

**Preparing the next Generation of Investigators**  
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**1. Current Industry development status, objectives and tasks in China**

According to annual report of airworthiness certification department in 2012, the average annual growth rate of transportation aircraft fleet is 10.47% during the last five years in China. As the end of 2012, 36 airlines operated under CCAR Part 121, with 1914 registered large aircraft; 18 airlines operated under CCAR Part 135, with 131 registered aircraft. The fleet type has changed dramatically, 918 Boeing series aircraft, 878 Airbus series aircraft, 118 Embraer series aircraft, total number of domestically made aircraft (mostly are MA 600 and MA60, is 21, another is Y7 series aircraft) is 24, other manufacturer aircraft is 112, including Bombardier, Gulfstream, ATR 72, Hawker, etc.. General aviation category aircraft is 1342.

In operation and safety data, scheduled passenger service in 2012 accomplished 6.16 million flight hours, 2.78 million flights, increased year-over-year by 10.1% and 9.0%, respectively. General aviation in 2012 accomplished 550,000 hours and 980,000 flights, increased year-over-year by -2.2% and 14.0%. Transportation flight accident occurrence is zero. Total number of general aviation accident have been declining, flight accident rate per million flights down 83.0%. Transportation aircraft incident occurred throughout in 2012 is 250, of which 8 serious incidents, down from 9 in 2011, serious flight incident rate per million hours caused by human factors is 0.006, decreased year-on-year by 62.5%. Overall industry operation and safety margin significantly improved. By June 30, 2013, the industry has maintained a continuous flight safety record of 35 months, or 16.86 million flight hours.

It is expected that the industry would grow rapidly in 2013, a net increase of 215 aircraft, The fleet is expanding, aircraft utilization and flight hours remained at a high level; relatively weak safety foundation in the western region will be rapid growth in air transport volume, general aviation will have a new period of development, with more extensive and more frequent activities, then increasing pressure on general aviation safety management. Industry safety infrastructure and integrated support capacity are facing enormous challenges.

Industry-wide safety goal in 2013:

For air transport, major fatal accident rate per million hours decreases from 0.23 (1998-2007 sliding value) to 0.20 or less. Major accident rate three-year sliding value does not exceed 0.5 per million hours. Prevent air accident related hijacking, hull losses and security. For general aviation, accident rate per million flights should be not more than 0.30, of which fatal accident rate per million flights not more than 0.15.

No major fatal ground and maintenance accidents.

Air transport incident rate per million hours is not more than 0.50, of which human factors causes is not more than 0.18. Serious incident rate per million hours does not exceed 0.12. General aviation incident rate per million flights is not more than 5. Ground incident rate per million flights is not more than 0.10;

ATC reasons incident rate per million flights is not more than 0.10, airport reasons are not more than 0.10, fuel causes incident rate is not more than 0.01.

The data are found in the Civil Aviation Authorities (CAA) 2012 Aviation Safety Performance report.

## **2. Aviation Safety Regulations Issues**

Recently, being developed, revised civil aviation safety regulations, standards and advisory circulars contributed to ensure industry continued safety level.

"Civil Aircraft Incidents" recommended standard revision was published in 2012. CAA related departments and airline representatives consist of review committee to discuss. The recommended standard was in reference to ICAO Annex 13, the U.S. FAA air traffic control orders and aviation related regulations based on the combination of China's civil aviation development and practical experience, revised and incorporated into cabin safety standards, for civil aircraft incidents provided identification basis. It started the implementation on March 1, 2013.

In order to refine and interpret relevant provisions on flight operations quality assurance (FOQA), guide air carriers to establish and continued operating comply with flight quality control procedures regulatory requirements, CAA issued in February 2012 Advisory Circular

"Flight Operations Quality Assurance implementation and Management"(AC-121/135-FS-2012-45), for the airlines daily risk management. This Advisory Circular describes the composition of FOQA, establishment, implementation, management, data protection and information sharing. On the one hand it provides guidance to certificate holder to establish and implement FOQA procedures meet the requirements of authorities, on the other hand it will help FOQA supervision and inspection to certificate holder by authorities.

