporting facilities will be put into use in the end of 2012.

深圳市基础设施领域仅次于轨道交通的重大建设项目——深圳宝安国际机场航站区及配套设施扩建工程，近日已获国家发展改革委核准。新航站楼预计2012年底投入使用。

深圳机场于1991年通航，2003年和2007年，旅客吞吐量分别突破1000万人次和2000万人次，2010年旅客吞吐量达2671万人次，而现有A、B和国际航站楼的设计旅客年吞吐量仅1750万人次。2003年初，深圳市政府开始着手机场扩建项目研究论证和前期工作。2006年，飞行区扩建工程首先获得国家发改委批复并开工建设，目前已完成第一阶段7平方公里的陆域形成及软基处理工程，3600米二跑道道场已基本施工完毕，预计今年6月底投入使用。

此次获得国家发改委核准的航站区及配套设施扩建工程，是深圳机场扩建项目核心工程。新航站楼建筑面积45万平方米，可满足2020年机场旅客吞吐量4500万人次、货邮吞吐量240万吨、飞机起降架次37万架次的使用要求。今年1月，新航站楼主体结构封顶。按计划，航站区及配套设施扩建工程将于2012年底投入使用。

## New Inspection of Qomul Secondary Radar Ended 哈密新二次雷达校验结束

Recently, the Flight Inspection Center of the CAAC issued a flight inspection plan to the CAAC Xinjiang ATMB for conducting the test on Qomul Secondary Radar and RS VHF.

The utilization of Mode S Radar and VHF would provide plentiful and intuitive control information for area control of the Urumqi ATC Region, effectively improve the coverage area of flight route VHF communication system of Eastern Xinjiang, and raise the ATC support capabilities of Urumqi ATC Region.

近日，中国民用航空飞行校验中心向中国民用航空新疆空中交通管理局（简称“新疆空管局”）发出了对哈密二次雷达及RS甚高频进行校验的计划。

哈密S模式雷达及甚高频的投入使用，将会为乌鲁木齐管制区区域管制提供丰富而直观的管制信息，有效改善疆内东部航路VHF通信系统的覆盖范围，提高了乌鲁木齐管制区的空管保障能力。

## Lhasa ATM Automation System with Full ADS-B Signals Put into Operation 全部ADS-B信号的拉萨空管自动化系统投入运行

Due to the idiosyncratic geographical conditions, there is no radar coverage for any air route within Lhasa, and the employed procedural control leads to serious limitation for flight activities and flow volume.

On January 28, the Chengdu-Lhasa Air Route Surveillance Project On-site Inspection and Acceptance Conference was held in Chengdu. As a sub program of the Chengdu-Lhasa Air Route Surveillance Project, the Lhasa Auto-ATM System constructed by the Second Research Institute of the CAAC smoothly passed the on-site Inspection and Acceptance organized by Southwest ATMB and went into trial operation.

The successful implementation of this project resolves air traffic controllers' "can-not-see" problem, ends the Tibetan plateau's condition of no auto-ATM system and provides a strong technical support for civil aviation security in the Tibetan region.

CAAC ATMB will stress boosting the application of ADS-B technology this year and have established the implementation principle as "try and use first in the west region and impel steadily towards the east" and "give priority to the most important and coordinate construction". CAAC ATMB has decided to start ADS-B preoperation first in the Chengdu-Lhasa air route.



由于其特殊的地理环境，拉萨境内所有航线均无雷达覆盖，一直实施程序管制，导致飞行活动和流量受到很大限制。

1月28日，成都——拉萨航线监视工程现场验收会议在成都举行，由中国民用航空局第二研究所（简称“民航二所”）承建的拉萨空管自动化系统作为成都——拉萨航线监视工程的重要子项目，顺利通过中国民用航空西南地区空管局组织的现场验收，拉萨空管自动化系统进入试运行。该项目的成功实施，解决了管制员“看不见”的问题，结束了青藏高原地区无空管自动化系统的现状，为西藏地区民航空管保障提供了有力的技术支持。

中国民用航空局空中交通管理局今年将重点加快推进广播式自动相关监视（ADS-B）技术应用工作，制定了“西部先试先行，由西向东稳步推进”和“突出重点，协调建设”的ADS-B建设应用原则，并决定在成都——拉萨航线率先开展ADS-B试运行工作。



## Yangtze River Express Airlines Co., Ltd. Introduced Their 10th B737-300 Freighter into Operation 扬子江快运引进第十架B737-300型货机

On April 7th, a B737-300 has completed its retrofitting at Taikoo (Shandong) Aircraft Engineering Company Limited (STAECO), which is the 10th freighter introduced by the Yangtze River Express Airlines Co., Ltd. (Yangtze River Express). After taking the ferry flight between Ji'nan and Pudong, it arrived at Shanghai Pudong International Airport at 19:11 on April 7th. At this point, the 10th B737 (Registration No. B2945) has joined the rest of aircraft fleet of Yangtze River Express successfully, and the scale of the fleet has now increased to 14 aircraft.

