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AIRCRAFT ACCIDENTS AT THE MANEUVERING AREA OF AIRPORTS AND REMOVAL OF THE AIRCRAFT WITH THE AIM OF ENSURING AIRPORT SAFETY

Key words: aircraft, removal, airport

1. Foreword

A disabled aircraft is any aircraft which cannot be operated either under its own power or through normal use of appropriate towing devices. A disabled aircraft obstructs the normal activity of the airport and requires the undertaking of urgent measures. So, a disabled aircraft is most often the aircraft with locked landing gear, or aircraft that stopped out of the runway, or aircraft bogged down in mud or snow off the runway or taxiway.

The removal of a disabled aircraft implies temporary closing of the airport or reduction of operations which, if even for a short period of time, results in the loss of revenue to the airport. Besides, temporary closing of the airport, or reduction of operations, creates problems with flight schedules and very often a chaos in the airspace, so loss in revenue also affects aircraft operators that are directly or indirectly involved in or caught up with the aircraft removal process.

If airports are not prepared for the removal of a disabled aircraft, then the problems become more complex and harder to solve, and of course they result in bigger losses in revenue.



Fig. 1. Incident of the aircraft "Fokker 100" at Podgorica airport, 25.01.2005 [6]

The event that best illustrates this statement occurred at the Diego Garcia airport, at the atoll in the midst of the Indian Ocean, about 1600 km away from the southernmost point of the Indian Peninsula. Next to the airport, there are several ports at the island where military ships are stationed. These ships transport medical and military equipment (tanks, jeeps, helicopters, etc.) for the US forces engaged in regional conflicts. Due to the significance of this port and its being equipped with different unloading devices (hoisting devices, cranes, etc.), it was assumed that all potential problems with the removal of a disabled aircraft from the runway could be easily solved at this island. But, as it turned out later, the removal of a disabled aircraft caused a lot of problems.

On 8 May 2006, a military aircraft, a bomber with variable-geometry wings "B-1B" "belly landed" at the runway of the above-mentioned airport. The reason for this type of landing was wheeled-up locked landing gear of the aircraft. After a fire, which caught the aircraft during its sliding along the runway, and which was soon extinguished by the airport fire-fighting unit, the crew was safely evacuated and the aircraft was left at the runway with minor visible damages. It took three weeks to obtain necessary removal equipment, and once it was finally removed from the runway, the total damage was estimated at 7.9 million US dollars [5].

2. The planning of aircraft removal

The airport operators in our country classify the removal of the aircraft in three categories, depending on the complexity of the removal process:

- Category I – easy (an aircraft bogged down in mud or snow that can move from runway by itself or can be pulled on its own wheels);
- Category II – medium (one or more wheels are up or can be pulled down after the aircraft has been lifted, and afterwards the aircraft can be pulled on its own wheels);
- Category III – hard (the wheels of the landing gear are detached from the airframe, or they are so damaged that the aircraft cannot be pulled on its own wheels).

Due to the fact that a disabled aircraft at the runway significantly reduces or totally prevents normal air traffic regime at the airport, the planning of disabled aircraft removal is an imperative for the safe and efficient operations at any airport. The efficient removal of a disabled aircraft is also the obligation arising from international, national and local regulations, the aim of which is to timely commence the planned preparation for the removal of a disabled aircraft.

Efficient removal of a disabled aircraft requires the development of an adequate Removal Plan, the content of which has been defined by an international document – ICAO Airport Service Manual [2]. In accordance with this document, but also with Article 213, para 3 of the Air Transport Law of the Republic of Serbia [3], it is the obligation of the aircraft operator to remove its disabled aircraft from the runway, but this also puts an obligation on the airport operator to take all the actions defined by the Removal Plan with the view of solving the problem. Namely, the aircraft operator is obliged to remove its aircraft from the runway, but for performing the actual removal action, it usually engages the airport operator, while the aircraft operator must compensate all airport's costs and losses associated with the aircraft removal process.

The costs for which the aircraft operator must compensate the airport operator include direct and indirect costs. The direct costs include: the costs of labour man-hours involved in the aircraft removal operation, the cost of recovery equipment, the cost of men and vehicles engaged in the defuelling process, the cost of fuel storage into adequate fuel tanks, the cost of general clean-up. Indirect costs include the costs incurred as a result of eliminating the emergency landing effects upon the environment, the loss of aircraft not being used due to the temporary closing of the airport, diversion of flights, and other costs.

In order to minimize these costs as much as possible, the airport operator is obliged to develop a Disabled Aircraft Removal Plan, which usually contains:

- introduction,
- removal,

- removal procedures,
- equipment and devices necessary for the removal operation,
- methods of removal,
- provision of information.

The main purpose of this Plan is to identify and carefully consider the ways for solving the problems occurring during the removal of a disabled aircraft. The basic condition set upon the airport is not to remove the aircraft until obtaining an approval from the Commission for investigation of aircraft accidents and incidents, except in those cases where the lives are put at risk or in order to prevent further hazards to the environment. In such cases, if it is necessary to remove the aircraft prior to completion of the investigation, special measures implying taking of photographs of the site with all details, marking of the location and position of all major components on the ground and drawing of a diagram of the accident site including ground scars, have to be taken.

The second part of this Plan deals with planning and implementation of the methodology for aircraft removal depending on the aircraft size. Special attention is given to the weight and centre of gravity of the aircraft, which again determine:

- the leveling and lifting technique to be used,
- the type of equipment to be used,
- the expected loads,
- any anticipated changes to the stability of the aircraft, and
- other parameters, like lateral and longitudinal balance limits not to be exceeded during the recovery operation.