This Advisory Circular require that aircraft monitoring rate should be 100%, segment monitoring rate should not be less than 85%, and monthly reports to the CAA flight standards department its flight quality monitoring statistics and trend analysis, statistical data including total control rate, total over limit rate, monitor rate and over limit rate by each aircraft model, and according to the time, aircraft type, over limit events etc. creating related statistical reports. Trend analysis report is including the overall trend analysis, over limit trend analysis by aircraft models, typically over limit event analysis and safety recommendations. Meanwhile, it is encourage flight quality monitoring information sharing between certificate holders.

### **3. Preparing the next Generation of Investigators**

#### **With independent intellectual property rights of flight data analysis application platform**

In addition to airborne equipment manufacturers provide flight data analysis software, some domestic technology companies have also developed software system for QAR data readout, management and then created an integrated systems to achieve a comprehensive and automatic data check, massive QAR data management and linking with airlines operation system. Flight data provide the breadth and depth of support. Airlines can conduct operational analysis and delicacy management to improvement efficiency.

It is widely believed flight data itself, especially QAR data is an important asset for airlines, having great applicable value. These technology companies through in-depth research on QAR data has been achieved thousands of QAR parameters automatic readout. By further excavation analysis of these data, airlines can work out more accurate flight plans, aircraft health monitoring, improved pilot training, promotion of safe operation and energy conservation, etc.

These systems put QAR rawdata as the core, integrating series of airlines operating data. From the route, fleet, airports, airlines personnel perspective, they conduct condition monitoring and early warning, and put forward multi-level operate indicator system for different levels of management in airlines to provide decision support.

In fuel conservation strategies, used appropriately, the cost index (CI) feature of the flight management computer (FMC) can help airlines significantly reduce operating costs. The CI is the ratio of the time-related cost of an airplane operation and the cost of fuel. The value of the CI reflects the relative effects of fuel cost on overall trip cost as compared to time-related direct operating costs. But airline is difficult to determine whether the pilot to fly in accordance with CI. Through the establishment of the operating model and optimization and test, airlines developed fuel-efficient incentive program for operator and flight crew personnel. In 2011, airline estimated that operating cost index less than 65% raised to 95 % or more, the average monthly amount of reduced fuel more than 3000 tons, the annual fuel cost savings up to more than 300 million yuan.

In the past, people mainly use QAR data to monitoring unsafe events. Now, flight safety manager can identify the pilot's poor flying habits from flight data monitoring and timely conduct training to improve flying skills, optimize standard operation procedures, and improve the overall airline training system to ensure safer flight.

CAA also encourages innovative use of QAR data. Parts of them also intends to set about establishing flight data monitoring system, integrated regional airlines QAR data, studying the typical route and aircraft models on different phases of flight deviations occurred, tracking and analysis of its causes.

### **Flight Operations Quality Assurance ground station project**

After more than ten years FOQA practices, flight quality monitoring work in China has made important contributions to ensure continued safe development. There are also some difficulties: (1) Authorities regulatory methods lags behind the development of the industry; (2) lack of industry FOQA information exchange and sharing of information; (3) FOQA information

analysis and application need to be strengthened; (4) CCAR Part 135 aircraft operator's FOQA work needs to be strengthened.

The construction of FOQA ground station for authorities can help solve these flight operations quality assurance problems encountered in the practices. By building WQAR data transmission network and WQAR data warehouse, WQAR data is automatically transmitted and stored in the data warehouse; considering various aircraft models and monitoring items and standards, it will determine authorized events monitoring standards; acquisition or development of flight data monitoring and analysis procedures, implementing automatic WQAR data processing and analysis; acquisition of statistical analysis tools to carry out industry-wide FOQA statistical analysis, trend analysis, customized industry analysis report; depth study QAR recording parameters, expand data analysis applications; And, creating a portal website, sharing data and information in the industry.

This ground station will meet civil aviation authorities safety supervision needs, and also an important basis for aviation safety decision-making, meanwhile it will establish industry-wide flight operations quality assurance information sharing platform. The main function of the current design project includes data storage, data quickly searching; FOQA-based data processing; statistical analysis and dissemination.