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Assessment Of Factors Responsible For The Excursion Of Runway In International Airport

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Abstract *— In Commercial aviation runway excursions generally occur due to overruns and veer- offs. This mainly leads to landing to accidents because of improper approach. The main reasons to make a study are to characterize runway excursion accidents involving commercial jet aircrafts. Also to find the factors and reasons on which these accidents occur. The main objective is to focus on the factors related in the occurrence of the accidents of aircrafts.*

Keywords*-Accidents, Aircraft, Excursion Factors, Overrun, Runway ,Veer-off.*

I. INTRODUCTION

Runway excursions (overruns and veer-offs) are common occurrences in commercial aviation. These lead to landing accidents because of improper approach. The main reasons to perform this study are to characterize factors and find reasons behind runway excursion accidents involving commercial jet aircrafts. According to ICAO, runway excursion is defined as an incidence involving an inappropriate exit from the runway by aircrafts. In runway excursion an aircraft departs the runway either by overrunning the runway end or veering off the side. A research which is carried out by the Flight Safety Foundation, the Netherlands Lab R and IATA specifies that runway excursions are now mostly occurring type of accidents. However, the research has resulted that the runway excursion and fatalities causing due to these excursions can be avoided if the runway area is designed with a view to enhance post-accident survivability.

II. NEED OF RESEARCH

The Research of runway excursions is one of the high priority factors. The following are some of the reasons-

- Airlines and manufacturers are utilising higher-capacity commercial aircraft, which carry more people and require more runway length to land.
- Population pressure around airports, and non-aviation development on airport land are reducing the safety margin between aircraft and people if a runway excursion occurs
- There is a real potential for an overrunning aircraft to collide with houses, cars, roads and other public infrastructure beyond runway ends if adequate runway end safety areas (RESAs) or other arresting measures do not exist.
- By providing some simple training to weather and flight crew staff various accidents could be avoided. To recognise these training requirements this study is essential.

III. DATA COLLECTION

We have collected data of excursion from 1998 to 2013 and analyzed the runway excursion accidents involving the worldwide commercial jet aircraft. We have analyzed types of accident responsible for fatalities in the last decade, and factors responsible for accidents caused due to the excursions. Following are the factors responsible for excursion:

1. Weather flight crew performance
2. Systems-related factors
3. Runway condition
4. Communication failure
5. Construction mistakes

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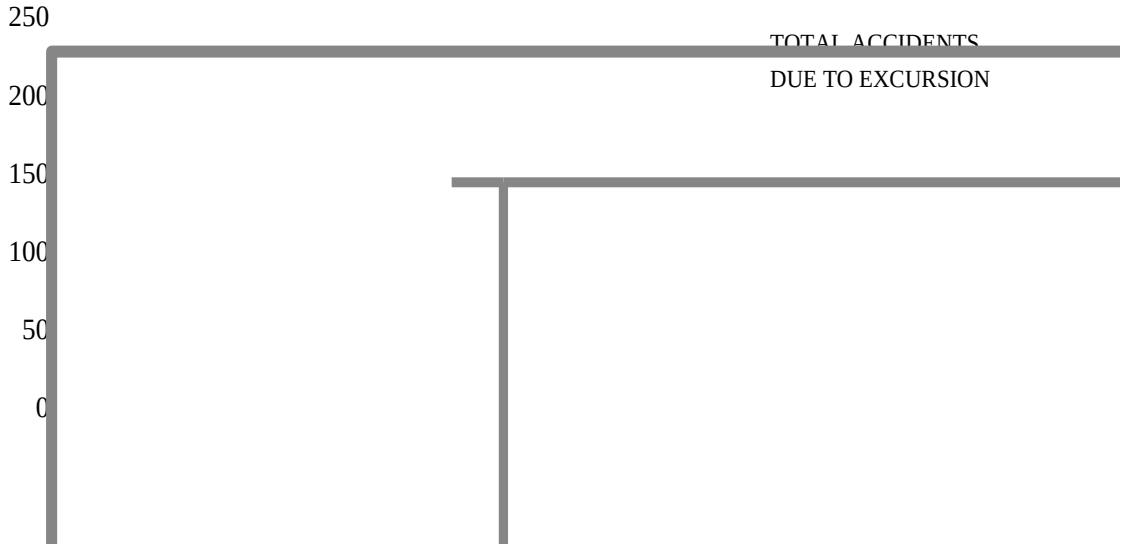
Total Accidents Vs. Accidents only due to Excursion



IV. DATA ANALYSIS

Factors responsible for runway Excursion:

