eXclusive e-JOURNAL
ISSN: 1339-4509 (Online) Journal homepage: http://www.exclusiveejournal.sk

ECONOMY & SOCIETY & ENVIRONMENT

Progressive methods of radiotelephony teaching at the Czech Technical University in Prague

Milan Kameník
Czech Technical University in Prague
Department of Air Transport, Faculty of Transportation Sciences
Horská 3, 128 03 Prague 2, Czech Republic
kamenik@fd.cvut.cz

Iveta Kameníková*
Czech Technical University in Prague
Department of Air Transport, Faculty of Transportation Sciences
Horská 3, 128 03 Prague 2, Czech Republic
kamenive@fd.cvut.cz

* corresponding author

Abstract: European aviation regulations require complex training of future pilots. In this context, the emphasis is put on deepening practical experience in radiotelephony. Based on this requirement, a project of experimental laboratory for teaching of aeronautical communications was executed at the Department of Air Transport, Faculty of Transportation, Czech Technical University in Prague. This workplace allows simultaneous training of four students in a very intensive way. Students use computer technology with dedicated software to simulate radio communications. Lecturers with practical experience from civil aviation, active or former airline pilots, provide the training. Communication laboratory is subjected to further development and innovations.
Keywords: European aviation regulations; specialised workplace; radio communications laboratory; radio-communication procedures; commercial air transport

JEL Classification: I23; J28; L93; M53

1. Introduction

Years ago, an independent flight school (Mrázek et al., 2015) was founded at the Faculty of Transportation Sciences, Czech Technical University of Prague (CTU). The aim was to build a facility that would provide classroom training for future professional pilots as a part of university degree education. This was desired not only by the quick development of aviation technology, but also by applicable European aviation regulations (Němec et al., 2007; Hospodka et al., 2016) and safety-related motivations (Socha et al., 2016, Hulínská et al., 2016).

Currently, there is an autonomous Department of Air Transport at the Faculty of Transportation Sciences. The spectrum of fields of study expands; new experts from the branch of air operations are coming to the department. The team of lecturers solves many research projects alongside their teaching.

Among the students, particularly great interest exists with regard to Bachelor's study branch "Professional Pilot". Close cooperation with Czech Airlines Inc. and Travel Service Ltd., and other Czech and foreign airline companies enhanced the quality of the study program. External specialists, especially professional airline pilots, support teaching of this study branch.

From the beginning, the aim was to apply, in terms of the Department of Air Transport, very consistent procedures and regulations from the countries of the European Union. The successful model equipment was gradually build, which could serve as a good example for other entities in the future.

Significant cooperation was established with the Civil Aviation Authority of the Czech Republic, as well as international organizations such as EUROCONTROL and ICAO. Flight School CTU obtained a valid certificate Aviation Schools FTO (Flight Training Organisation) already in year 2001.

2. Communication Laboratory

Recently, numerous facilities were built at the Department of Air Transport, Faculty of Transportation Sciences CTU that currently provide part of the ground training for professional pilot students.

Some time ago, the department was confronted with a task to complement theoretical preparation as part of airline pilot training with special stage in line with JAR-FCL (Flight Crew Licensing) standard at that time.

The task included especially deepening of practical knowledge of radiotelephony, communications and procedures for air traffic control - development of an interactive communication laboratory for ground training of professional pilot students as part of radio communication training (Kameník, 2011; Kameník, 2014).

This issue was not yet satisfactory solved at the Czech Technical University in Prague not even in the Czech Republic. It is due to certain specifics of the requirements, which, however, exactly correspond to the contents of the study of branch Air Traffic Control and Management. According to the available information, other universities in the Czech Republic do not yet solve this problem. On the other hand, foreign technical universities are increasingly concerned with the issue of aviation radiotelephony.

The task that needed to be worked out as a project to develop a training system for future professional pilots in the field of radiotelephony and communications, control and air traffic management. In the early stage of the training, lectures and exercises were provided. This was then followed with practical training in an interactive laboratory on a computer flight simulator.

The project dealt mainly with designing and building a laboratory for radiotelephony and communication training (Kameník, 2001).

3. Radio traffic simulation

The basic goal was to create a system for training and training of students itself in interactive communications laboratory, where communications segments will be integrated with individual simulated workplaces of air traffic control service.

