NEW GENERATION OF THE DEPARTURE CONTROL SYSTEM FOR AIRPORTS

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Summary. The airport departure control systems (Departure Control System - DCS) are currently designed for the automation of complex control processes in the passenger and baggage handling provided by airports for individual airlines. The passenger handling system has arisen because of some specifics in aviation such as the limited capacity of the aircraft and requirement to enrol only the passengers who have purchased a ticket on their names. This process serves to protect air transportation against acts of unlawful interference. The handling process comprises check in of passengers, printing of boarding passes, the security checking of passengers and baggage, aircraft balancing and inspection, boarding the passengers (from passing the gate to boarding), and arrival procedures. All these activities must be directly linked (except the phase after arriving). For smooth handling the collaboration of passengers is also required because their approach can speed up the process, but also slow down (long lines, gusty access to the different phases, etc.).

Keywords: Departure Control System, DCS, Model of Departure Control System

1. INTRODUCTION

Around the world, nowadays there are several systems of handling the passengers. Due to the air transportation interest in air connectivity, the major role in the field of handling systems is played by Amadeus Altéa Departure Control system, SITA Departure Control system a Lufthansa Departure Control system. These so-called new generation systems are focused on the complex control of air passenger transport. These systems, based on the functionality offered and mainly for the price, are especially designed for large international airlines and sized airports. There are of course also other DCS systems, but these do not play a major role in this area.

2. TIMELINESS OF THE PROJECT

The choice of handling such systems on airport itself is carried out mostly by an airline. If this is a major company taking its own DCS system, it is not more a problem. Sometimes the system is selected by the airport, in the event that the system meets the requirements of the airline. Also possible upgrading of the system should not be very difficult. The financial aspect also has a great influence on the selection or adoption of the system. Because of the low frequency of flights it is not financially worthwhile to buy new airport equipment for this system, but the management effort is to get an agreement with the airline to compromise.

As to the current state of the available DCS systems the problems which have occurred are of high priority to be solved and their timeliness is very important.

In particular, the following impacts:

- In many cases it happens that especially low-cost carriers cannot afford complete DCS systems due to the high financial burden or with respect to certain specifics in transport. Therefore they prefer handling passengers manually; they do not use any information systems throughout the

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process. This condition often causes delays of individual flights and thereby disruption of the flight schedules.

- The available DCS systems offer only client online access via remote login to the central system causing a very common problem of unavailability of the various services and data transmission errors.
- Equally problematic is the approach of DCS system makers to possible changes in the offered functions for the specific requirements of the airlines. Most of the available DCS systems are offered as a closed systems, where the customer can choose only from the offered system functions and their possible modification is problematic or impossible.
- The available DCS systems are very demanding on database control and communication links in terms of reliability and security of information transmission.
- The available DCS systems are very difficult to operate and individual agents should be regularly sent to time-consuming and costly trainings in special training centres which is considerably a financial burden for airlines.
- Practical impossibility of fast incorporation of all new changes under the IATA and AEA recommended procedure.
- Lots of competing DCS systems do not allow handling directly during the process of balancing the aircraft with respect to the safety and economic efficiency of flight and even do not give the necessary basis for such actions that must be implemented through a combination of multiple systems.

With current major problems described above and leaving of one important player in the market with DCS systems - Lufthansa, which finishes to support the product of Lufthansa Departure Control system which has been developed over 30 years and brought many bad qualities without further compensation which is no longer supported for the future and no database is maintained; the amount of the airlines using the system reached the stage of selecting a new complex of DCS system to suit their requirements.

It is therefore essential and highly actual to fill the slack in DCS systems and to design a new highly effective and efficient dispatch system aimed at regional and low-cost carriers in the European but also at global level, which would eliminate all mentioned shortcomings of the other competing systems and become highly competitive capable of running in the field of DCS handling systems.

There is space to expand the Faculty of Aeronautics TUKE focus on this very important area to redirect the results of its research to the commercial area and also to establish cooperation at international level with other airlines that will be an invaluable source of information and experience in the use of similar DCS systems and allow the Faculty of Aeronautics efficient and rapid progress in this area.