1. **Weather flight crew performance:** The problem related to the performance of aircraft in various weather conditions is an important factor of the performance of an aircraft which includes operating an aircraft on a wet or contaminated surface, landing in heavy rain and braking action. A pre-landing risk and threat briefing can assist flight crew in assessing whether a landing attempt is safe in the prevailing weather and runway conditions, and provide a conservative estimate of landing rollout length prior to arrival that takes these conditions into account. It is important for the pilots to guard against visual illusions and spatial disorientation. Flight crew should make them aware of prevailing weather, the airport and approach path terrain. This factor can be reduced by properly judging the obstacles coming through the way in unfavorable climatic conditions.
2. **Systems related factors:** System related risks are proper training to the mainly caused due to lack of operationally-focused knowledge of factors that affect landing performance. Due to poor practical and theoretical trainings regarding landing standard operating procedure excursion occur. Main factors affecting system of an aircraft are slip ratio and malfunctioning of system due to abrupt braking action. Slip ratio can be defined as the slipping speed of the wheel with proportion to braking action. So when pilot applies brake the slip ratio is 0 and when brake is not applied still wheel is freely skidding then slip ratio is 100. In most runway excursions, any one or combination of these factors can lead to loss of control of aircraft which may result in fatal injuries. To avoid this factor the slip ratio should be properly maintained as well as abrupt braking action should be avoided. Management need to be aware of all the safety factors that can avoid runway excursion this can be done by implementing policies that promote “safety first” culture.
3. **Runway condition:** The condition of the runway can mostly get affected because of faded marking on runway, Improper Runway Distance Remaining Signs (RDRS), if proper RDRS signals are not provided to the pilot it can lead to runway excursion. At night or in poor visibility condition, runway light and runway end lights are one of the important safety factors to maintained pilot aware if these lights are not properly visible it can cause excursion. Poor Quality design, irregular maintenance and poor drainage are some of the factors which cause, lack of friction (Surface contaminators such as ice, snow, oil, rubber, slush or water patches hamper runway friction up to 25%).
4. **Communication Failure:** Communication failure occur due to the lack of communication between the cockpits and airport authority, improved technology in cockpits could assist flight crews in determining whether enough rollout length exists for their aircraft prior to landing given the approach type, prevailing weather, and runway conditions. Airport authority must followed the CASR 139 *Manual of Standards* provide further guidance to airport operators on the required intensity and directionality of runway end lighting for better communication. Runways awareness and advisory system is an example of a cockpit bored warning system that improves the communication this system use global positioning system data to determine the position relative to the airport.
5. **Construction Mistakes:** Construction mistakes include the displaced threshold on runway or strip of runway, equipments used for the purpose of construction and the improper placement of hazard lights. The preventive measures which can be taken for the safety purpose are displaying the threshold strips and lights at proper places for

