

Comparative Study on Airframe Specialist graduates of Approved Training Organizations

JAMES E. DEATO

Faculty, BSAMT, Airlink International Aviation College

Abstract—The purpose of this Study is to come out with a comparison of Sheet Metal Specialist Training (SMST) graduates from the different Approved Training Organizations (ATO) in Manila in terms of the skills they acquired from the SMSTs and their performance level/rating. Therefore vis-à-vis the requirements and qualifications standards set by the various Maintenance, Repair and Overhaul (MRO) stations in Manila, by gathering information through survey. Two (2) sets of questionnaires were handed out to forty (40) participants comprised of the first batch (2019) of graduates of the Wide-Aero School of Aviation (WASA) and the Flight School International (FSI). WASA and FSI are among the ATOs in Manila that are duly certified by the Civil Aviation Authority of the Philippines (CAAP) and the Philippines Civil Aviation Regulation (PCAR). The participants are the target respondents to this study because of the location of the ATOs that they trained. Among the information required for this Study, are the qualification standards and the performance rating/assessment of the survey-participants/personnel at the entry-level airframe mechanic positions. The survey questionnaires for the ATO-graduates is a self-rating type and was devised using the skills test standards of CAAP found in Advisory Circular (AC) 02-18. The said Skills Test Standards enumerates the subject areas covered by an airframe mechanics, the description of performance levels 1, 2 and 3, and the tasks involved which are the basis by which performance level are assessed. In general, this enabled the researcher to gather performance level rating of the participants from ATOs and their demographic profile. The survey questionnaire for the major MROs was also designed using the AC 02-18 standards, which aimed at gathering the required demographic profile and the performance rating of an entry-level airframe mechanic in each of the subject areas as rated by the authorized personnel, the Human Resource officials or the maintenance manager, whoever is applicable.

The data gathered from ATOs were analyzed through Mann-Whitney, and the results/findings thereof are compared with the data gathered and analyzed from the MROs. The comparative results from there were then used as a basis for the way forward-recommendations that ATOs may undertake to improve/enhance the qualification standards and the quality of training for the entry-level airframe mechanic in MROs in Manila.

Indexed Terms—Aircraft Maintenance, Airframe Specialist, Aviation Education

I. INTRODUCTION

There are various skills specialization trainings available to aircraft maintenance technicians or to those who have completed the Aircraft Maintenance Technology (AMT) course. These are: wheel and brakes; aircraft battery; composite specialists; and sheet metal specialist. These trainings are administered by the approved training organizations (ATO) in accordance with the Civil Aviation Authority of the Philippines (CAAP) under PCAR Part 3. The study focused only on the Sheet Metal Specialist Training (SMST) given by ATOs located in Manila. The objective of this study is to compare the quality of the trainings administered by the ATOs to Airframe Mechanics in terms of the skills they acquired and their performance at work in relation to the qualifications and performance standards set by the Maintenance, Repair and Overhaul stations in Manila. Airframe mechanics are AMTs that specialized in airframe structures and those that received sheet metal specialist trainings. Further, the Study aimed at assessing the competency level of the Sheet Metal Specialist Training (SMST) provided by the ATOs in Manila for the purpose of improving and enhancing the trainings curriculum or modules of the ATOs.

Airframe Specialist Training

Specialist trainings are one of the qualifications that MRO employers look for in an applicant not only in the Philippines but also abroad. Applicants with this training on their credentials have higher rates of getting employed and/or promoted than those without this training. The specialist trainings are available at a price ranging from Php30,000.00 to Php200,000.00 depending on the specialization. Such a rate is found to be costly for most of the AMT graduates.

There is no age requirement for the said training for as long as one has the necessary requirements. SMST is one of the most in-demand programs in the country. Upon completion of the training course, one is granted with a certificate that qualifies the individual as an airframe mechanic. SMST Certificates are issued by the CAAP and the Philippine Technical Education and Skill Development Authority (TESDA) in accordance with the provisions of Republic Act No. 7796 or the (Technical Education and Skills Development Act) Act of 1994.

