
Initial Air Traffic Control Training At Tartu Aviation College

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ABSTRACT

A well developed air traffic control training system is vitally important for guaranteeing flight safety and the efficient provision of air traffic control services. This article provides an overview of the development of an initial air traffic control training program at Tartu Aviation College. Lessons learned from the first two classes of students provide the basis for future improvements in the training program.

INTRODUCTION

A well developed air traffic control training system is vitally important for guaranteeing flight safety and efficient provisions of air traffic services (ATS). The following is an overview of initial air traffic control (ATC) training at Tartu Aviation College. The program includes descriptions of the training design and preparation, training process, development and future prospects.

HISTORICAL BACKGROUND

After the break-up of the Soviet Union and the Aeroflot structures in the beginning of 1990s, it was essential for independent Estonia to establish its own aviation system including air traffic control services. During the Soviet era, air traffic control services were provided by Aeroflot and airforce. The procedures were different from western procedures and the technical equipment inadequate. This situation had a negative influence on flight safety and air transportation efficiency.

The Estonian Civil Aviation Administration (CAA) was established in 1990 and was given the responsibility for providing air traffic services (ATS). The situation concerning personnel, during those days, was complicated. All air traffic controllers were former employees of Aeroflot who had received their training at Soviet training centers according to Soviet standards. There were no Estonians working in air traffic services before April 1994, when three Estonian air traffic controllers graduated from ANS Institute of Finnish CAA.

TRAINING NEED

A training program was needed to establish an independent and well functioning air traffic control service system in Estonia. This training was necessary to guarantee that a sufficient number of well trained and local ATS personnel would be placed in the system.

There was a need for advanced training to upgrade the knowledge and skills of employees already working in the system. International inbound and outbound traffic from Estonia and the opening of new ATC routes for overflying traffic reinforced the need for English training. The training need involved the following ATS units: Tallinn Air Control Center; controlled aerodromes in Tallinn, Kardla and Kuressaare; and AFIS aerodromes in Tartu and Parnu.

To accomplish the tasks in a cost-effective way it was decided to establish a local training system. Tartu Aviation College was established in 1993 and its first major project was to create a local ATS training system.

DESIGNING OF TRAINING PROCESS

The first step in ATS training was developing the ATC I/1994 course. The preparations for this course began in 1993. I was appointed to be responsible for the ATS training at Tartu. At this time, I was in Finland together with my Estonian colleagues. We decided to build up the initial training system according to the Finnish pattern we were already familiar with. We believed that a system similar to this one would be effective at Tartu. It was decided that the initial ATC training should consist of the following parts: theory, familiarization practice, aerodrome control training, non-radar approach control and on-the-job training (OJT).

We decided practical flying experience was essential in training an air traffic controller. This training allows the controller to understand the situation the aircraft is in and when to avoid giving clearances when a pilot is unable to comply. Speaking from my own experience, after practical flying of approximately 50 hours it was much easier to understand the situation in the air as an air traffic controller. However, taking into account the situation in Estonia it was unrealistic to set the practical flying experience as a prerequisite for the training. Also, due to the limited financial resources, it was impossible to give all students private pilot training within the framework of ATC training.

We compromised by giving the students private pilot ground school and 15 hours of practical flying as a beginning phase before ATC training. The objective of practical flying was to show the students different phases of flying, starting with local visual flight rules (VFR) flights and ending with instrument approaches. This amount of flight training will help prepare students for the initial ATC training.

DESIGNING AND CREATING TECHNICAL EQUIPMENT

Before we started training we had to design and prepare all the equipment necessary for the training process, the materials for theoretical studies and simulators for practical training. However, beside the International Civil Aviation Organization (ICAO) documents and some Estonian regulations, most materials for the theoretical training were missing at that time. The problem with using these materials during initial training is that they are too dry and complicated for students who do not have experience in aviation.

We began to create special study materials to make training more effective and convenient for students. During this stage we were faced with a big problem; many of the rules and regulations necessary in air traffic services in Estonia were missing. Therefore we had to present new rules and procedures to the CAA for approval to accomplish the training according to international standards. The need for training and training materials sped up the improvement of the already existing system. During the development of training materials we often used the materials we had received during our own studies from Finland. Simulators had to be built in order to accomplish practical training at the college.

The most urgent need was to create an aerodrome control simulator and non-radar approach simulators. However, there were principal questions to be resolved before we could do this: What should the technical level of the simulators be? Should we buy the simulators or should we build them ourselves? What kind of airspace should we use for simulation?

We decided to build a table-top version of the aerodrome control simulator, which consists of tower and airport layout including all basic equipment necessary for air traffic control. We also decided to use real Tallinn airspace for simulation. The main reason for choosing this alternative was because it was not cost effective to purchase high-tech equipment with our limited resources.