For the Communication Laboratory, there is a special room dedicated at the Faculty of Transportation Sciences, which is equipped with hardware and workbenches with four communication boxes. These boxes represent individual aircraft (Figure 1). In the first phase of practical training, they represent general-aviation aircraft, in the second phase then air-transport aircraft. In each box, student has a real pilot headphone set, control unit and all the necessary equipment (Route manual, Jeppesen or Lido airport documentation, Scenarios of flights, etc.).

Figure 1: Communication boxes to simulate aircraft

Each student can use one of two independent communication circuits. During training, each of them has its own pseudo - air traffic controller. The control unit provides the ability to listen to the transmissions of automatic terminal information system (ATIS) at Vaclav Havel Airport Prague and other selected airport, which run on an endless loop. All students are still in the mode: receive. For broadcasting, it is necessary to press the (PTT) Push-to-talk service pushbutton on the control unit. If two students broadcast simultaneously, the frequency will be congested, as in the case during real radio communication operations.

Students can monitor the progress of their flights on a demonstration blackboard, directly in from of them. Aircraft silhouettes are moving on the blackboard and their position corresponds to the current phase of their flight (figure 2).

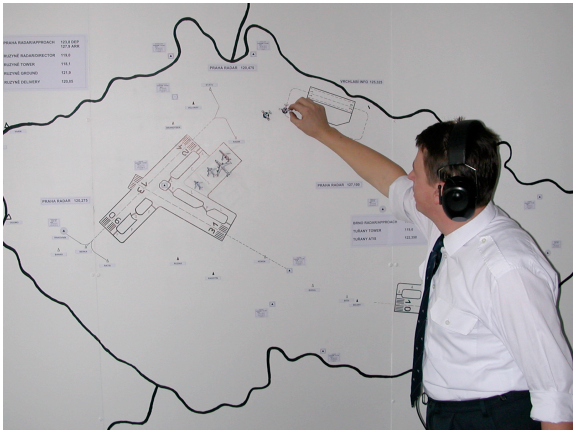

Figure 2: Demonstration blackboard with simplified airports and airspace

Imaginary airspace is shown on this blackboard. It represents a simplified airports and airspace but it is based on known reality from the Czech Republic.

For example, the largest airport corresponds to the Vaclav Havel Airport Prague but it has limited amount of taxiways. Operating frequencies of ATC radio stations at this airport have the same values and correspond to the reality. The situation is similar for other airports, represented by the public international Airport Brno-Tuřany and private domestic Aerodrome Vrchlabí.

The centre of the system is comprised by control place for two air traffic controllers. The main station is equipped with a central computer and with communications control unit, which is connected to the PC.

The primary type of training consists of routine flight of general aviation or air transport aircraft, where students act according to the prescribed basic scenario. Lecturers generate for students some situations (including non-standard) to which they have to react. Communication is kept mostly in English.

During training, on lecturer's workplace (main controller station) there are only assistants with experience from aviation radio communications. In addition to the active pilots-lecturers of the Department of Air Transport, there are also retired airline captains and first officers, continuing to pass their experience to younger students.

Training with single tutor is also provided. Students are listening to sequences of real flight recordings and they have to interactively react. They also practice emergency situations and broadcasting of emergency or urgent messages (Mayday, Pan-pan).

For this purpose, the central computer is equipped with special programs. These programs allow to simulate any situation which may occur during real flight operations. Besides standard aeronautical phraseology, the training includes also Morse code.

The facility completed its trial run and it was incorporated into standard trainings. Versatility of the equipment lead to an interest to use it for language courses, etc.

4. Feedback

Feedback from students was gathered to find out whether the facility meets their expectations. Students find the flights performed on this facility much more demanding as expected, especially due to non-standard situations and fairly high workload caused by frequent need to react promptly. Even though they did not have to control the aircraft in terms of flying or navigating, there was no room for relax or extensive preparation for activities. This implies that the exercises were well prepared and make it possible to simulate real stressful situations.

Students considered the facility as useful but they recommended to transform the boxes into more aircraft-like workstations. They would recommend to place flight instruments on a small screen, yoke or joystick, engine noise from speakers etc. to increase the workload by non-communication activities (navigation etc.) and so to increase the degree of simulation.

