Article **ECORFAN Journal**
June 2017 Vol.3 No.4 9-13

Implementation of a quality management system to obtain production approvals in mexican companies of the aeronautical sector

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Received January 18, 2017; Accepted June 20, 2017

Abstract

An exploratory analysis of the requirements established for obtaining the production approvals by the General Directorate of Civil Aeronautics of the Ministry of Communications and Transportation of Mexico is presented. The requirements established for the Quality Management System in the Mandatory Document CO AV-29/11-R2, against the strategies offered by the ISO 9001 standards in their 2008 and 2015 versions, are compared. It was observed that ISO 9001: 2008 provides a sufficient scheme to achieve compliance with the requirements established in the mandatory document. However, if quality management is to be pursued in an avant-garde way, robust and prepared for the coming changes in national regulations, it is advisable for companies to focus their efforts towards the implementation of management systems, preferably integrated, that have high-level structures, such as those required by ISO 9001: 2015, among others.

Manufacturing certificate, aeronautics, quality management

Citation: PURATA-SIFUENTES, Omar Jair, RAMOS-ESTRADA, Cecilia, RODRÍGUEZ-LARA, Ricardo Alejandro and NAVARRETE-REYNOSO, Ramón. Implementation of a quality management system to obtain production approvals in mexican companies of the aeronautical sector. ECORFAN Journal-Republic of Paraguay 2017, 3-4: 9-13.

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Introduction

Two years after the update of the most popular management systems standard in the world, the ISO 9001 standard, it would be impossible to deny the acceptance that the management systems (SG), and in particular the quality SGs (SGC), have had in companies internationally. Mexico has not been the exception, which can be seen in the growth of SGC certifications of companies in the national territory under the ISO 9001 standard from 978 companies in 1998 to 7 418 in 2015, while the aeronautical sector global level presents figures of 1 052 and 1 783 certificates issued from ISO 9001, in the same period of time (ISO, 2016). It is important to note that to date there is no specific ISO standard for the aeronautical sector, such as the AS 9100 or the EN 9100.

In Mexico, the Directorate General of Civil Aeronautics (DGAC), belonging to the Ministry of Communications and Transportation, establishes in the document called Compulsory Circular CO AV-29/11-R2 (SCT, 2016) the requirements to be met for companies that they intend to obtain some of the production approvals, necessary documents to be able to legally carry out operations related to the manufacture, distribution and purchase of different goods and services, necessary in the aforementioned turn.

In this practical application, the requirements established in (SCT, 2016) are contrasted with respect to the QMS that the manufacturer must implement, in order to obtain the approval of the production of aeronautical products or articles.

It is observed that the ISO 9001 standard, in its 2008 version (ISO, 2008) offers a sufficient scheme to achieve compliance with the requirements established in (SCT, 2016).

But if you want to have a robust scheme for quality management, it is better to implement a QMS based on a high level structure, as outlined in the ISO 9001: 2015 standard (ISO, 2015)..

Methodology

(SCT, 2016) lists four different types of production approvals (Table 1). For the first three, the same circular establishes in its Appendix B the requirements to be met by the QMS, while for the fourth type of approval the structure of the required QMS is left to free choice..

KIND	Scope
Production Certificate (PC)	Aeronautical products and their articles involved
Authorization of Standard Mexican Technical Order (ASMTO)	Items that meet a specific TSO
Approval of the Parts Manufacturer (APM)	Replacement and modification items
Manufacturing Evidence (ME)	Items produced through a PC, TSOA, PMA or equivalent, granted by a Civil Aviation Authority

Table 1 Types of Production Approvals. Source: (SCT, 2016).

The methodology used is a comparison of the requirements imposed by the DGAC, as regards the QMS, for each of the production approvals cited in Table 1.

ISSN-On line: 2414-4827

In the heading "Responsibilities of the owner", (SCT, 2016) requires maintaining the conformity of the SGC with respect to the approved data and procedures, which is specified in the elements: 8.1.4 b) for the PC; 8.2.4 b) for the TSOA; 8.3.4 b) for the PMA; and 8.4.3 b) for the CM. (ISO, 2008) in its element 5.6 "Review by management", allows to satisfy this item.

In the item "Inspections and / or verifications and tests", (SCT, 2016) requires that every manufacturing body or manufacturer must cooperate with the Aeronautical Authority and allow it to inspect and / or verify its QMS, facilities, technical information and any other aeronautical product or article produced, and witness any evidence, including inspections and / or verifications or tests at the facilities of its suppliers, necessary to determine compliance. All the above is specified in the elements: 8.1.7 for the PC; 8.2.7 for the TSOA; 8.3.6 for the PMA; and 8.4.5 for the CM. (ISO, 2008) in its elements 8.1 "General" and 8.2 "Monitoring and measurement", allows to satisfy the present item.

