



# ANALYSIS OF THE IMPLEMENTATION OF PART-147 IN THE ENVIRONMENT OF AIR TRANSPORT DEPARTMENT AND AVIATION TRAINING AND EDUCATIONAL CENTRE

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## Abstract

The following article is announcing author analysis of EASA Part 147 regulation and its application for the creation of the Maintenance Training Organization under Aviation Training and Educational Centre (ATEC), and Air Transport Department (ATD) in the University of Žilina (UNIZA). Introduction of article includes main targets and methodology of its processing. In the beginning of the work, it deals with theoretical outcomes derived from current regulations relevant to Part 147 with corresponding Applicable Means of Compliance (AMC) which brings essential basics of the MTO. The main part consequently elaborates substantial chapters with direct overview of conditions and requirements to be fulfilled by personnel, environment and full scope of manuals and procedures included in the facilities of UNIZA located in the Airport Žilina. Upon current (existing) conditions it identifies all requirements to be implemented in MTO to satisfy its initial audit and certification. To the most practical outcome of this article belongs MTO manual processed in line with all regulations and their local implementation on the ATEC and ATD environment including training modules and training conditions for on job training itself. In the final chapter there are instructions and recommendations for MTO development as well sustainability of the processes to satisfy also the students' knowledge, skills and abilities for their future transport Authority examination and also for their successful applicability in practice.

## Keywords

*maintenance, training, environment, manual, handout, Part 147, EASA, regulation, education*

## 1. INTRODUCTION

The aim of this scientific paper is to examine the introduction of Part 147 in the Aviation Training and Educational Centre (ATEC) as a combined organization under Part CAO with the participation of the Air Transport Department (ATD) in the University of Žilina (UNIZA). To achieve the desired result, it is necessary to use methodology of acquisition, consolidation analysis of the current state data. Such base is followed by processing of real scenario using induction and deduction to reach desired conditions. Firstly, we used the method of analysing the current state of Part 147- related regulations and context. Subsequently, we dealt with further analysis assuming LVVC organization CAO activities to be extended to compliance with Part 147 regulations in order to be able to fulfil the requirements and to adjust required needs. From this point of view, we chose another specific method of creating a SWOT analysis that could outline the strength and opportunities of the current background, coupled with treats and weaknesses that could occur in the implementation phase. The last issues of this article are the output, which already evaluates the final results of the research and dedicated proposal for ATEC Part 147 manual in the wording of the latest changes and additions.

## 2. LEGISLATION DISCUSSION

The first legislative debate included problems related to general aviation, where the general aviation community had a problem with excessively expensive and long courses at certified maintenance training organizations. This was particularly the case for ELA1 aircraft, where a category B2 license requires up to 2400 hours of training and mostly people who obtained this license had no incentive to devote themselves to aircraft used in

general aviation, which meant that there was a shortage of personnel able to maintain their aircraft in the required condition. As a result, a B2L category license was created, giving general aviation access to more licensed maintenance personnel. As a result, new maintenance programs had to be developed in certified maintenance organizations, thus creating new course developments and new job opportunities [1].

The reason for adding and defining this update was EU Regulation No. 1142/2018, which defines in new tables the minimum duration also for the B2L license, stating that the number of hours may be increased depending on the selected qualification of the additional system. For this reason, an additional table has been drawn up, which is presented in our work as table No. 3. This table presents the minimum duration (in hours) and the proportion of theory for individual systems such as COM/NAV, instruments, automatic flight control, surveillance and airframe systems [2].

The second legislative debate addresses the problem of so-called unofficial refresher courses, which certified maintenance training organizations practiced and guaranteed students would pass theory and practical exams in less time, which posed a safety risk because the personnel could commit releasing an aircraft into service without having the basic knowledge required by regulation. The solution was to modify the competences of the maintenance training organization, namely that the organization must not conduct tests on behalf of the competent authority. However, it may conduct examinations on its own behalf for its students who have attended the organization's maintenance training courses or for students who have not attended type training and basic training. It also discusses the choice of a site that must comply with the

certificate or permit and questions from the European Central Question Database (ECQB), setting these questions by the competent authority if it is not available [3].

Another legislative discussion that includes broader views for Part-147 is from 2016. It addresses the issue of the implementation of a safety management system (SMS) in the field of maintenance, focusing on Part-M, but in a way also intervening in maintenance training organizations, because they have found that these organizations should also have an SMS system. This creates a requirement for maintenance training organizations to create a new nomination of a person or group of persons for this segment to monitor stimuli. Of course, this implies the obligation to further certify these persons [4].