After importing the B737-300 freighter, it will be put into operation on April 8th on the domestic air route to greatly relieve the pressures due to lack of capacities.

Yangtze River Express started its first flight in 2003, and there are a total of 10 B737-300 freighters and 4 B747-400 freighters currently.

4月7日，扬子江快运航空有限公司（简称“扬子江快运”）引进的第十架波音737-300飞机在山东太古飞机工程有限公司（简称“山东太古”）完成改装，并执行济南——浦东调机，经过一个多小时飞行，于4月7日19:11安全抵达上海浦东国际机场。至此，第十架波音737-300货机（飞机注册号B-2945）顺利加入扬子江快运机队，扬子江快运机队规模增加至14架。

扬子江快运引进此架波音737-300货机后，将于4月8日便正式投入公司国内航线生产运营，大大缓解了公司飞机运力不足所带来的生产压力。

扬子江快运自2003年首航以来，截至目前已拥有10架波音737-300货机和4架波音747-400货机。

## Shanghai Hongqiao International Airport Super Huge Tunnel Completely Through 上海虹桥机场超大型隧道全线贯通

The huge Yingbin San Lu Tunnel that connects the East and the West Terminals of Shanghai Hongqiao International Airport is fully through on March 21. The tunnel also passes through the runway and other sensitive buildings successfully.

Being one of the most direct and convenient passageway of connecting the east-west terminals, Yingbin San Lu Tunnel bears a significance on forming the framework of Hongqiao integrated communication hub road network. Not only as an outward auxiliary passage, but it will also become the dedicated passenger transport thoroughfare between Hongqiao hub, with its east surrounding areas, and the central city; enabling this will greatly enhance the operational efficiency of this global transport hub.

Yingbin San Lu Tunnel utilized the nation's largest 14.27m diameter EPB (earth pressure balance) shield construction that successfully passed through Qixin Road overhead viaduct, Beihengjing, Hongqiao airport taxiway and main runway, the airport fuel pipe, the apron, the 101 railway and the historic preservation building, successfully completing the boring task of about 1,862m long tunnel section.

3月21号，连接上海虹桥机场东、西两大航站楼的超大型隧道迎宾三路隧道全线贯通，该隧道也成功穿越了机场跑道等敏感建筑物。

作为沟通虹桥机场东西航站楼两侧最直接、便捷的通道之一，迎宾三路隧道的建设对于形成虹桥综合交通枢纽配套路网的框架有着重要的意义，它不仅是虹桥枢纽对外的辅助通道，还将成为虹桥枢纽及其以东周边地区和中心城之间的客运专用通道，启用后将大大提升这个世界性交通枢纽的运营效率。

迎宾三路隧道工程采用直径达14.27米的国内最大土压平衡盾构施工，一路成功穿越七莘路高架、北横泾、机场滑行道、机场主跑道、机场航油管、停机坪、101铁路及历史保护建筑物，圆满完成长约1862米的隧道段掘进任务。

## Tianjin Airlines Successfully Fly the Ordos-Xi'an Route 天津航空成功执飞鄂尔多斯—西安航线



天津航空首次执飞鄂尔多斯—西安航线 摄影/刘国强

At 09:38 on April 28, the EMB145 aircraft (registration # B-3031) from Xi'an landed steadily at Ordos Airport. So far, Tianjin Airlines Co. Ltd. has successfully flown the round trip routes of Ordos-Xi'an.

Such was Tianjin Airlines' premier flight of the Ordos-Xi'an route. Ordos Airport had held a brief but grand ceremony at parking bay 3 to celebrate Tianjin Airlines' fly of the route.

4月28日09:38, 由西安飞来的一架EMB145飞机(注册号B-3031)平稳降落在鄂尔多斯机场。至此, 天津航空有限责任公司(简称“天津航空”)成功执飞鄂尔多斯—西安往返航线。

这是其首次执飞该航线。鄂尔多斯机场在3号停机位举行了简短而隆重的仪式, 庆祝天津航空公司执飞该航线。

## Shenzhen Bao'an International Airport was Named the World's "Best Cargo Airport of the Year" 深圳宝安国际机场被评为全球“年度最佳货运机场”

In mid-April, the Shenzhen Bao'an International Airport (hereinafter referred to as "Shenzhen Airport") obtained the global "Best Cargo Airport of the Year" award issued by the authoritative World Air Cargo magazine "Air Cargo News". It is understood that this is China's first time having an airport to receive such honor.