3. PROJECT

The aim is to adapt the resulting solutions directly to the needs of small but also large airlines. Competitive DCS systems often do not meet the requirements of low-cost companies and their solutions require high costs for implementation and operation at the same time. The primary objective of the project is to design its own (local), flexible and cost-effective DCS specifically designed for smaller airlines.

The solution will be the L-DCS system as a fully integrated multiuser and multihosting system for automated process of passenger check-in, boarding pass issuance and automated printing the voucher (bag tag) and new functions to support the "weight and balance" rebalancing process of aircraft. L-DCS will simplify the whole process to handle passengers with encouraging efficient use of agents´ time, their mistakes will significantly reduce and the passenger check-in process becomes faster and more secure. This means that designed efficient processes and the procedures will allow the agents to optimize their time better while saving passengers´ pre-flight time (pre-flight time), which may be spent in other activities at the airport and thus possibly increase the airport revenues also through other offered services of added value. DCS Topology can be seen in Figure 1.

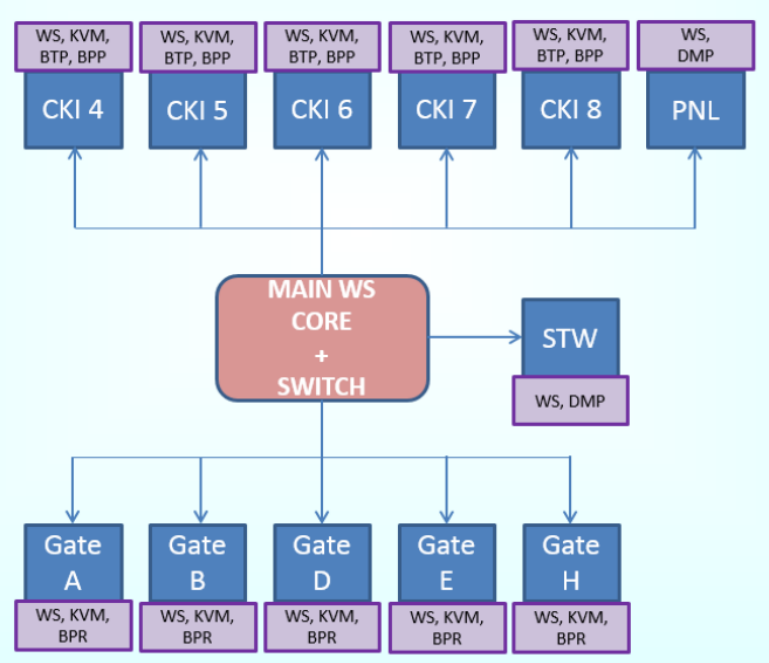

Figure 1 DCS Topology

We expect a comprehensive range of the proposed system:

1. Automated "handling passengers' accessible from any local workstation with compliance of all safety regulations for access to the L-DCS
2. Check-in – a universal system optimizes the entire handling process of a passenger
3. Seating - fully graphic visualization of available charts of passenger seats and the seats allocated to each individual or an entire group of passengers. High efficiency through the simple and intuitive control with the help of the function buttons.
4. Baggage handling - automated allocation of bar codes or QR and accurate identification.
5. Boarding - highly secure automated system for registration of passengers and their access on board, allocation system boarding passes and accurate identification of passengers on the basis of the allocation of bar codes or QR codes.
6. Gate - a highly secure automated inventory system taking passengers on board, a direct identification of passengers on the basis of the allocation of bar codes or QR codes.
7. Aircraft Weight and Balance – an independent and highly mobile automated system for the aircraft balancing process that will work simultaneously when loading passengers at check-in process.
8. Administration of flights – a separate system for managing and editing of flights that will allow you to quickly and easily change the passenger information and information about the flight itself. It will also be designed for the overall management of flights, blocking them, locking and unlocking individual sub-processes during the handling process of passengers.
9. The control module of L-DCS system - the system administrator for assigning permissions to users of L-DCS system, logging their activities and traceability of their activities.