In the heading "Changes in the SGC", (SCT, 2016) requires that after the issuance of the production approval the holder must submit to the Aeronautical Authority any change in the SGC for its revision; and immediately notify the Aeronautical Authority, in writing, of any change that may affect the inspection, compliance or airworthiness of its aeronautical product or article. The above is specified in the elements: 8.1.8 for the PC; 8.2.8 for the TSOA; 8.3.7 for the PMA; and 8.4.6 for the CM. (ISO, 2008) in its element 5.4.2 "Planning of the SGC", allows to satisfy the present item.

Finally, in the "Documents to deliver" category, (SCT, 2016) requires:

- *Document the function relationships between those responsible for quality management and identify a Responsible Manager, who will be the main contact with the Aeronautical Authority, which is specified in the elements: 8.1.9 h) for the PC; 8.2.9 h) for the TSOA; 8.3.8 i) for the PMA; and 8.4.7 i) for the CM. (ISO, 2008) in its element 5.5 "Responsibility, authority and communication", allows satisfying this part of this item.*

- *Provide for approval by the Aeronautical Authority, a manual describing its QMS, in English or Spanish, in an electronic format that is not editable and acceptable to the Aeronautical Authority, which was specified in the elements: 8.1.9 j) for the PC; 8.2.9 j) for the TSOA; 8.3.8 k) for the PMA; and 8.4.7 k) for the CM. (ISO, 2008) in its element 4.2.2 "Manual of quality", allows to satisfy this part of the present item.*

- *Establish and describe a QMS in accordance with the requirements of Appendix "B", which is specified in the elements: 8.1.9 i) for the PC; 8.2.9 i) for the TSOA; and 8.3.8 j) for the PMA. For the CM, 8.4.7 j) indicates that a QMS should be established that is applicable to the production facilities of the supplier or subcontractor located in national territory. In the following paragraphs this part of this item is addressed in particular*.

As can be seen, only for the CM it is specified that the establishment of a QMS may not conform to that described in Appendix "B" of (SCT, 2016). However, it is possible to compare the requirements of Appendix "B" of (SCT, 2016) with (ISO, 2008), in order to corroborate that a QMS that complies with the requirements of the latter will also do so with those established in the First. Table 2 shows this comparison.

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APPENDIX "B"	ISO 9001: 2008
a) Control of design data	7.3 Design and development
b) Document control	4.2.3 Control of documents
c) Control of Suppliers	7.4.1 Purchasing process
d) Control of production processes	7.5.1 Control of production and service provision
e) Inspection and testing	8.2.4 Monitoring and measurement of the product
f) Control of the inspection, measurement and test equipment	7.6 Control of monitoring and measuring equipment
g) Inspection and test status	7.5.3 Identification and traceability
h) Control of aeronautical products and non-compliant items	8.3 Control of nonconforming product
i) Corrective and preventive actions	8.5.2 Corrective action and 8.5.3 preventive action
j) Handling and storage	7.5.5 Preservation of the product
k) Control of quality records	4.2.4 Control of records
l) Internal audits	8.2.2 Internal audit
m) Feedback in service	8.2.1 Customer satisfaction
n) Quality leaks	8.3 Control of nonconforming product
o) Issuance of airworthiness release documents	8.2.4 Monitoring and measurement of the product

Table 2 Appendix "B" of (SCT, 2016) vs ISO 9001: 2008 (ISO, 2008). Source: self made.

Results and Discussion

Table 2 makes it clear that each of the requirements detailed in Appendix "B" of (SCT, 2016) can be fully covered by one or more elements of ISO 9001: 2008 (ISO, 2008). Then, it is possible to implement a QMS based on ISO 9001: 2008 (ISO, 2008), which will satisfy the requirements of (SCT, 2016) for any of the production approvals listed in Table 1. However, it is important to note that some of the requirements of Appendix "B" are prescribed, that is, it indicates in detail how things should be done, while ISO standards have never been intended to be prescriptive, but descriptive and even abstract at the levels of the SGC or the processes that integrate it, but not in the levels of the procedures and instructions.

However, with respect to ISO 9001: 2015 (ISO, 2015), its high-level structure has evolved and ISO is betting on fewer specific documentary requirements (fewer prescriptions). For example, a Quality Manual is no longer required in a specific way, or the figure of the Respresentative of the Directorate has disappeared, as well as the concept of preventive action. However, many elements of the new ISO 9001: 2015 (ISO, 2015) were already present in the immediate previous version of the standard, such as design and development, control of production and service provision, identification and traceability, control of nonconforming product, product preservation, internal audit, and some others. In these elements, only changed its accommodation in the structure of ten elements of the so-called Annex SL.

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Conclusions

The requirements established to obtain the four production approvals documented in (SCT, 2016) were analyzed in an exploratory manner. The analysis indicated that the QMS requirements established by (SCT, 2016) can be met with the implementation of a QMS based on ISO 9001: 2008 (ISO, 2008). However, if you want to be prepared for less prescriptive requirements, it would be convenient to implement a QMS that has a high level structure, such as the one specified in Annex SL for ISO 9001: 2015 (ISO, 2015).

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ISSN-On line: 2414-4827