The 2010 freight indicators of Shenzhen Airport were fully remarkable; the annual cargo-mail throughput achieved 809,000 tons, representing a net increase of 204,000 tons, an increase of 33.6%, in which 170,000 tons were international cargo. Shenzhen Airport risen to 24th on the global cargo rankings, and the market share of Pearl River Delta increased 0.9%. Because of the 33.6% increase and other excellent performance, Shenzhen Airport gets the wide attention of global cargo industry professionals.



4月中旬, 深圳宝安国际机场(以下简称“深圳机场”)获得世界航空货运权威杂志社《Air Cargo News》颁发的全球“年度最佳货运机场”奖。据了解, 这是国内首次有机场获得该项荣誉。

2010年深圳机场货运指标全线飘红, 全年实现货邮吞吐量80.9万吨, 同比净增20.4万吨, 增幅达33.6%, 其中国际货运量达到17万吨。深圳机场在全球货运排名升至第24位, 在珠三角的市场占有率增加了0.9个百分点。正因增幅33.6%等系列出色表现, 深圳机场获得了全球货运行业人士的广泛关注。

## Phase III Shenyang International Airport Construction Began 沈阳机场三期建设开工

The phase III construction project of Liaoning Shenyang Taoxian International Airport began officially on April 1. Minister Li Jiaxiang of the CAAC, Secretary Wang Min of the Liaoning Provincial Committee of the CPC, Governor Chen Zhenggao, Commander Zhou Laiqiang of the Air Force in the Shenyang Military Region and related departments and bureaus leaders of Liaoning Province, Shenyang City and CAAC attended the ceremony, and laid the foundation to get the project started.

Minister Li Jiaxiang extended his congratulations toward the phase III project. He said that the kickoff of Shenyang Airport's phase III project marked another important project started in Liaoning Province's civil aviation and economic-social developments. Civil aviation industry is not only a means of transport; being one of the nation's strategic industries, the development of civil aviation can promote the development on finance, tourism, trade, logistics, exhibition and other related industries, and serve as the symbol of the enhanced quality of the city.

Governor Chen Zhenggao of the Liaoning Province stated that Shenyang Taoxian International Airport is intended to be the regional hub airport, thus the start of the phase III project made an important step towards achieving the goal, would provide a strong transport security for the 12th National Games of The People's Republic of China in 2013 organized by Shenyang, and added new force for the overall revitalization of Liaoning Province.

Zhang Yuan, General Manager of Liaoning Province Airport Management Group Company, introduced that the 4.5 billion Yuan total investment of Shenyang Airport phase III project would build a new 37-stand apron, the corresponding increase of connecting taxiway, the landing runway, and the 240,000 square meters terminal building. The project started in April and finishes in July 2013. Based on "Shenyang Taoxian International Airport Master Plan", in the future, Shenyang Airport will improve the construction of the integrated transport system, making Shenyang Airport an all-in-one, three-dimensional, modern integrated transport hub, to achieve seamless transfer between air transport, subway, high-speed railway, common railway, Inter-city railway, airport buses, long-distance buses, public buses, taxis and social vehicles.



4月1日, 辽宁沈阳桃仙国际机场(简称“沈阳机场”)三期建设工程正式开工。中国民用航空局(简称“民航局”)局长李家祥, 辽宁省省委书记王珉、省长陈政高, 沈阳军区空军司令员周来强以及辽宁省、沈阳市、民航局相关司局领导出席开工典礼, 并为工程开工奠基。

李家祥对沈阳机场三期工程的开工建设表示祝贺。他说, 沈阳机场三期工程动工标志着辽宁省在民航发展和经济社会发展中的又一个重大项目启动。民航业已不仅仅是一种交通运输方式, 作为国家的战略产业之一, 民航业的发展既能够带动金融、旅游、商贸、物流、会展等相关产业的发展, 同时也是城市品质提升的象征。

辽宁省省长陈政高则表示, 沈阳机场的目标是成为区域性枢纽机场, 沈阳机场三期工程的开工, 使沈阳机场向实现这一目标迈出了重要的一步, 将为沈阳举办2013年第十二届全国运动会提供有力的交通保障, 为辽宁省全面振兴增加新的动力。

辽宁省机场集团总经理张瑗介绍, 总投资45亿元的沈阳机场三期建设工程将新建包括37个机位的站坪, 相应增加联络滑行道、机坪滑行通道, 新建航站楼面积24万平方米。该工程于今年4月开工, 2013年7月竣工。依据《沈阳桃仙国际机场总体规划》, 未来, 沈阳机场将完善综合交通体系建设, 使沈阳机场成为一体化、立体化、现代化的综合交通枢纽, 实现航空运输、地铁、高速铁路、普通铁路、城际铁路、机场巴士、长途巴士、公共巴士、出租车以及社会车辆之间的无缝衔接换乘。

## Changzhou Benniu Airport New Terminal Put into Official Use

### 常州机场新航站楼正式投入使用

Through more than one year's worth of intense construction, the new terminal of Changzhou Benniu Airport is fully operating beginning April 28.

