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A REVIEW- RISK ASSESSMENT OF RUNWAY OVERRUN INCURSION

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Abstract: Aviation crashes all over the world have recently was on the high rise, stemming from negligence, mechanical faults, weather, ground control errors, pilot errors, taxing and maintenance crew errors as are probable reasons for such accidents. This case study models the probabilistic risk assessment of runway incursion data endeavored to determine the correlation in between the reported incursions that occurred at Nagpur airport between fiscal years 2005 and 2015 and the meteorological conditions, times of day, and presence of an air traffic control tower of Nagpur Airport. With runway incursions long-plaguing the safety of aviators, their passengers, and aviation personnel, continued research aimed at refining the body of knowledge underpinning incursions coupled with ongoing prevention efforts aspire to diminish the annual incidence of incursions, increase safety, and save lives. In accordance with this mission, mining the Civil Aviation Organization (ICAO), and Federal Aviation Association (FAA) runway incursion databases and analyzing the resulting data of Nagpur with the Pearson correlation indicated a higher likelihood of incursions amid clear weather, during the daylight hours, and at airport with an air traffic control tower. Congestion at any airport occurs when demand exceeds capacity. With the advent of new airlines commencing operations with highly attractive fare structure the domestic traffic has increased multifold at the rate of 24% in the year 2015 and the growth is being sustained till nowt

Keywords: Runway Incursions, Aviation Safety, Runway Safety, Airport Safety, Congestion, Delays, Pricing, Short- Term & Long Term Planning, ATC.



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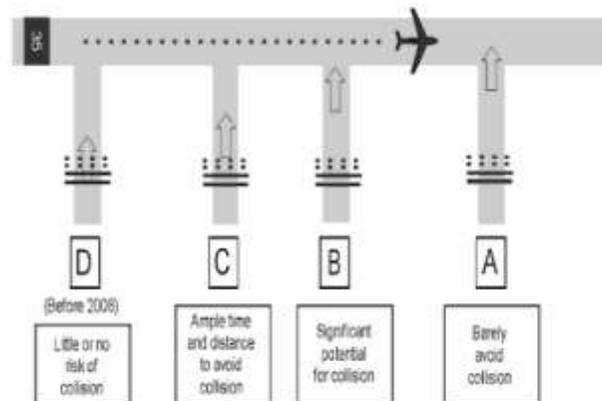
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INTRODUCTION

The ever increasing growth in air transport implies increasing demand for air transport services, which further propagates into need for providing more efficient, effective and safe runway operations. Landing and take-off are critical phases of flight operations and runway is an area where landing and departing aircraft may have the opportunities to interact with other taxiing aircraft, ground vehicles, personnel, animals and foreign objects. Given The speed of aircraft and its limited ability in exercising avoiding actions on the runway especially during take-off and landing roll, the potential hazard as may be created by runway accidents have become a deep concern to aviation safety in many countries. The worst aircraft accident in aviation history happened in 1977 and it was a runway collision involving two Boeing 747 aircraft in Tenerife, the Canary Islands, resulting in the loss of 583 persons. International Civil Aviation Organization (ICAO) has specified Standards and Recommended Practices (SARPs) relating to airport system operation and the development of operational procedures for the purpose of achieving runway safety. Despite all these efforts, absolute aviation safety for humans and property is still a mirage and unsafe events still persist. Aviation accident and prevention have been challenging within the air transportation industry for years and undoubtedly will continue to be a major concern for not only aviation professionals but for all those directly or indirectly affected by air transportation. Accordingly, although safety conditions are exceptionally good in air transport, as compared with rail, road and water transport, safety management is a fundamental factor for the sustainability of this service (Pacheco et al., 2014). Runway accidents are majorly runway incursions and runway excursions. A runway incursion is any unauthorized intrusion onto a runway, regardless of whether or not an aircraft presents a potential conflict (US Federal Administration Authority, 2008b).Runway incursions have sometimes led to serious accidents with significant loss of life. Although runway incursion is not a new problem, with increasing air traffic, runway incursions have been on the rise. Aviation safety programme has a common goal - to reduce hazards and manage residual risk in air transportation. Runway operations are an integral part of aviation; the hazards and risks associated with runway operations need to be managed in order to prevent runway incursions that may lead to accidents. According to the Manual on the Prevention of Runway Incursions (International Civil Aviation Organization, 2007), a number of factors is likely to be responsible for the continuing increase in runway incursions, including traffic volume, capacity-enhancing procedures, aerodrome design and increasing environmental pressures. These factors, combined with inadequate training,poor infrastructure and system design, and inadequate ATC facilities, can lead to an increased risk of runway incursions. Runway Incursions are the unauthorized presence of vehicle, pedestrian, or aircraft on a Runway. Identifying situation or condition in which runway incursions are more

likely to be severe can suggest policy implications and areas for future safety research. As a result of the continued, multi-faceted threat that runway incursions pose to the safety of many aviation users despite longstanding efforts to diminish their incidence, a case study analysis of incursion data archived within the ICAO's and FAA's databases sought to determine the positive or negative correlations between incursions and several situational factors.



a).Potential levels of Runway Incursion

With 2,871 runway incursions compromising the safety of pilots, passengers, and airport personnel between fiscal years 2005 and 2015, answering the following questions aimed to refine the aviation industry's collective understanding of the conditions that were more favorable for incursions (Federal Aviation Administration [FAA], 2013b).

