

Research on Current General Aviation Operational Control System

Li-qun Li

*Aviation engineering institute, Civil Aviation Flight University of China,
Sichuan Guanghan618307
Llqun129@163.com*

Abstract

As the rapid development of general aviation and the growing number of the aviation enterprise and aircraft, a great pressure comes to industry supervision of civil aviation and operational control of general aviation. Because of the shortage of solution of the general aviation, there's a big difficulty on operational protection. This paper elaborates the current situation of general aviation enterprise of our country, analyzes the shortage of it, combines with the characteristic of general aviation operational control and units being researched, and has a systematic research, then ensures the need of general aviation enterprise's operational control.

Keywords: *General aviation; Operational control; Current situation; Demand Analysis*

1. Overview

General aviation was listed as a long-term growth foreground business, which is developing and promoting the industry, by The Twelfth Five-Year Plan for National Economic and Social Development of the People's Republic of China (Mar 2011). The Chinese general aviation industry is boomingly developing currently. The number of huge, medium, and small enterprises is increasing rapidly, and different kinds of general aircrafts are swiftly brought in. 164 general aviation enterprises has got the certificate of operation, 1,394 aircrafts and over 10 thousand employees have been involved in the general aviation industry up to July 2013 [1-2].

Compared with the aircraft, practitioners and the growing surge in the amount of flight operations, general aviation contrast various enterprises and institutions, in particular, is engaged in the use of flight operations "in the small" type of shipping companies, the use of smaller aircraft, simple structure and facilities running low demand. In the current navigation is not running relatively high, a lot of work and control of work flow running entirely on the use of manual control mode has not been exposed to the statistics of serious problems. However, with the deepening of China's reform of low-altitude airspace, the total general aviation operation will accelerate the rise, especially the influx of a large number of "in the small" type navigation business. The growing number of the aviation enterprise and aircraft, a great pressure comes to industry supervision of civil aviation and operational control of general aviation. If you continue to run this simple control method will necessarily due to the impact of human factors, such as a huge security risk, a serious crisis aviation safety.

Air transport is very mature with respect to the operation of the control system, due to the current China's civil aviation regulations CCAR-135, CCAR-91 did not make refine requirements [3] on the run control, so there is not a general aviation field in system, the actual demand for general aviation, with general aviation features to run control system.

However, with the rapid increase in the amount of general aviation run, relevant laws and regulations will necessarily be gradual refinement and adjustment.

2. Current Situation of Operational Control

2.1. Overview of Current Operational Situation

The aircraft maintenance section is managing the aircraft maintenance technique by half computerization and paper work. For example, they are accessing, typing in, and announcing the airworthiness directive, time control management, aircraft maintenance work list mainly by paper work, and some of the work with the assistance of computer. The way of manual operation and half computerization have the disadvantage of easy got mistake, complex process, inefficient performance; data information cannot be solved in time, data storage dispersing, extremely convenient to search. The management staff needs to write down the aircraft and the engine record patiently and carefully in time if they are using the paper to do it [4]. However, when they face the huge number of aircraft, heavy flight mission, the need cannot met, the operational need cannot be satisfied by this kind of management, the information cannot be solved and shared in time.

2.2. Operational Process Analysis

As the rules of the Chinese civil aviation law, the aircraft maintenance technical information, which should be started to count by the moment aircraft shows out, includes the basic information, the record of aircraft and engine, the fault information, the maintenance information, the technical file information, the airworthiness situation information [5]. The majority aircraft maintenance sections of the general aviation unit, that the technical section, quality control section, and production section are involved in are managing the aircraft maintenance technique by paper work. As shown in Figure 1.