CAAC Inspector Wang Ronghua, Deputy Director-General & Pilot-General Zhu Zhoulong of CAAC North China Regional Administration, Chief Wei Huabin of Air Arm of East China Sea Fleet of Chinese Navy, Secretary Fan Yanqing of Changzhou Municipal Committee of the CPC, Mayor Wang Weicheng of Changzhou, Commander Chen Ping of Changzhou Military Subdistrict and other related leaders presided the operation ceremony.



Wang Weicheng delivered a speech during the ceremony saying that the official use of the new terminal of Changzhou Airport is one big event in the history of Changzhou's aviation development; it is also a joyful event for Changzhou citizens as well as the travelers. He pointed out that the new terminal is the new starting point for Changzhou aviation port construction where the goal is higher and the role is heavier. Changzhou aviation port needs to try harder in 1) increasing flights, expanding flight routes, striving to breakthrough this year's passenger throughput of 1 million persons while achieving 2 million in 2015; 2) innovating mechanisms to invigorate the market, that is combining the aviation port construction with modern service industries development to speed up building aviation logistics park, to strongly promoting cargo transportation development, and striving to achieve a 15 thousand tons cargo throughput this year, 35 thousand tons in 2015; 3) optimizing services to display image, making the airport a window display of urban civilization, each staff member as a messenger of civilized Changzhou and let visitors feel at home; and 4) opening up to the world, striving to open up air ports and international air routes sooner.

经过1年多的紧张建设，常州机场新航站楼4月28日起全面启用。

中国民用航空局（简称“民航局”）巡视员王荣华、中国民用航空华东地区管理局副局长兼总飞行师朱州龙、海军东海舰队航空兵参谋长魏华彬、常州市委书记范燕青、市长王伟成、常州军分区司令员陈平等相关领导出席启用典礼。

王伟成在启用典礼上致辞。他说，常州机场新航站楼的启用是常州航空发展史上的一件大事，也是全市人民和广大旅客的一件喜事。他同时指出，新航站楼的启用是常州航空港建设的新起点，今后目标更高、任务更重，常州航空港要加倍努力，一是增加航班、扩大航线，力争今年客运吞吐量突破100万人次、2015年达到200万人次；二是创新机制、搞活市场，将航空港建设与发展现代服务业结合起来，加快建设航空物流园，有力推动货运发展，力争今年货运吞吐量达到1.5万吨、2015年突破3.5万吨；三是优化服务、展示形象，让机场成为展示城市文明形象的窗口，每位工作人员都成为文明常州的使者，让旅客宾至如归；四是对外开放、走向世界，力争尽快实现航空口岸开放、开通国际航线。



朱成帮（左）与王新河（右）签订阿尔山机场供油协议

## Aershan Airport Aviation Fuel Supply Security Agreement Signed

### 阿尔山机场航油供应保障协议签订

On May 25th, the Inner Mongolia Branch of China National Aviation Fuel Supply Co., Ltd. General Manager Wang Xinhe and Mayor of Aershan city, Zhu Chengbang, respectively on behalf of China National Aviation Fuel Supply Co., Ltd. and Aershan Municipal People's Government, signed the Aershan Airport Aviation Fuel Supply Security Agreement. The Signing of this agreement lays a good foundation for officially opening up navigation of Aershan Airport, also marks the birth of a new member of China National Aviation Fuel Supply, which is the 12th supply station of the Inner Mongolia Branch.

Aershan Airport lies southwest of the Greater Khingan Mountains. The airport is at the 4C level with a total investment of 0.278 billion yuan, undertaken by the central finance, civil aviation foundation and local public financing according to the ratio of 25:33:42. The airport was put into construction on the 14th of September 2008; its runway will be 2,400 meters long, 45 meters wide and is sufficient for takeoffs and landings of aircraft types under Boeing 737. When the navigation of Aershan Airport is opened up officially, the two flight routes of Aershan-Beijing-Aershan and Aershan-Hohhot-Aershan will be the first to open up.