One of the most recent legislative discussions, which is currently in the approval process, solves several problems that have arisen. The first problem that has arisen here is similar to what has been dealt with in general aviation, but this time it deals with Group 1 aircraft, which are morally and technically obsolete and certified maintenance personnel are no longer available for these aircraft, and maintenance training organizations do not provide such type courses due to costly constraints, or due to lack of interest. The second problem relates to updating individual modules of training between different licensing subcategories. The third problem relates to on-the-job training, where they found that there was a problem with the doubled requirement for license confirmation, which was causing duplication. The fourth problem concerns Part-147 in terms of new training methods and teaching techniques. As aircraft technology evolves forward, it is necessary to adapt to this trend. This means that, in line with Part-66 and Part-147, the creation of new type courses to provide future maintenance technicians for aircraft is important, as Regulation 1321/2014 itself does not reflect the current developments and training tools described in the legislative debate. By having a pandemic period here, it was found that the regulation did not allow teaching outside the maintenance training organization for type courses. It was also found that Part-147 does not list specific practical aids that should be applied when appropriate practical aids are used, with a lack of integrated procedures. However, it is also a problem that the current regulation does not allow combining different training methods in order to improve the effectiveness of courses in a maintenance training organization. Emphasis also applies to multimedia training (MBT), which does not yet have sufficient criteria for implementation [5].

If we look at this legislative debate even more closely, we can see that it regulates the requirements for the organization and in such proportion that it not only strictly defines closed spaces for training processes, but also the possibility of a virtual training environment. Of course, this does not apply to the theoretical and practical exam, which should continue to be in face-to-face form. It is also the responsibility of the maintenance training organization to inform the student of the form of training under what conditions and in what environment it will be conducted before the start of the course [5].

The organization should develop or acquire so-called maintenance training simulation devices (MSTDs) to replace artificial training equipment. Also, distance learning requires the maintenance training organization to be equipped with the means provided for this purpose [5].

The duration of distance learning has also been influenced by teaching materials, which should be recently available on suitable media (CD, USB, server database, etc.). The student must have access to the materials intended for training during his course. Thus, the maintenance training organization is required to provide material in an appropriate form for the presentation of the teaching materials, or to provide the hardware and software appropriate to the course for its students [5].

Within the examinations carried out by the maintenance training organization, the concept of supervised environment is added, with the condition that the exams should be carried out only in such an organization that is certified and regularly audited by an independent inspection body (the Transport Authority of the Slovak Republic) as well as carefully secured materials for conducting the exam to prevent their theft or misuse for the benefit of the student [5].

The length of extension courses will also be shortened depending on the courses, as distance learning and the combination of some basic elements will be allowed, as well as the possibility of more individual plans for students. The terminology will also be changed and the word "examination" replaced by "summary of type/basic training" [5].

### 3. ORGANISATION REQUIREMENTS

In general, lecturers who wish to teach in a CAO organization with an approved Part-147 organization should meet the basic requirement of competence with Part-66. Competence in this case implies that such a person has knowledge of the issue, has experience in aircraft maintenance and a positive attitude. Knowledge must be demonstrated by the final Part-66 examination. The evaluation of what is expected of the instructor is mainly that the instructor should know what training procedures to choose correctly and how to carry them out in order to meet the conditions and course tasks. He should also be familiar with the pedagogical approach. This person should be able to know well the environment (application of protection and safety at work) in which he will conduct lessons of training. Lecturer shall understand the individual systems which are included in the courses, also he should be able to explain how the systems work, describe their functionalities and how to handle with them as part of maintenance. He should also have knowledge in areas that require higher professional attention, such as specific locations typical to the type of aircraft and experiences which are typical for practical training and they should not be trained on simulation devices. That person should be able to use, read and interpret the records. It is also necessary for the instructor person to be able to read the relevant aircraft documentation, to navigate in it and to perform the prescribed maintenance procedures. They must be able to perform maintenance to demonstrate the safe maintenance and operation of aircraft, engines, components and the selection of the appropriate tools. Last but not least, to create a record of the maintenance performed and test whether the aircraft meets the parameters that comply with the regulations. It is important to take into account the following training attributes: clarity, efficiency, time availability (flexibility), suitability (adequacy), constructiveness and proper organization. But how to achieve this? EASA advises that it is necessary for the organization to ask itself a number of

questions in order to achieve the above attributes [6]. Those questions are as follows:

- What are the success factors for the job?
- What are the typical characteristics for a task to achieve compliance?
- What criteria should be observed and focused?
- Is there a standard available according to which the task, maintenance, is to be conducted?
- What is the pass mark (minimum point that meets the requirements)?
- What minimum and maximum time do we need to reach the goal? Efficient use of time.
- What if an aircraft maintenance technician student fails to meet the requirements? How often will such a fact be allowed to be admitted?
- When and how will an aircraft maintenance technician student be ready for assessment?
- What proportion of instructor assessment outside of student collaboration is needed during the assessment phase? [6]

It is these questions that can facilitate access to how an organization should approach both personnel issues and other issues, such as scoping and content training itself, or at least be inspired by them. It is always necessary to include all the factors that go into it.