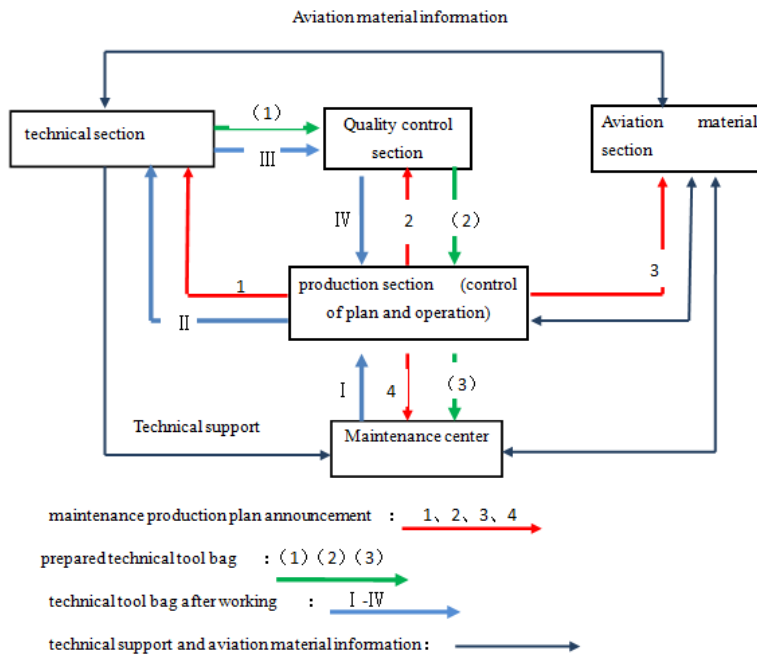


Figure 1. Maintenance Management Operation

(1) Technical section is in charge of aviation basic information, installed equipment list, maintenance file list, including different kinds of maintenance book, airworthiness announcement, etc.

(2) Quality control section is in charge of describing the significant fault and recording the solution, reporting the repeating fault, reporting the ground fault, reporting the flight fault, etc.

(3) Production section is in charge of writing the time control list, the execution record, the aircraft and engine record, the flight record, and the aircraft showing out situation, etc.

The managing work of the whole aircraft maintenance section, which is show in figure 1, is finished in a close ring.

The production section is the core section in the whole aircraft maintenance section and the center of the maintenance operation. The production section will make the work forecast list and hand it to technical section by the deadline of overhaul of the aircraft and the engine, regular checking, and finishing point for time control unit. The technical section, which is in charge of the maintenance book of the aircraft and engine, will make the work list card and hand it out to aircraft material section, quality control section, maintenance center by the book and the maintenance plan from production, so that the aircraft material section will prepare the aircraft material parts by the maintenance work list, the quality control section will supervise this performance and store the signature after checking when the whole work on the list is finished, the maintenance center outside will do the repairing work when they get the work list and ask the technical support from the technical section if they meet with the technical problem that cannot be solved. Each link of the whole maintenance work close ring is using the aircraft maintenance technical information.

The detailed operational process map vividly shows the maintenance management work process. It is showed in Figure 2.

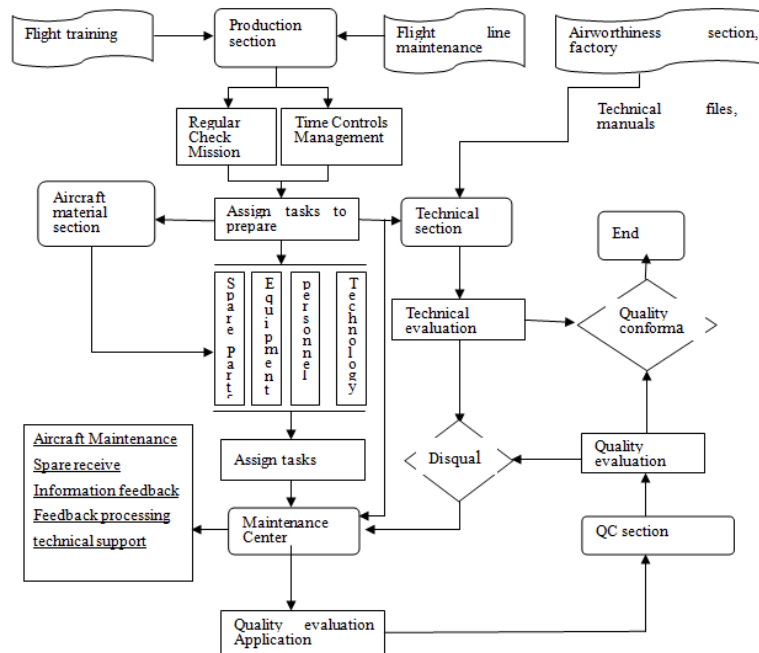


Figure 2. Work Process of Maintenance Business

The production operational control process can be comprehended through analyzing current maintenance production operational situation.

3. Characteristic of General Aviation Operational Control

Paper work is used as the management from the basic information of the aircraft, the record of engine, the fault information, the maintenance information that makes the aircraft maintenance management, which involves all the sections of aviation system, perform inefficiently, and lowers the maintainability and the safety of the information. It shows on major aspects below:

(1) Since the airworthiness file is renewed rapidly and used on wide range, the traditional management cannot meet the using need.

(2) Paper work file is not timeliness for announcing, and high cost to store.

(3) Time control unit information and life management are out of date and inefficient.