The Opening up of the Aershan Airport will play an important role in improving the traffic of Northeast China and East Inner Mongolia areas and in boosting the economy and tourism industries around the Aershan and Xing'an League areas.

5月25日，中国航空油料有限责任公司（简称“中国航油”）内蒙古分公司总经理王新河，阿尔山市市长朱成帮，分别代表阿尔山市人民政府、中国航油在阿尔山机场供油协议上签了字。供油协议的签署，为阿尔山机场的正式通航奠定了基础，也标志着中国航油又添新丁，也是内蒙古分公司所辖第12个供应站。

阿尔山机场地处大兴安岭西南山麓，属4C级旅游支线机场，总投资约2.78亿元，由中央财政、民航基金、地方财政按照25:33:42的比例承担。该机场于2008年9月14日开工建设，跑道全长2400米，宽45米，可满足波音737-300以下机型使用。正式通航，将首开阿尔山——北京——阿尔山，阿尔山——呼和浩特——阿尔山两条航线。

阿尔山机场通航后对改善我国东北地区和内蒙古东部地区的交通状况，促进阿尔山及兴安盟地区的经济及旅游事业发展将起到十分重要的作用。



## Two Largest Parts of ARJ21-700 Aircraft Delivered ARJ21-700新支线飞机的两个最大部件交付

On April 15, the two largest parts, the fuselage and the outer wing box, of the 1st pre-production ARJ21-700 new regional aircraft, were off the assembly line of Xi'an Aircraft International Corporation successfully, and shipped to COMAC Shanghai Aircraft Manufacturing Co. Ltd., a subsidiary of Commercial Aircraft Corporation of China, Ltd., on April 17.

With volume production of the new regional aircraft started, the Xi'an Aircraft International Corporation, which bears the important task of manufacturing above 60% of aircraft parts, has delivered the upper and lower part of the rear fuselage as well as the forebody of the 1st pre-production aircraft in the first quarter of the year. Xi'an Aircraft International Corporation will finish delivering all large parts of 106 aircraft before the end of May, and strive to complete the large parts assembling task of 10 aircraft annually as customers demand.

4月15日，首架预投产ARJ21-700新支线飞机的两个最大部件——中机身、外翼翼盒在西飞国际成功下线，并于4月17日发运中国商飞所属上飞公司。

随着新支线飞机开始投入批量生产，承担着飞机60%以上零部件制造重任的西飞国际，在今年一季度交付了首架预投产飞机中后机身上、下部、前机身等部件。西飞国际将于5月底前完成106架飞机的所有大部件交付工作，并力争按照客户需求完成全年10架份的大部件装配工作。

## Construction Project of Hainan Aviation Academy Base Got Approved 海航宜昌航校基地建设项目获核准

The construction project of Hainan Aviation Academy Base at Yichang got approved by the Hubei Development and Reform Commission on March 23, 2011.

The Academy Base construction site is located at the flight zone of the present Yichang Sanxia Airport. The 6-months construction will include a new 735 square meters Type III hangar, a new 7,250 square meters training apron, and nine new airplane sheds, fire-fighting, power supply as well as related supporting facilities and equipments.

Hainan Aviation Academy Co. Ltd. is a foreign-domestic joint venture that got issued the CCAR Part 141, the Civil Aviation Aircraft Provisional Pilot School Certificate, by the CAAC in April 2010. Its headquarter is located at Sanya City, in Hainan Province, with the main operation base at Yichang Sanxia Airport and the 2nd operation base at Ningxia Zhongwei Xiangshan Airport. There were 100 plus participants who attended the training since the one-year operation. Presently, flight trainees are using Yichang Sanxia Airport as the primary training ground for routine flight training, and use Sanxia Airport, Xiangyang Airport and Changde Taohuayuan Airport for performing transition training.

3月23日，海航宜昌航校基地建设项目获得湖北省发改委核准。

海航宜昌航校基地建设项目位于现宜昌三峡机场飞行区内，建设工期为6个月。届时，将新建一座三类飞机库，建筑面积735平方米；新建训练机坪7250平方米；新建9个机棚，消防供电及相关配套设施、设备。

海南航空学校有限责任公司（简称“海航航校”）是一家中外合资企业，2010年4月获得中国民用航空局（简称“民航局”）颁发的CCAR-141部（临时）合格证。其总部位于海南三亚市，主运行基地设在宜昌三峡机场，第二运行基地在宁夏中卫机场。运行一年来，已有百余名学员参加培训。目前，飞行学员以三峡机场为主训练场，开展日常飞行训练；以三峡机场、襄阳机场、常德桃花源机场三点开展转场训练。

## China Eastern Airlines and Honeywell Signed a Flight Equipment and Maintenance Services Contract 东航与霍尼韦尔公司签署航材及维修服务合同

The Flight Equipment & Maintenance Services Contract signing ceremony between China Eastern Airlines Corporation Limited and Honeywell International Inc. was held officially at the Banquet Hall of

4月14日，中国东方航空股份有限公司（简称“东航”）与霍尼韦尔公司的航材及维修服务合同签订仪式在沙龙宾馆一楼宴会厅正式举行。



李养民（左）和马天明



宋科璞（左）和马浩翔

Salon Hotel on April 14.