The training which usually lasts for 3-4 months is composed of two (2) parts:

1. Theories, which is a classroom-based training that focusses on detailed airframe construction and repair; and
2. Practical, which consists of theory applications through several projects using the various tools for in-sheet metal repair and airframe construction.

Based on the standard program for SMST, the requirements are as follows: Diploma in Aircraft Maintenance Technology; Transcript of records; and Physically fit to work in an aviation environment

Moreover, the modular-topics covered in a typical SMST, are as follows: Human Factor, Safety and Quality Awareness; Basic aircraft maintenance practices; Aircraft Cabin Component and Equipment Familiarization; Corrosion prevention and control program; Aircraft Structural Repair Manual (SRM) and MM ATA Chapter Familiarization; Hi-Lok and Hi-Lok Tigues Fastener Familiarization; and Basic Repair for Aircraft Composite Structures.

All topics covered in the training program are in accordance with per CAAP under PCAR Part 3 of its Implementing Standards and the curriculum must be certified and accredited by CAAP under its PCAR Part 3: ATO and TESDA.

Statement of the Problem

1. What is the profile of the participants in terms of:
 1. Age
 2. Gender
 3. Years of experience before airframe specialist training
 4. Training provider
2. What is the performance level of the participants from the graduates of the training providers in terms of the following subjects based on CAAP 02-018:
 1. General subjects
 2. Airframe structures
 3. Airframe system and components
3. Is there a significant difference in the performance level of the participants when grouped according to their selected training providers?
4. From the preceding, what qualification standards can be developed for entry-level airframe mechanics to align with the requirements of MROs in Manila?

Significance of the Study

Nation Building - Improved and enhanced training quality standards that are at par with the international standards and standards of developed nations especially those known and involved in the manufacturing of the known and best aircraft in the world will make our AMT and or SMST graduates more globally competitive.

Promotion of Values and Filipino Culture - A well organized and professional environment will enhance the morale and the quality of our graduates. The practice of excellence, and uniquely Filipino spirit of hard work, dedication, resiliency based on faith and fear in God and love of family, elevates the quality and caliber of Filipino workers nationwide.

Teaching and Learning Process in the Field of Aeronautical Management - The results of this study may find significant use and basis among ATOs

providing SMSTs to improve its standards to primarily qualify and satisfy the required standards and quality set by the MROs in Manila.

Scope and Limitation of the Study

Approved Training Organization

Only two (2), WASA and FSI of the six (6) certified ATOs were selected as the universe of this Study. Location and training covered by the two ATOs were the consideration for their selection. Both are located in Metro Manila and provide SMSTs. Most of the graduates of these ATOs provide services to MROs with stations in Manila. Table 1 supports the criteria used for selection.

The participants to the Study are the first batch (2019) of graduates from the two ATOs with twenty (20) participants from each ATO. Moreover, it also the requirement of CAAP to conduct trainings on regular basis to maintain the currency and the validity of the trainings required. This is to give way for technology updates and upgrades.

The survey instrument did not provide for a query on the participants 'training provider to prevent biases. The Researcher instead, already segregated the survey questionnaire before distribution to the participants with their training provider already pre-determined. Moreover, the management of the ATOs concerned had already approved the questionnaire and all data contained therein.

Maintenance Repair and Overhaul Station

Three (3) MROs were selected: A+ Aviation Partnership Inc.; Air Philippines Corporation; and Lufthansa Technik Philippines, Inc., using the following selection basis:

1. Specification of their Aircraft Maintenance Organization Certificate (AMOC) given by CAAP which allows them to administer training for airframe maintenance;
2. Metro Manila is the location of the organization; and
3. Company's services are also part of the selection, catering maintenance training programs to their entry-level airframe mechanics.

MRO	Address	AMOC no.
A+ Aviation Partnership Philippines Incorporated	Manila Domestic Road, Pasay City	58-05 L
Air Philippines Corporation	Andrews Avenue, Pasay City	69-08 L
Lufthansa Technik Philippines, Incorporated	Villamor Air Base, Pasay City	40-00 L

Table 1: Selected MRO, address and AMOC

Table 1 indicates and satisfies these selection criteria.