1. What are the correlations between meteorological conditions and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?
2. What are the correlations between times of day and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?
3. What is the correlation between air traffic control towers and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?

Through adherence to such guiding questions, a case study analysis of publically-available, government resources of Nagpur airport, focused on runway incursions aspired to improve aviation safety by furthering regulators', instructors', aviators', and airport operators' awareness of the meteorological and environmental conditions in which incursions were more likely to occur. This study will help us to examine runway incursions from a statistical perspective and provide insights into the broad trends underlying severity.

So, basically the significance of this paper is that it will analyze 10 years of runway incursion event information of Nagpur Airport

II. LITERATURE REVIEW

“Reference [1]” Bradley G. Cozza,(April 12, 2013) [1] Within the twelve-month fiscal year spanning October of 2010 and September of 2011, 954 runway incursions endangered the 50,739,762 aircraft operations that air traffic controllers recorded within the U.S. during the same period, and despite efforts to curb the incidence of incursions, the 2011 rate of 18.8 incursions per 1,000,000 aircraft operations marked a 0.8-point increase over 2009 (FAA, 2013a; FAA, 2013b; FAA, n.d.). Jointly defined by the International Civil Aviation Organization (ICAO) and the Federal Aviation Administration (FAA) as “any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle[,] or person on the protected area of a surface designated for the landing and take-off of aircraft” (FAA, 2010b, p. 2), runway incursions threaten the safety of aircraft pilots, their passengers, and aviation personnel. In spite of the aviation industry’s collective initiatives aimed at preventing runway incursions, such as the NTSB’s inclusion of incursion reduction on its aviation safety

Most Wanted List since the list’s inaugural publication in 1990, an average of three incursions continue to imperil America’s aviation system daily.

FAA’s causal classification of runway incursions, exploring their severity categorization of incursions, and studying the research-identified factors underpinning incursions affords a comprehensive understanding of incursions that offers the opportunity to diminish their occurrence through education (FAA, 2009).

Together, the FAA’s and private researchers’ comprehensive investigations of the diversity of factors underpinning runway incursions furnishes regulators, controllers, aviators, and airport operators with the information requisite for conceiving, implementing, and executing long-term, sustainable initiatives designed to improve aviation safety through a reduction in incursions. Whereas the FAA has targeted its prevention efforts at educating aviation personnel through the assembly, analysis, and dissemination of incursion data, private researchers have focused on diminishing the incidence of incursions through an exhaustive analysis of the human, meteorological, and environmental factors accompanying incursions. Collectively, such public and private research efforts offer the aviation community the specific information that they have sought in their enduring mission to curb the incidence of runway incursions within America for the safety of all aviation personnel and the passengers who depend upon them.

“Reference [2]” Denise R. Jones and Lawrence J. Prinzel, (III) A Runway Incursion Prevention System (RIPS) and additional incursion detection algorithm were adapted for general aviation operations and evaluated in a simulation study at the National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC) in the fall of 2005. RIPS has been designed to enhance surface situation awareness and provide cockpit alerts of potential runway conflicts in order to prevent runway incidents while also improving operational capability. The purpose of the study was to evaluate the airborne incursion detection algorithms and associated alerting and airport surface display concepts for general aviation operations. This paper gives an overview of the system, simulation study, and test results.

“Reference [3]” Fedja Netjasov: Risk and safety are always considered the most important operational characteristics of contemporary civil aviation. Usually, they refer to the potential occurrence of air traffic accidents which might result in loss of life, damage to infrastructure and third party property damage. Consequently, they have been regarded as externalities in addition to other adverse effects such as noise, air pollution, land-use, water/soil pollution, waste, and congestion. Due to their inherent very high importance, risk and safety have been issues of continuous research ranging from purely technical/technological aspects to strictly institutional. These issues warrant the setting up of adequate regulations on system technology designs and operations. This paper deals with a review of part of the research on risk and safety modeling in civil aviation. In such a context, the basic (generic) concepts and definitions of risk, safety and their evaluation are described. A review of the research is focused on four categories of methods/models for risk and safety assessment: causal for aircraft and air traffic control/management (ATC/ATM) operations, collision risk, human factor error and third-party risk. The review is carried out with respect to their purpose, problems, recommendations and relation to new technologies.

III. DATA REQUIREMENT AND METHODS

1. What are the correlations between meteorological conditions and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?
2. What are the correlations between times of day and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?
3. What is the correlation between air traffic control towers and the reported runway incursions that occurred between October of 2005 and September of 2015 at Nagpur airport?

EXPECTED OUTCOME:

This paper will provide a review of some of the methods for assessment of risk and safety in civil aviation at Nagpur Airport. The main findings have provided insight into the efforts already carried out in developing these methods, their different complexity and lack of sufficient flexibility, lacking of the available data for calibration and testing, and lack of the sufficient predicting capabilities enabling easier application to the assessment of risk and safety of new technological, procedural and operational concepts. In this paper we have also aimed at increasing system capacity on the one hand and reducing acceptable risk and safety thresholds on the other.

The safety event studied in this paper will fall within the group of most frequently reported accident types in the air transportation. It can still be considered as a major threat to aviation safety. Analysis of the capacity of the airport and as well how to calculate delay per aircraft and to analyze the congestion of the Airport.

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