Li Yangmin, Deputy General Manager of China Eastern Airlines, and Tim Mahoney, President & CEO of Honeywell Aerospace, had exchanged opinions on the auxiliary power unit (APU), avionics system, wheel & braking devices and their maintenance services. Li Yangmin extended his gratitude to Mr. Mahoney for providing China Eastern Airlines quality flight equipments and related maintenances thus far, and anticipates Honeywell to increase its equipment manufacturing and maintenance abilities continuously to provide more high-efficient, safe, reliable services to China Eastern's air fleet during the future long-term cooperation. Mr. Tim Mahoney acknowledged China Eastern Airlines as an important global counterpart of Honeywell, and is most willing to provide highly efficient, professional technical supports for China Eastern Airlines' determination to modernize and improve the flight equipments reliability, operational features.

Li Yangmin and Mr. Mahoney signed an official Airborne Equipment Model Selection Contract afterward. Honeywell will provide the APU and avionics system for 30 Airbus A320 aircraft, and avionics system for 30 Boeing 737NG aircraft of China Eastern Airlines. Moreover, Honeywell will provide wheels and braking devices for 16 newly purchased Airbus A330.

东航副总经理李养民与霍尼韦尔航空航天集团总裁兼CEO Tim Mahoney先生就辅助动力装置（APU）、航电系统、机轮及制动装置等航材设备及维修服务交换了意见。李养民副总经理对霍尼韦尔一直以来为东航飞机提供优质的航材设备及相关维修服务表示了感谢，并希望霍尼韦尔公司能够不断提升设备制造及维修实力，能在未来的长期合作中为东航机队提供更加高效、安全、可靠的服务。Tim Mahoney总裁在讲话中表示东航是霍尼韦尔公司全球的重要合作伙伴，正处在快速发展期，霍尼韦尔公司非常愿意为东航实现现代化和提高航空设备的可靠性、运营性提供专业高效的技术支持。

随后，李养民副总经理和Tim Mahoney总裁正式签订了机载设备选型合同。霍尼韦尔公司将为东航30架空中客车A320客机提供辅助动力装置（APU）和航电系统，为30架波音737NG客机提供航电系统。另外，霍尼韦尔公司还将为东航新订购的16架空中客车A330客机提供机轮与制动装置。

## Chengdu Maintenance Base of Air China: Renovation of First APU Off Assembly Line

### 国航成都基地：首台GTCP131-9A型APU翻修下线

March 16, the first GTCP131-9A Model APU (auxiliary power unit) was renovated successfully and off the assembly line at Chengdu Maintenance Base of Engineering Technology Company of Air China Limited. The first repairment success of GTCP131-9A APU, from entry examination to test appearance, took only 49 working days (including the waiting period of 34 days for exchange).

GTCP131-9A Model APU is the auxiliary power unit installed in Airbus A319, A320 and A321 aircraft. The first successfully repaired APU off the assembly line will provide APU maintenance support for Airbus A320 series aircraft, the main aircraft enforced by the Base, and become the Base's new profit growth.

3月16日，中国国际航空股份有限公司（简称“国航”）工程技术分公司成都飞机维修基地首台GTCP131-9A型APU翻修成功，顺利下线。此次GTCP131-9A型APU首修成功，从进场检查到试车出场，仅用了49个工作日（含等待交换件周期34天）。

GTCP131-9A型APU是安装在空中客车A319/A320/A321机型上的辅助动力装置。首台APU的成功修理下线，将为该基地执管的主要机型空中客车A320系列提供APU维修保障，并成为基地新的利润增长点。



## Tianjin Airlines Employed Nation's 1st E190 Crew Cabin Simulator

### 天津航空启用国内首台E190乘务员客舱模拟器

On April 26, the 1st E190 crew cabin simulator of Tianjin Airlines Co. Ltd. was put into operation. It is known as China's first and Asia's newest model with the most complete functioning E190 cabin simulator. The simulator is built on a 1:1 scale as the E190 aircraft where crew members can receive various simulated exercises in a realistic cabin environment.