Conceptual Framework

This study uses an IPO research process. The Input comprises of the Participants 'accomplished survey questionnaire. The questionnaire shall bear the demographic profile of the participants and self-rating made on the performance level of each of the participants. This is based on CAAP skills test standards under AC 02-18.

The information contained in the accomplished survey questionnaires shall be tabulated and statistically processed using Mann-Whitney and other forms as may be needed, and subsequently be evaluated, interpreted, and results shall be presented in percentiles and frequency.

Based on the interpretation and results, the Researcher can state its findings, conclusions, and recommendations which shall form part of the Output of this Study.

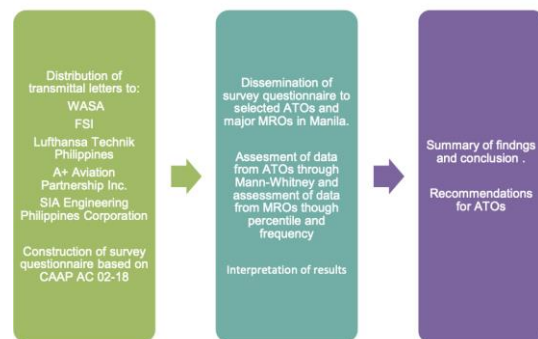


Figure 1: IPO research diagram

II. RESEARCH METHODOLOGY

Research Design

This Study is descriptive-quantitative research. Quantitative method was used to measure the population of the participants for each of the performance level of the subject areas, and which was compared to the data from the MRO. The Researcher used descriptive design in the survey questionnaire to address the main problem of the Study and to verify the hypothesis.

Descriptive research is a study designed to depict the participants in an accurate way. It is all about describing people who took part in the study

Data Collection

In Metro Manila, there are six (6) well-known training providers of SMST. Two were selected based on their location, training coverage that should include the SMST), and the willingness to undergo the Study. Participants were from the first batch of trainees for 2019. The survey questionnaires were distributed to the participants that enabled the Researcher to collect appropriate data needed to prove the hypothesis.

Participants from the MROs in Manila are officials of the Human Resource Department and Aircraft Maintenance Managers. The Researcher also provided the participants with the survey questionnaire that asked, among others, the required performance level for an entry-level airframe mechanic.

Research Instrument

The survey is the research instrument used to gather the demographic profile of the participants and to assess their performance level for each of the subject area based on AC 02-18.

The survey instrument was designed to eliminate biases. Participants from WASA and FSI are not aware of the performance level accompanying the task allotted per subject area.

The survey questionnaire is designed to gather relevant and reliable information for the study. It has two parts. The first part shows the demographic profile of the participants while the second part indicates the subject areas and the task for allotted for performance

levels 1, 2, and 3 in accordance with AC 02- 18. The second part allows the participants to assess their own performance per subject areas following the CAAP skill test standards. The subject areas were pre-determined by the Researcher based on what is essential to airframe mechanics. All subject areas were given one (1) question each on performance level.

In answering the second part of the questionnaire, participants were asked to rate each element using a four-point Likert’s scale. Responses for the unit weight under CAAP AC 02-18, indicates the performance level of the participants.

Performance Level	Corresponding skill competency
1	Know basic facts and principles Be able to find information and follow directions and written instructions Locate methods, procedures, instructions and reference material
2	Know and understand principles, theories, and concepts Be able to find and interpret maintenance data and information and perform basic operations using appropriate data, tools, and equipment
3	Know, understand and apply facts, principles, theories, and concepts Understand how they relate to the total operation and maintenance of aircraft. Be able to make independent and accurate airworthiness judgments Perform all skill operation to return-to-service standard using appropriate data, tools, and equipment. Inspections are performed following acceptable or approved data.

Table 2: Performance level based on CAAP AC 02-18, 3.3 (Civil Aviation Authority of the Philippines, 2011)

Table 2 shows how the performance level is measured using task orientation. The response for each level per CAAP AC 02-18, 3.3 based on International Civil Aviation Organization (ICAO) Annex 1 is used. This document is used for skill test standard purposes of airframe mechanics in the country.