(4) Since the information of the aircraft is managed disperse, it's not easy for the old and new aviation staff to usually read to strength his aircraft knowledge.

(5) The troubleshooting of the aircraft need to be optimized.

Based on those aspects above, we are facing the new characteristics of large number of file, rapidly renewing, heavy training operation, and complex information maintenance.

4. Demand Analysis

(1) Aircraft team information management: the system can make the function, which can type in, inquire, and renew the information of aircraft team, come true. It specific includes the basic information management aircraft and engine, the information of aircraft and the type of engine, the every day registration information of aircraft and engine, the aircraft and engine group information management.

It is quite clear for one to understand the basic situation of the training plane and the engine through the information above [6]. Not only the situation of the training plane of a branch but also the whole unit can be known and checked. So it can satisfy the daily plane management and help the newcomer to understand the basic file of the training plane he should manage for the coming work.

(2) Airworthiness file management: the system should timely effectively manage the airworthiness file, different kinds of book for plane and engine and other files from the civil aviation administration. It includes the effective management of nationality certificate of registration, broadcasting station license, airworthiness certificate, the typing in, inquiry, and renewal of these three licenses, the management of books of aircraft and engine maintenance, list of parts, fault isolation and so on.

(3) Significant maintenance record management: the maintenance section of the school must record and file the information of the significant fault, repeatability fault, retaining fault, and hard using report in detail in the view of the rules of the airworthiness supervision section of civil aviation administration [7]. To meet with this need, the system should manage to type in, inquire and renew the information above, so as to make it convenient for the maintenance management section from the unit and airworthiness supervision section to check.

(4) Fault information management: it should include the functions of compiling and modifying the fault information, the solution of the fault information, and the fault information statistics [8-9]. The system should manage the daily fault information of the plane and engine, which includes compiling, inquiring, fault diagnosing, statistic analyzing the fault.

Currently, the maintenance solution operation basically refers to the maintenance book of aircraft and engine. If the maintenance information management can come true, the

maintenance section can definitely find the similar or same fault once happened through the solution information of the fault in the history, and then solve the fault happening now by the information of the solution for the fault happened. We can also do the statistics analysis to the fault in five ways by time, ATA chapter number, stage of happening, certain aircraft, and parts to get the maintenance report of the unit rapidly and assure the maintenance ability and level of different branches of this unit [10].

5. Conclusion

Through the analysis above, we know that the daily flight plan and maintenance work arrangement depend on manual work, a safe, stable, and effective production process control system lacks. Making the departure and maintenance plan by analyzing and filtering huge information is a heavy work, and has unreasonable arrangement easily, which cannot achieve the requirement of echelon use and scientific management use of the aircraft. In order to make sure the safe, healthy, and rapid growth of the general aviation enterprise, the problem of low operation supervision level and lack of security assurance ability must be solved as soon as possible, and a systematic computerized operational management system, which accords with the operational management characteristic of the general aviation enterprise, must be built.

References

- [1] China Civil Aviation of China General Aviation General, Beijing (2008).
- [2] Y. Wan, "Research enterprise information island", Branch Technical University of China, Anhui (2003).
- [3] Yantao-wang and lirui, "General aviation operations refinement criteria", China's civil aviation (2011).
- [4] W. Bing, "Aircraft Maintenance Management Information System Development and Research", Northwestern Polytechnical University, Xi'an (2006).
- [5] Guanjun-lai and P. xing, "aviation maintenance industry Pan star status quo and development trend analysis of China's research", Civil Aircraft Design and Research, vol.1, (2009), pp. 14-17.
- [6] F.-l. Shu, "Aeronautical Maintenance Management Information System", China Civil Aviation College, Beijing vol. 21, (2003), pp.76-78.
- [7] J. Korbicz, J. M. Koscielny and Z. Kowalczyk, "Fault diagnosis—models, artificial intelligence and applications [M]", Berlin: Springer, (2004).
- [8] China Civil Aviation Administration, AC121-60 [S] (2005).
- [9] Ligang-Wang, "general aviation maintenance technology information management systems development and research", master's thesis (2012).
- [10] S. Tao and Y. Chen, "Research and thinking of ATC operational management and control systems (AOC) construction", J. Air traffic management, (2004).

Author



Li-qun li, female, she was born in 1983, master degree, experimentalist. Her main research direction is for aerospace electronics, electrical automation. Email: llqun129@163.com,

Unit's name and Address: Aviation engineering institute, Civil Aviation Flight University of China, Sichuan Guanghan618307