The utilization of Tianjin Airlines E190 cabin simulator bears the extreme importance on lowering the company's training cost, improving the crew's training efficiency, and enhancing the company's competitiveness. The simulator can smoothly complete 26 crew training issues including etiquette service and emergency response protocol related to the E190 aircraft, allowing crew members to learn the proper methods on opening various emergency escape doors and guiding passengers to evacuate swiftly in a state of emergency, providing passengers safety, higher efficiency and standardized services.

4月26日，天津航空有限责任公司首架E190乘务员客舱模拟器投入运营，据悉，这也是中国国内首台正式启用的E190乘务员客舱模拟器，同时也是亚洲区域内最新型、功能最齐全的E190客舱模拟器。该模拟器对照E190飞机1:1比例建造，乘务员可在逼真的客舱环境中接受各种模拟练习。

天津航空E190客舱模拟器的投入使用，对于降低公司培训成本、提高乘务培训效率、提升公司竞争实力具有非常重要的意义。该模拟器可顺利完成E190飞机含应急处置、礼仪服务在内的26项乘务员训练项目，可培训乘务员在飞机处于应急状态下，如何正确应急开启各类逃离门、引导旅客迅速撤离等重要技能，为旅客提供安全、高效、标准化的服务。

## Aviation Maintenance Engineering Institute is Established

### 航空维修工程研究所挂牌成立

On May 11th, the Maintenance Engineering Institute of China Civil Aviation MRO R&D Base was established in Ameco Beijing.

Maintenance Engineering Institute is attached to the China Civil Aviation MRO R&D Base, which is responsible for carrying out the important task of creating scientific and technological innovations. The Institute established six research areas, including Engineering Technology, Operation Management, Measuring & Testing, Career Safety, Safety & Quality Management. It built up 13 study rooms and laboratories, selectively employed 512 full-time R&D staff and 161 part-time R&D personnel. The Chief of the Institute is chaired by Yin Huixin, the Executive Director of the Operation Division of Ameco, and the Deputy Chief is Hou Liguang, Dean of Office of Science and Technology Commission. All of the directors and R&D staff are all the technical experts and the backbones of Ameco. This Institute will serve as a branch for the civil aviation maintenance engineering R&D base, and the R&D activities will be carried out in the form of team projects.



5月11日，中国民航维修机务工程科研基地航空维修工程研究所在北京飞机维修工程有限公司（简称“Ameco”）挂牌成立。

北京航空维修工程研究所隶属于中国民航机务维修工程科研基地，承担着开展科技创新活动的重要任务。该研究所设立了包括工程技术、运营管理、计量检测、培训技术、职业安全以及安全质量管理在内的六个研究方向，组建了13个研究室和实验室，并选聘了512名专职研发人员以及161名兼职研发人员。研究所所长由Ameco运营管理部执行部长殷慧辛担任，副所长由Ameco科委科技办公室主任侯立国担任，所有研究室主任和研发人员均由Ameco在各个领域内的技术专家和骨干担任。该研究所将作为民航机务维修工程科研基地的分支机构，以项目组的形式开展日常的研究活动。

## Yinchuan-Kunming-Dubai, the First International Air Route in Ningxia Opened

### 宁夏首条国际航线开通 银川经昆明飞赴迪拜

At 11:40am on May 11th, Yinchuan-Kunming-Dubai, the first international air route, took off for its first scheduled international passenger & cargo flight at Yinchuan Hedong Airport, smoothly connecting the air "Silk Road" among Ningxia, Middle East and Central Asia.

This means that the people of Ningxia can visit Dubai, the biggest city in the United Arab Emirates from Yinchuan, which also symbolizes that Ningxia has now become the important transit trade port between China and Arab countries and regions.

5月11日上午11时40分，宁夏首条国际航线——“银川—昆明—迪拜”定期国际客货两用航线航班在银川河东机场实现首飞，宁夏与中东、中亚地区将通过这条空中“丝绸之路”顺利对接。

这意味着从此宁夏人民可以直接从银川飞往阿拉伯联合酋长国第一大城市迪拜，也标志着宁夏将成为我国对阿拉伯国家和地区重要的贸易中转口岸。



## Resetting of Public Welfare of the Medical Care & Emergency Rescue of Heilongjiang Airport Group Completed

### 黑龙江机场医疗应急救援公益性复位全面完成

On the 24th of May, Heihe Airport and the Heihe Municipal Public Health Bureau signed the Medical Emergency Rescue Daily Security Agreement (hereinafter referred to as the Agreement), marking the medical care task officially transferred to the local government and brought into the local medical support system. Thus, the Resetting of Public Welfare of the Medical Care & Emergency Rescue of the four old feeder airports of Heilongjiang Airport Group was completely finished.