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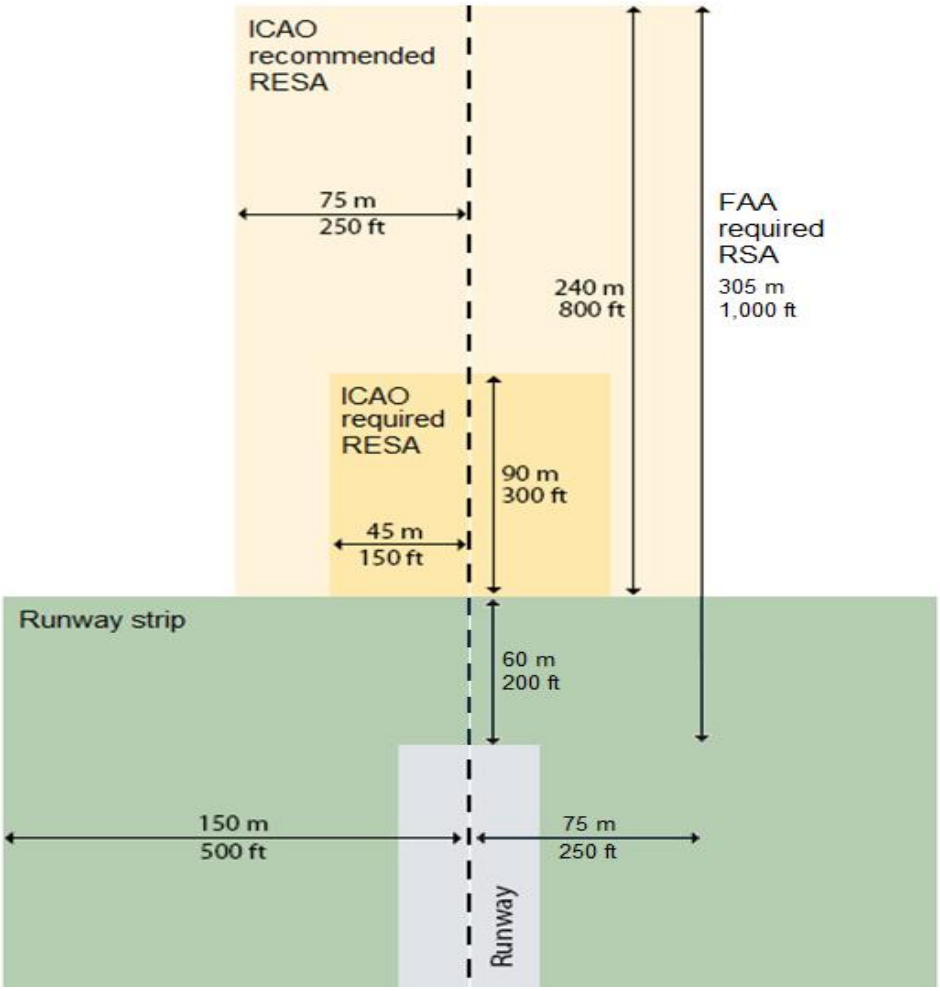
judgment to land or takeoff. Improper runway design and regular maintenance are the most important risk responsible for excursion accidents. Surveys on innovative materials for aircraft arrestor beds are of great interest in airport safety research. To avoid runway overrun, the arrestor bed are provided within the airport boundaries. In doing so, the bed essentially collapses under the effect of the vertical load and main gears. Along the contact areas between the wheels and bed, the horizontal drag forces generated depend on the dissipative properties of the material used in the bed. The use of innovative materials in arrestor beds could lead to a significant improvement in the performance of same. Good runway drainage is important to provide skid-resistance, improved runway friction, dissipate standing water, and prevent aquaplaning on water-affected runways. Runway cambering or transverse sloping allows water to drain to the side of the runway, which stops standing water pools from forming. Following Image shows the Standard And recommended Dimension For RESAs (ICAO) and RSAs (FAA)



Standard And recommended Dimension For RESAs (ICAO) and RSAs (FAA)

V. CONCLUSION

- Minimizing risk related to runway excursions is one of the major factors. If proper safety measures around runway boundaries are not provided then there is a real potential for an overrunning aircraft to collide with houses, cars, roads and other public infrastructure beyond runway end.
- To minimize runway excursions the following majors should be taken into consideration
  - While landing and take-off the flight crew should take into consideration all the factors that can lead to excursions. Thus the flight crew should be trained with practical as well as theoretical knowledge.
  - To avoid runway excursion due to overrun and veer-off, the runway should have proper runway design with sufficient lighting arrangements.
  - Airport authority should also maintain runways from water clogging and contaminations.
  - Communication signals between the airport authority and the cockpit should be precise to avoid accidents.

VI. REFRENCES

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[1] Piyush Gandhewar, Asst. Prof. Hemantkumar G. Sonkusare "Runway Excursion: A Problem" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 11, Issue 3 Ver. I (May- Jun. 2014), PP 01-00 www.iosrjournals.org

[2] Eduardo S. Ayra "Risk Analysis of Runway Overrun Excursions at Landing: A Case Study

[3] Rosa María Arnaldo Valdés, Fernando Gómez Comendador, Luis Mijares Gordún, Francisco J. Sáez Nieto "The development of probabilistic models to estimate accident risk (due to runway overrun and landing undershoot) applicable to the design and construction of runway safety areas" (Safety Science) 49 (2011) 633–650

[4] Ernest Heymsfield, W. Micah Hale, Tyler L. Halsey "Aircraft Response in an Airfield Arrestor System during an Overrun" DOI: 10.1061/(ASCE)TE.1943-5436.0000331 © 2012 American Society of Civil Engineers.

[5] Marco Bassani, Emanuele Sacchi, Fulvio Canonico "Performance Prediction for Innovative Crushable Material Used in Aircraft Arrestor Beds" DOI: 10.1061/(ASCE)MT.1943-5533 .0000425. © 2012 American Society of Civil Engineers.

[6] David, R., 1990. Location of Aircraft Accidents/Incidents Relative to Runways. DOT/ FAA/AOV90-1. Office of Safety Oversight, Federal Aviation Administration, Washington, DC.

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