MROs were given a separate survey questionnaire to ensure that the standard of quality for entry-level airframe mechanics remain objective. The questionnaire is also divided into two (2) parts; the first part includes the demographic profile of the participants while the second part contains the minimum requirement for entry-level airframe mechanics, in terms of their performance level based on CAAP, AC 02-18.

A Likert Scale is a psychometric scale that is commonly used in researches that employ questionnaires. Likert scale is often interchanged with

a rating scale, although there are other types of rating scale.

Unit Weight	Scale Responses Interpretation	Equivalent Weight Points
1	Strongly Disagree	1.00 - 1.50
2	Disagree	1.51 - 2.00
3	Agree	2.51 - 3.00
4	Strongly Agree	3.51 - 4.00

Table 3: Likert scale for the questionnaire

Table 3 shows the unit weight, response to each of the unit weight, and their equivalent weight points.

Statistical Treatment of Data

Statistical treatment of data is thru Percentile and Mann-Whitney. The researcher gathered the frequency of the participants 'demographic and employment profile. The frequency was determined by adding all the answer of the participants to a specific question.

Frequency and Percentage Distribution

Frequency and Percentile are used to determine the percentage distribution of the participants, using the information indicated on the first and second part of the questionnaire. The formula is a follows:

$$P = \frac{f}{n} + 100$$

Where: P=percentage
f=Frequency
n=number of participants

Frequency and Percentage Distribution was also used to analyze the data gathered to assess the demographic profile of the participants, and the performance level required by MROs in Manila.

Mann-Whitney is a non-parametric hypothesis test that determines whether two populations have the same population median or not. In this Study, Mann-Whitney was used to analyze the data gathered to assess the performance level of participants from WASA and FSI.

III. RESULTS AND FINDINGS

1. Majority of the SMST graduates are within the age of 21 to 25, all males, with less than 1 to 2 years of work experience prior to the training;
2. There is a higher number of participants from FSI that “Agree” and “Strongly agree” to the task indicated in the performance leveling based on CAAP AC 02-18
3. Entry-level airframe mechanics from MROs in Manila are within the 21 to 25 age bracket, all-male, and with less than 1 to 2 years of work experience. This is similar to the demographic profile obtained from participants from WASA and FSI.
4. Most of the MROs in Manila requires Performance Level 2, which is contrary to the Performance Levels 1 and 3 that participants from WASA and FSI indicated. Therefore, the gap is evidently presented by the statistics.

IV. RECOMMENDATIONS

1. To address the gap on what the MROs require versus what trainings are available, the ATOs need to be more pro-active in providing the requirements of the MROs. Trainings on tasks for Performance Level 2 should be made available by the ATOs to enable the AMT graduates acquire the necessary skills and technical knowledge for proper job-matching and higher rate of job placement. In this regard, it is highly recommended for ATOs to design and made available trainings for Performance Level 2.
- 2.
3. Moreover, the ATOs are recommended to enhance their training programs to include or cover the following subject sub-areas: aircraft drawing; weight and balance; fluid lines and fittings; aircraft covering and finishes; sheet metal and non-metallic structures; hydraulic and pneumatic power system; cabin atmosphere control system; ice and rain control system; aircraft instrument system;

aircraft fuel system; and position and warning system

4. ATOs are recommended and enjoin to provide a more comprehensive continuing professional development by adopting a more dynamic training module that would allow frequent technology updates and upgrades on aviation operations. This training would facilitate the competitive advantage of the AMTs even though they are past the 21-25 age bracket. Experience and maturity will always count-in the performance of tasks and functions, but without the technical advantage, the identified gap in this Study would not be addressed. Further, it not only the gap that would be resolved, but this way the employment life of an AMT graduate will prolong and they will not add up to the unemployment rate of the country.
5. ATOs are highly recommended to further this Study to do more comprehensive research and involve more MROs to assess what skills and performance level are most needed in their operations.

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