### **3.1. Classrooms and spaces in the organization**

Currently, ATD is equipped with a sufficient number of classrooms for theoretical training of maintenance technicians. It shall also meet the parameters for a sufficient number of administrative premises required for the purpose of offices and rooms to hold all records that require retention. In the case of conducting practical training, both the ATD and ATEC have at their disposal premises and hangars in which practical training of maintenance technicians can be carried out. The library requirement is also met, because currently there is a central library for the entire university at the university premises and a second aviation dedicated library, which is located in the UNIZA building at the airport in Dolný Hričov, where ATD lessons are carried out and at the same time there are also ATEC premises, including maintenance hangars. However, we cannot specify whether this library contains all technical materials, because we cannot verify it in this state of art and it will be necessary for the formation of this organization to carry out a search and necessary additions. However, we can say that most of the technical materials (hardware) are already included in this library [7].

### **3.2. Equipment and tools in the organization**

From the point of view of equipment and maintenance tools, it is important that inspection and regular calibration to standards is allowed, as these tools are expected to be used for day-to-day basis. These tools, which are used on daily basis, should be inspected at least once a year or every 100 hours of work with

tools that may be calibrated as a result of the performance of the work. Each of such checks shall be recorded by the organization. The availability of these tools should be ensured by the organization [6]. There are also available the fleet of real small aircraft on which maintenance is carried out and our opinion is that they can be also used for training aircraft maintenance technicians. We had consulted this fact jointly with the head of the diploma thesis, who confirmed that the current CAO organization performs comprehensive maintenance performed on ATEC aircraft fleet. In addition, decommissioned aircraft are also available, so it is possible to carry out the assembly and disassembly of aircraft units on them, including engines, propellers, landing gears, wings, avionics, etc. From this point of view, we can say that the organization meets the requirements required by the regulation for basic training of maintenance technicians. If we intend to meet the requirements of higher categories with type training, specific types of larger (complex) aircraft and engines would have to be available. However, we will not be currently focusing on such type training within the Part-147 organization [7].

## **4. SWOT ANALYSE**

### Strengths

The biggest strength this organization will have is that it will be part of the university. This means that it will have technical and material resources in terms of appointing a responsible manager, because universities generally have some exemption from the regulation in this case if a competent person is appointed. In addition, it has the possibility of teaching, i.e. it has the means to provide teaching with high quality and more comprehensively than defined by the regulation. By creating an organization in an environment of cooperation between ATD and ATEC, it is ensured that qualified management is available in these institutions who have experience and are able to meet the conditions of the regulation. Another very important strength, however, is that there is the potential of a quality organization for maintenance training due to the existing CAO and high standard of training, and therefore they tend to move this organization to the highest quality. The size of this organization can also be an advantage, because we cannot consider it as large organization, which can be a considerable positive [7].

### Weaknesses

The mentioned size can also be positive, but we also consider it to be partly negative, i.e. a weakness also because a smaller organization may not have such a large impact on those interested in training aircraft maintenance technicians. However, we consider a significant weakness mainly the incompatibility of some theoretical areas that should be integrated into teaching, i.e. it is a weak point with a temporary period, since it may be eliminated in the future. On this we can capture students, i.e. create an imaginary "sieve" through which potential candidates can get through, and also by such a step secure and increase the competence of future personnel if they successfully complete the training. It is also worth mentioning the LVVC fleet, which is sufficient for basic training, but we consider this to be a potentially weaker point, because if the organization had more technical resources at its disposal (meaning more complex or complex aircraft), it would ultimately

be much better for it because of the attractiveness for potential students of technical aircraft maintenance. A smaller organizational weak point we also see the location where most of the teaching is carried out, which is the Dolný Hričov airport. Accessibility to this place is comfortable only from the point of view of passenger road transport and this method can attract potential clients who currently do not have a personal means of transport for various reasons. In the future, there is a need to carry out research and provide other forms of transport, whether in terms of buses, or a closer train stop, which could be created and later operated at minimal cost [7].