My own training experience assures that there are advantages to using a simple table-top simulator. Pilots do not need special training for using this equipment and it is possible to keep a larger group of students active at the same time. If the time comes when we need more sophisticated simulators for advanced training, we can work with Finland as a cooperative partner. Finns have one of the best simulator complexes in the world. The reason for using Tallinn airport and airspace instead of artificial airspace is that the air traffic control in Estonia is centered to Tallinn. For training purposes we simplified some procedures and created exercises where aerodrome control and approach control are combined into one unit like it is at smaller airports in Estonia. During the exercise designing stage we faced the same problem as when developing the training materials: many areas were not exactly regulated or were missing totally.

We decided to build the non-radar approach and area control simulator ourselves. The technical solution of this simulator is not complicated. Only the radio and telephone systems for aerodrome control simulator were purchased from the Swedish ATS Academy.

We also have a radar simulator at the college, which we purchased later under a BITS project via Sweden from the Canadian company ATS Aerospace Inc. This simulator is PC based and consists of one controller position and two pilot positions. It is technically possible to expand the simulator into a network of four working positions. The simulator includes necessary software for creating a huge variety of different exercises. We have prepared a package of exercises for initial radar training based on Estonian airspace.

FOREIGN CO-OPERATION PARTNERS

Throughout the working process at Tartu Aviation College we have had good and fruitful relations with colleagues from abroad. It is vitally important for a young system to obtain information from other countries, analyze it, pick up all useful details and avoid the mistakes others have experienced during their development. There is no need to reinventing the wheel. The main task is to find out how to use the wheel in the most efficient way in our existing situation.

Our first cooperative partners were from ANS Institute of Finnish CAA. My first Estonian colleagues and I received our training in Finland and we know the Finnish system and the people working there well. In order to trust your cooperative partners, it is very important to know them in advance. The Finns have been our closest cooperation partners. The cooperation partnership has covered the following areas: consultancy, participation of Finnish instructors in practical training at Tartu and on-the-job training in Finland.

Our second cooperative partner in ATS training is the Swedish ATS Academy. In 1995 the BITS (at present SIDA) project became active and it included many sub-projects such as instructor training, participation of Swedish instructors in practical training at Tartu, on-the-job training for Estonian students in Sweden and the delivery of a radar simulator.

In summer 1995, we had a Canadian consultant from CESO working at the college for almost two months to improve our existing ATS training system. As a result of that project we changed our existing system to make it more effective. We also received a great deal of useful information about the implementation of radar training. In addition we have had contacts with colleagues from Denmark, the U.S.A., Great Britain, France, Lithuania and Latvia.

RECRUITMENT AND SELECTION OF STUDENTS

A well designed recruitment and selection system is one of the most important prerequisites for successful training. There are certain requirements for the applicants of ATS training. They should at least have a secondary education, good English speaking skills, good health, be between 19 and 30 years old and they should be citizens of Estonia. Besides these formal requirements applicants must also assume a strong will to study and work in the field of aviation.

The selection process consists of three parts. First the students have to pass oral and written examinations in English. The second step is a psychological test

with the objective to find out if a person is suitable to work in ATS. It is evident that a person carrying out the operational work in ATS should have certain abilities like good spatial orientation, capability to perform different tasks at the same time, etc. To examine all these abilities thoroughly, a testing system has been created. Much of the work in this field has been done by Professor Luuk and his colleagues from University of Tartu. The testing also includes an interview conducted by ATS instructors and external experts. The last step is a medical examination according to ICAO standards.

The main problem during the recruitment and selection process has been the lack of applicants. For the first ATC course, ATC I /1994, we accepted 17 students from 60 applicants. In Finland the number of applicants for a group of approximately the same size was ten times larger. The reasons for the small number of applicants in Estonia are that ATS specialties are not well known in the society and the salaries are relatively much lower than in other countries. The fact that the training begins at an academically nontraditional time (in February) has also had a slight influence on the number of applicants.

The other problem we face quite often is the applicants' insufficient knowledge of English. This problem is created by the uneven English teaching levels at secondary schools. However, we can increase the number of English lessons and make the language studies more intense throughout the training period during college.

TRAINING PROCESS

The following analysis and conclusions are based on experiences from two domestic ATC courses: ATC I/1994 and ATC II/1995.

Both courses allowed the same amount of practical flying in the beginning of the training session. This proved to be a necessary part in training making further studies easier and motivating the students. Fifteen hours of practical flying is sufficient if the program is built up in a logical way, but the more the students can fly, the better. The problem we faced with the first ATC course dealt with the students learning the wrong radiotelephony material during the practical flying. A former Aeroflot employee was not precise during his instruction. The students adopted incorrect phrases and it took some time during the practical training to correct them.

The theory phase of training after flying contains all subjects necessary for an air traffic controller. Students are expected to pass written examinations by at least 70 percent. However, the instructors feel this phase is too dry and boring because it contains only theory. Test results have confirmed this feeling.