The transfer of the medical care task of Heihe Airport gained great attention from the Heihe Municipal Party Committee and Heihe Municipal Government. Heihe Municipal Government held many meetings to research this matter and Heihe Airport and related functional governmental departments conducted a number of consultations and reached a consensus, that is, the airport medical care & emergency will be transferred to the local government's management and accepted by Heihe First People's Hospital assigned by Heihe Municipal Public Health Bureau. The Agreement includes that Heihe First People's Hospital offers Heihe Airport daily medical emergency security, outfits ambulances, medical personnel and emergency facilities & equipments and periodically organize & participate into airport emergency response integrated or individual drilling, should be responsible for training in airport emergency response & quality and command and transfer follow-up medical care forces. Heihe Airport should provide facilities and equipments such as reserve space for medical first aids, diagnosis, treatment, rescue and emergency medical supplies, etc..

The resetting of public welfare of Heihe Airport increases its emergency response abilities and enhances its integrated security.

5月24日，黑河机场与黑河市卫生局签订了医疗应急救援日常保障协议，标志着黑河机场医疗救护职能正式移交给当地政府，纳入了地方医疗救援体系。至此，黑龙江机场集团4个老支线机场的医疗应急救援公益性复位全面完成。

黑河机场医疗职责移交地方工作得到了黑河市委、市政府的高度关注。黑河市政府多次召开会议研究，机场与政府职能部门进行了多次协商，达成了共识，确定机场医疗急救移交地方政府管理，由市卫生局指定市第一人民医院接收。协议内容包括：市第一医院为机场提供日常运行医疗急救保障，配备救护车、医护人员及急救设施设备，定期组织和参加机场应急救援综合、单项演练，负责机场应急救援知识和技能的培训，负责指挥调动后续医疗力量。机场提供应急医疗急救、诊断、治疗、抢救及急救救护物资储备用房等设施。

黑河机场公益性复位增强了机场应对各种紧急事件的快速反应能力，提高了机场的综合保障能力。



## Lijiang Airport Flight Zone Expansion Project Passed the Acceptance Test

### 丽江机场飞行区改扩建工程顺利通过试飞验收

At 9:20am on April 8th, a B737-700 (Registration No. B-5271) from China Eastern Airlines' Yunnan Branch, carrying the working group for the Lijiang Airport Flight Zone Expansion Project, landed smoothly at Lijiang Airport, and implemented the acceptance test of the new procedures which will be adopted after the expansion.

In accordance with the provision of Civil Aviation Administration of China, the flight test team checked the Nav-aids, lighting systems, and flight procedures at Lijiang Airport, and investigated the runway and taxiway on-site, inspected all the security information and operation information of the working procedures, implemented all the subjects of the flight test, and finally completed the flight test successfully. According to the flight test report, the flight test was passed. Once the conditions of the ATC and field roads for the expansion project pass the industrial acceptance test, it can be put into operation.

The successful test flight means that the security capabilities will be further enhanced after the expansion. After pass of the overall industrial acceptance test, Lijiang Airport will be upgraded to a 4D airport. At that time, B737-800 and all the other D-type aircraft can take-off and land at Lijiang Airport, which will lay a solid foundation for the opening of both medium and long-haul air routes and international flights at Lijiang Airport. At the same time, the pass of the flight inspection and flight test of the Lijiang Airport Expansion Project marked the renovation and expansion project, which has lasted for more than three years, and will be fully completed soon.

4月8日上午9时20分，中国东方航空股份有限公司云南分公司波音737-700（注册号：B-5271）飞机搭乘着执行丽江机场改扩建工程试飞的工作组平稳地降落在丽江机场，开始执行丽江机场改扩建后新程序正式使用前的试飞任务。

试飞工作组按照中国民用航空局的规定，对丽江机场的导航设备、灯光系统、飞行程序进行了检查，并实地考察了机场跑道、滑行道，详细检验了机场各项保障信息和工作程序的运行情况，顺利完成试飞各项科目，最终圆满完成了此次试飞任务。根据试飞机组出具的试飞报告，本次试飞获得通过，机场改扩建空管、场道等工程具备投入使用的条件，待通过行业验收后，即可投入使用。

此次试飞成功，意味着丽江机场改扩建后机场保障能力进一步增强，待总体改扩建工程通过行业验收后，丽江机场等级将提升至4D，届时，波音737-800及D类飞机都可以在丽江机场起降，为丽江机场开通中远程航线和国际航班奠定坚实基础。同时，丽江机场改扩建工程通过校飞、试飞后，标志着历时三年多的改扩建工程即将全面完工。