#### Opportunities

In the occasions we have written 4 points that we consider to be possibilities that are necessary nowadays or will arise by creating a maintenance training organization. Currently, we have noticed a significantly increased demand for aircraft maintenance technicians and based on current trends, we can assume that this demand will continue to grow instantly. So the creation of such an organization has justification. We can say that these technicians will not have a license valid only in the territory of the Slovak Republic, but in all organizations that meet the requirements of EASA, especially within EU member states. An opportunity that we can really define as significant is the possibility of using sub-contractors. This means that if an organization meets the theory requirements for categories for which it will not be able to provide practical training, it can create new specialized courses under contract with sub-contractors. Also, in the event of a shortage of staff, it is possible to employ instructors on a temporary basis, but must have a sufficient minimum number of staff (13). However, good cooperation remains a strong motivation, where all parties involved will benefit. The creation of an organization according to Part-147 will help not only the organization of LVVC but also the whole university from the point of view of research, when the university can directly participate in research activities and will create not only a positive reputation for the organization itself, but also for UNIZA abroad [7].

#### Threats

In threats, we have defined only 4 points, which are often repeated, but need to be correctly identified. First of all, a fundamental threat that can occur practically anytime there is a world crisis in any proportion. We have overcome the Covid-19 crisis, which has receded over time and negatively affected virtually all sectors. Currently, the war in Ukraine is still ongoing, which also affects the entire continent of Europe and other potential disasters that may arise. Another threat can be significant inflation and rising costs, when the company can become insolvent and get into a problem that it may not be able to control. The way of changing and supplementing new technologies can also be a threat, for which the organization may not have sufficient resources to adapt to new trends. This is also related to legislation and amendments to regulations, due to which the organization will have to suspend or terminate its activities in view of new conditions that it may not be able to fulfill. Therefore, these threats are very sensitive and also in general, but it is necessary to always be alert and monitor what is happening so that we can partially eliminate these threats [7].

## 5. CONCLUSION

The final evaluation of our work leads us to individual points, which we state in the conclusion. The context of the work includes the application of specific regulations that define the organization for maintenance training. These rules are often accompanied by additional documents that already specify individual interpretations of the regulations. They include the essence of the application, and some provisions are described in more detail, and others less so. In this we see the space that, from the point of view of maintaining the safety and airworthiness of aircraft, the approach of the institutions concerned is, from our point of view, not exactly the strictest and has significant gaps that should be identified more directly by the organization itself. It is good that some institutions are merging these regulations into one, because over the years, as legislation changes and is updated, it is issued separately with each and every change.

The findings that we have identified in this article in the case of the theory currently performed at the university were partially surprised us, since we had identified significant differences that, in our opinion, act negatively, that is, to the detriment of the creation of quality teaching of the theoretical component according to Part-66. This is not to say that the ATD and ATEC will fail to form an organization, but to point out specific problems in the mismatch of the thematic areas of the theory that can be eliminated by reconciling the future change that will have to occur to ensure that the curriculum is as consistent as possible with those required by the regulation.

However, we are giving a big warning finger especially to the competent authority, which is responsible for inspections and stable support for all regulations, because there we have found that since 2016 the procedures for setting up a maintenance training organization have not changed, while legislation has also changed in this area, in particular by identifying new and old teaching methods as well as aids, which are suitable for each and every method. From this point of view, the Transport Authority does not sufficiently ensure a quality procedure that would include new teaching techniques. We also confirm that the procedure developed by the Transport Authority in the mentioned year 2016 does not mention a number of issues regarding practical training. However, we know that even the regulation does not directly define the specific steps towards this task. Therefore, we recommend that the competent authorities begin to think about the question of how to set an indicative period of practical training in the organization in accordance with Part-147. Specifically, we analyzed this problem, and it was precisely because of this absence that we could not make adjustments to the curriculum for practical training.

The aim of this article is not only the solving the problems, but through the provided SWOT analysis, we also point out a state that, after some shortcomings, can be useful for all parties involved. Through the performed analysis, we found out that the organization for maintenance training has the potential of a quality and successful organization not only from the point of view of normal operation, but also by being part of the university and can confirm its justification by cooperating with ATEC and ATD on the basis of research and improvement of maintenance processes.

Our final assessment of whether it is possible to create a maintenance training organization under ATD and ATEC conditions is yes, it is feasible and possible, it is a must to meet the requirements of Regulation Part-147 in accordance with Part-66, which is essential for the certification of aircraft maintenance personnel. That is why we have also updated the relevant maintenance training organization manual in the appendix, which is already up to date with the regulation.

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