5. Conclusions

The task for building laboratory of air communication is not finished and it will continue to develop. At this time, it already affected the quality of teaching and the extent of practical skills of CTU students and it contributes indirectly to the improvement of flight safety in the Czech Republic for the upcoming years (Kraus et al., 2012; Vittek et al., 2013). Potential employees of Czech aviation institutions and operators – current students are verifying their skills under simulated conditions before they will have to react to those in real situations.

The project of interactive communication laboratory demonstrated great importance with regard to prevention of air accidents, student preparation for their future profession and the general increase of air traffic safety with regard to newly developed systems (Vittek et al., 2016; Lališ et al., 2016).

References

Hospodka, J., Endrizalová, E., and Mrázek, P. ATPL/CPL Theoretical Training Changes. In: Book of Abstracts of the International Scientific Conference New Trends in Aviation Development 2016. New Trends in Aviation Development 2016. Košice, 08.09.2016 - 09.09.2016. Košice: Faculty of Aeronautics Technical University Kosice. 2016, pp. 14. ISBN 978-80-553-2594-1.

Hulínská, Š., Němec, V., and Szabo, S. Regulation for aviation safety [online]. Interdisciplinarity in Theory and Practice. 2016, 2016(10), pp. 38-41. ISSN 2344-2409. Available from: https://docs.google.com/viewerng/viewer?url=http://itpb.eu/pdf/2016-2/8-Hul%C3%ADnsk%C3%A1+%C5%A0.+-+N%C4%9Bmec+V.+-+Szabo+S..pdf&wmode=transparent

Kameník, M.: Letecká telekomunikační služba - skripta pro zkoušky palubních radiooperatérů. 2014

Kameník, M.: Letecká telekomunikace - skripta pro zkoušky k získání Všeobecného vysvědčení radiotelefonisty. 2001

Kameník, M.: Communication - skripta pro přípravu létajícího personálu ke zkoušce. Nakladatelství CERM, duben 2011.

Kraus, J. and Pleninger, S. The Need to Increase Safety at Uncontrolled Aerodromes [online]. Perner's Contacts. 2012, 7(4), pp. 60-66. ISSN 1801-674X. Available from: http://pernerscontacts.upce.cz/28_2012/Kraus.pdf

Lališ, A., Vittek, P., and Kraus, J. Process Modelling as the Means of Establishing Semi-Automated Safety Management. In: OSTAŠEVIČIUS, V., ed. Proceedings of 20th International Conference Transport Means 2016. 20th International Conference Transport Means 2016. Juodkrante, 05.10.2016 - 07.10.2016. Kaunas: Kauno technologijos universitetas. 2016, pp. 254-258. ISSN 1822-296X.

Mrázek, P., et al. Provozní příručka ATO. [Applied Certified Methodology]. 2015

Němec, V. and Novák, M. Metody výcviku a zkoušení při pokračovacím výcviku leteckého pozemního personálu. In: Zvyšovanie bezpečnosti v civilnom a vojenskom letectve - 2007. Zvyšovanie bezpečnosti v civilnom a vojenskom letectve-2007. Žilina, 17.04.2007 - 18.04.2007. Žilina: Žilinská univerzita v Žilině Fakulta prevádzky a ekonomiky dopravy a spojov. 2007, pp. 52-56. ISBN 978-80-8070-665-4.

Socha, V., et al. Evaluation of Pilots' Psychophysiological Condition using Recurrence Quantification Analysis of Heart Rate Variability. In: OSTAŠEVIČIUS, V., ed. Proceedings of 20th International Conference Transport Means 2016. 20th International Conference Transport Means 2016. Juodkrante, 05.10.2016 - 07.10.2016. Kaunas: Kauno technologijos universitetas. 2016, pp. 428-434. ISSN 1822-296X.

Vittek, P., et al. Metodika pro řízení provozní bezpečnosti malé letecké organizace. [Applied Certified Methodology]. 2013

Vittek, P., et al. Integrated Aviation Industry-Wide Approach to Risk Management and Control. In: OSTAŠEVIČIUS, V., ed. Proceedings of 20th International Conference Transport Means 2016. 20th International Conference Transport Means 2016. Juodkrante, 05.10.2016 - 07.10.2016. Kaunas: Kauno technologijos universitetas. 2016, pp. 292-296. ISSN 1822-296X.

Socha, V., et al. Air accidents, their investigation and prevention . In: eXclusive e-Journal, Č. 4 (2014), s. 1-9., ISSN 1339-4509