The planning of aircraft removal is also influenced by the size of the aircraft. In accordance with the international classification, all aircraft are divided into different categories according to their size, and the size of the aircraft (wingspan and outer main gear wheel span) defines the alphabetical reference code of the aircraft (from the reference code for small aircraft – A, to B, C, D, E till the biggest in size with the reference code F) and indirectly determines the aircraft removal procedure. For example, “CESSNA 172S” aircraft with the wingspan of 11,0 meters and outer main gear wheel span of 2,7 meters has the reference code 1A, while “BOEING 737-300” with the wingspan of 28,9 meters and outer main gear wheel span of 6,4 meters has the reference code 4C.

Another very important element is determination of the operational weight of the aircraft which comprises:

- standard equipment (unused fuel and lubricants, oxygen equipment and other equipment), and
- operational equipment (crew and passenger baggage, food and beverages containers, technical water, emergency equipment, dustbins, etc.).

Disabled Aircraft Removal Plan has to envisage in detail all the possibilities for partial removal of standard and operational equipment from the aircraft, which significantly facilitates the aircraft removal operation.

The aircraft removal process is very complex and careful planning of each element of the process considerably shortens its duration. Special importance should be given to planning of technical preparation for the removal, aimed at aircraft stabilization with tethers and shoring so as to prevent secondary damage of the aircraft. Safe and efficient aircraft removal is also influenced by weather conditions (strong wind, snowstorm, etc.), as well as the soil characteristics (grass, soft squashy ground, sand, etc.), which requires further planning for stabilization of the soil and aircraft weight reduction.



Fig. 2. Levelling

Removal operation also requires careful planning before the initiation of lifting operation, where levelling is of particular importance – preceding phase. Before lifted, each aircraft has to be levelled, which implies the precise determination of all levelling points so as to put the aircraft into the proper lifting position.

The next prerequisite for efficient aircraft removal is determination of the spot for positioning of pneumatic lifting devices with the aim of lifting the aircraft or bringing the landing gear into operational position. The Plan should envisage the most complicated situations for positioning of lifting devices in order to timely arrange for acquisition or making of plywood for placement of pneumatic lifting bags or other pneumatic lifting devices.

The procedures for disabled aircraft removal envisage the removal operation, which is to be further determined by the aircraft size, aircraft damage and available recovery equipment. This part of the Plan defines the removal procedures and methods, for example after lateral and longitudinal levelling, the aircraft is raised to the required height by cranes or spreader bars with straps, or more efficiently, with two cranes instead of spreader bars, etc. The removal methodology should elaborate all possible alternatives for aircraft removal.

All the above-mentioned lifting methods have one common goal, to move the aircraft from an unsuitable surface to a suitable one – hard stable surface, and then, if possible, to move it to the repair facility supported on its own landing gear.

The removal equipment has crucial importance for safe and efficient removal of a disabled aircraft, so it is described in a separate chapter of the Removal Plan.



Fig. 3. Special removal equipment [5]

Partially, removal equipment can be found at the airport (tow ropes, firefighting vehicles, tow vehicles, etc.), but most of the equipment, and particularly special equipment like cranes and lifting devices, cannot be found

at the airport itself. That is why it is important to envisage in the Removal Plan all necessary equipment for the removal of those categories of aircraft which are the user of that airport, as well as the addresses and phone numbers of other entities or airports that possess this special equipment for the aircraft removal.

The efficient aircraft removal implies that missing removal equipment will be provided as quickly as possible, so it is important to conclude the necessary contracts with the entities that are in possession of such equipment. The conclusion of contracts is often financially conditioned by the owner of the special removal equipment, but regardless of the fact that this sometimes represents significant financial expenditure for the aerodrome operator, it is necessary to obtain warranty from the equipment owner that the delivery of special equipment and the aircraft removal operation shall be performed in a safe and efficient manner.

The expenses arising from the conclusion of these kinds of contracts can be later compensated by the aircraft operator, since it is the primary obligation of the aircraft operator to remove its disabled aircraft for the runway.

Separate part of the Disabled Aircraft Removal Plan deals with the information issues. This primarily implies the obligation to provide the information about the occurrence in a manner prescribed by international regulation – ICAO Manual of Aircraft Investigation and Information Instruction which has to be developed by each airport operator. The information has to be provided with the aim of proper and timely notification of all interested parties about the accident that occurred at the airport so as to be able to intervene on time and bring the airport safety back to the adequate level as soon as possible.

3. Conclusion

Aircraft incidents and accidents in the airport zone are the reality, while majority of them occur at the maneuvering areas of airport. For that reason, the removal of a disabled aircraft from the airport maneuvering areas presents a special challenge for each airport operator. The removal of a disabled aircraft implies the temporary closing of the airport or reduction of operations which, if even for a short period of time, results with loss of revenue to the airport.

Only well-planned removal of aircraft from the airport maneuvering areas brings the problems at the airport to the acceptable level, which is why it is very important to develop the adequate Disabled Aircraft Removal Plan that elaborates all possible occurrences and situations, defines the procedures and contains a plan of the equipment necessary for the removal of a disabled aircraft.

PREFERENCES

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S U M M A R Y

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An aircraft accident at the maneuvering area of the airport has a negative impact upon the airport safety and further leads to the temporary closing of the airport; it causes many other problems not only at the airport. If the airport is not prepared for safe and efficient removal of disabled aircraft, the problems connected with the removal become more complex and harder to solve.

This paper deals with the specificities of the aircraft removal from the maneuvering area of the airport, the need to develop the adequate Removal Plan and describes the basic elements of this Plan.