4. OUTPUT

The output of the project will be the software product with high applicability to practice. We expect that our proposed L-DCS system will differ significantly from other DCS systems, especially with innovative key advantages that are the basis of high originality and innovativeness of expected solutions:

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1. The primary anticipated benefit of a system is to ensure communication between modules through the Internet or intranet technologies, based on the latest HTML5 and Java technologies and implementation of individual modules as Internet applications through active dynamic pages, ensuring the independence of the hardware on the computer system platforms. The result will therefore be a universal solution.
2. The conditions for deployment of the final implementation of the DCS system, with supporting hardware is its physical location directly at the destination as a target customer, as well as supporting devices allowing communication via the local computer network, thus removing a very common problem of unavailability of a data transmission error in more than 90% of DCS systems, which work through the WAN communication lines. In local link of communication devices such unreliability is virtually eliminated and in case of failure of any equipment breakdown is not dependent on a third party, but the fault may be abolished as soon as possible, thereby reducing the costs associated with the repair.
3. The system conceived as a fully modular and easily configurable for specific user needs, unlike other DCS systems, which are offered as "closed", where the customer can choose only from the functions of the system and their possible modification is problematic or impossible.
4. Fast and efficient check-in process with a minimal number of steps to achieve the desired objective and to higher satisfaction and travel comfort of passengers.
5. Fast and efficient boarding process with minimal steps to shorten ground handling of aircraft.
6. Due to the high efficiency of the proposed solution processes and user interface reduce the time of training of an agent, thus reducing operating costs, system and staff training.
7. The ability to quickly incorporate any new changes under the IATA and AEA recommended practices.
8. User interface designed as a fully customizable user to increase the efficiency of its work and overall well-being.
9. A prerequisite for implementing the outcomes of the proposed solution of LDCS system is the use of only open source advanced development technologies, which clearly reduce the costs of project implementation in terms of licensing policy.

The primary users of the resulting solutions are local carriers, airlines and airports operating in Europe with a special focus on regional low-cost companies and companies providing charter flights, which create subsystems separately at airports because of cost savings per passenger and which will be able to independently optimize selection of desired components.

The motivating factor for the application of the potential buyers is contemplated licensing policy, which will be open to a consumer in which the amount of the charge will be firmly defined and will not depend on the number of transported passengers.

The project creates equal conditions for the emergence of the innovative consulting and training centre for the promotion and administration of the proposed LDCS system, in which university-educated workforce will be used for the actual provision of services with high added value of 24 hours a day, 7 days a week at the beginning of a Europe-wide and later in the larger scale.

The results also create conditions for further development of the knowledge base for further research and design of modern and innovative technologies, balancing the aircraft directly from the cockpit without the need for complex and unreliable technology, but using simple sequence of steps, which guarantee future competitive advantages.

5. CONCLUSION

The project solves the current problems of handling processes at the airport, examines all possible circumstances causing errors of staff (agents) in the service for passenger and baggage handling with a clear view to present solutions to eliminate those errors completely, or at least to decrease them to an acceptable level. The entire process, from design, through implementation, to field testing in specific application, will utilize effective, advanced technologies, methods and procedures of the current practice

in this area of development and implementation. The project is planned as a series of systematic applied research to get information, research - introduction of innovative elements, which could lead to a rapid and direct introduction of new knowledge into practice. We expect that, based on research findings and lessons of good practice in the project, the work efficiency of operation will increase reducing the financial costs for staff training and operation of the proposed handling system at every stage of the handling process, and thus the possibility of applying university graduates, and accelerate their entry into the work process and airports and we expect that it will create conditions for improving their quality of life. At the same time, thanks to the usability of the proposed project in the educational process at the Faculty of Aeronautics it will be possible to increase the preparedness of the institution for practice. Finally, thanks to the acquisition of the information knowledge base on service responses to certain situations while using the proposed system in simulation of real deployment with the contractor provides a basis for applying the results in other areas of research.

The proposal and the final realization of our proposed functional model of L-DCS system, its testing and consequently the future of its implementation for customers, the Faculty of Aeronautics will rank among the several leading providers of DCS systems, thereby also raise the profile of scientific and applied research in the Slovak Republic at international level.

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