The familiarization practice after the theory period is necessary because it illustrates how ATS systems and operations at different airports are organized. Both ATC classes had a chance to visit our neighboring countries. Besides the main objective, these visits gave our students good language practice and motivation for further studies.

The aerodrome control phase consists of theory and practical training. The theory is mainly the review of ATS procedures. The practical training consists of 25 simulator exercises. Simulator exercises are divided into different groups depending on the content. At the beginning of this phase the instructors give a great deal of assistance to the students with the expectation that at the end the students will be ready to perform the exercises without external help.

These exercises are randomly evaluated, except for the last three exercises which are always evaluated. We do not inform students which exercises will be evaluated in order to avoid unnecessary stress. However, the students usually guess which exercises are evaluated. The evaluation itself takes place according to special rules. A certain amount of points will be subtracted for each mistake. The students receive two different marks: one for ATC procedures and general performance and the other for radiotelephony. This evaluation shows that the working load and the amount of exercises has been suitable for the students during the training phase.

The next phase in training is usually the most difficult for students. During non-radar approach control, students cannot see the aircraft and are responsible for additional separation of aircraft in a much larger area of responsibility. The non-radar approach phase contains the same elements as the aerodrome control phase, only the theory part lasts longer. In the beginning of the practical training there are six exercises where tower and approach are combined. In the second half of practical training we have two exercises where both units, tower and approach, work at the same time like in real life. This gives an excellent experience with cooperation and is a good review of tower duties.

We have found that the non-radar approach phase is difficult for students. Quite often instructors feel the students understand only at the very end of the training phase. A solution to this problem is to increase the number of exercises during the practical training.

During the practical training phases we have had instructors from Finland and, for the second ATC course, instructors also from Sweden, working together with Estonian instructors. The reason for this was lack of local instructors, however I think this type of international cooperation is beneficial to everyone. The students receive a wider view of possible working methods, as well as good language practice. The instructors also gain new experience.

For the second ATC course we added an extra training phase before on-the-job training, the introduction to radar control. The objective of this phase is to give the students a basic knowledge about radar control and to enable them to cooperate with the ATC units using radar during the on-the-job training. This phase consists of shortened theory and two introductory simulator exercises. The technical side of radar equipment is almost excluded. The feedback of this introduction has been positive and we consider this training phase an important step before the on-the-job training phase.

The main problem with on-the-job training in Estonia is the lack of airports. The only suitable airport for OJT is Tallinn. At smaller airports the traffic load is

so low that the students will forget what they have studied in the simulator. However, it is impossible to accommodate all the students at Estonian airports during OJT. The solution to this problem is the use of foreign airports. The students of the first ATC course received OJT at the following Estonian and Finnish airports: Tallinn, Kuressaare, Turku, Vaasa and Rovaniemi. The students of the second ATC course also had the chance to receive their training at Swedish airports such as Gothenburg/Landvetter, Jonkoping and Stockholm/Arlanda.

After OJT, the students graduate and are able to apply for work at aerodrome control units and at combined aerodrome control and approach control units.

The success rate for ATC I/1994 was 76 percent and for ATC II/1995 88 percent. From the graduates of ATC I/1994, 92 percent are working in air traffic services. For ATC II/1995 this figure is unavailable because the students have just graduated.

TRAINING OF FOREIGN STUDENTS

In summer 1996, we had a group of 12 Lithuanian ATC students at our college. The objective was to provide aerodrome control practical training for the group. The training consisted of seven exercises and a study visit to Tallinn ATS center. Three Estonian instructors participated in the training which lasted for two weeks. The general impression of the training period was very good. All of the students were highly motivated and eager to study and they all reached the training objectives.

We hope the cooperation with Lithuania will continue and we are able to provide training for other foreign customers. The instructors and the equipment are ready for additional customers.

FUTURE IMPROVEMENTS IN TRAINING PROCESS

Based on the existing training process, I see two major areas that should be improved. The first need is to combine theoretical studies with the practical training in the earlier stage of training. This will avoid difficulties during the long theory phases and will make the study process more efficient and interesting for students.

The second need is to make the whole training process more flexible. If we know the exact needs of future employers we can prepare students during the initial training phase. However, we should be careful not to delete necessary items from the initial training program, as well as not to overload the students.

These are the two major changes I suggest to improve the initial training system, but there are always hundreds of smaller areas which need polishing on a continual basis to keep the training at a high professional level. Progress in aviation is rapid, air traffic control training should follow, if not be a step ahead of it.

**INITIAL AIR TRAFFIC CONTROLLER TRAINING
AT TARTU AVIATION COLLEGE**

- Phase 1** Flight Training
Private Pilots Ground School
15 Hours of Flying
- Phase 2** General Theory
Familiarization Practice at the Airports
- Phase 3** Tower
Theory
Simulation
- Phase 4** Non Radar Approach
Theory
Simulation
- Introduction to Radar Control
Theory
Simulation
- Phase 5** On-the-job Training
Graduation