

**55<sup>th</sup> CONFERENCE OF  
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ASIA AND PACIFIC REGION**

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AGENDA ITEM 7: AVIATION AND ENVIRONMENT

**ENVIRONMENTAL BENEFITS FROM ALTERNATIVE  
AIRCRAFT TAXI SYSTEM**

Presented by India

**INFORMATION PAPER**

**SUMMARY**

This Information Paper deals with the environmental benefits of having an alternative aircraft taxiing system at airports to reduce air pollutants and carbon emissions during taxiing. The paper describes about the available alternate aircraft taxi system, their environmental benefits and challenges.

## **ENVIRONMENTAL BENEFITS FROM ALTERNATIVE AIRCRAFT TAXI SYSTEM**

### **1. INTRODUCTION**

1.1 There is increasing awareness of the contribution of airport-related activities to local air quality, greenhouse gas emissions, and noise. Fuel costs and fuel price volatility add pressure on profit margins for airlines. Technologies are emerging to reduce fuel use and reduce environmental impact during aircraft taxiing.

1.2 However, as the demand for air travel continues to grow, airports are facing increased pressure to reduce their contributions towards local air emissions and noise. Airport, environmental agencies and other stakeholders in the aviation industry are becoming increasingly aware of the contribution of airport-related activities to local air quality, greenhouse gas emissions and noise. Fuel is one of the key costs that airlines have to consider and aircraft operators are exploring other alternatives to reduce fuel consumption cost. Majority of aircraft fuel is consumed during the cruise phase of flight (around 40%) and very little can be done to reduce this component. However, fuel burn (around 6 - 10%) and associated emissions can be reduced while the aircraft are on ground.

1.3 Taxing of aircraft, from parking bay to the take-off/runway hold point, consumes lots of fuel. In the current practice, tow bars are used to provide push back and followed by engine startup and aircraft taxi from parking bay to runway hold point. In the case of airports where the aprons are congested and taxiways are quite longer, the amount of fuel consumed is huge coupled with increased noise, carbon emissions and other pollutants leading to worsening of local air quality inside the airports. The aviation sector is committed to technology, operational and infrastructure advances to continue to reduce its sectoral emissions and use of alternative aircraft taxi solutions is a step ahead in achieving its climate targets by airlines.

### **2. DISCUSSION**

2.1 There are five primary types of alternative aircraft-taxiing systems currently being explored:

- i) Dispatch taxiing – using existing pushback tractor,
- ii) Semi-robotic dispatch taxiing – using a hybrid external tractor for taxiing,
- iii) Nose-wheel-mounted electric aircraft taxiing system,
- iv) Main landing gear electric aircraft taxiing system, and
- v) Replacement of the APU with on-board taxi jet engine.

2.2 The main advantages of having an alternative aircraft taxing system is that the aircraft main engines are not used during the taxiing period leading to reduced fuel burn, emissions and noise during taxiing. The net reductions in emissions and noise depends largely on i) Taxiing time, ii) Size and type of aircraft, and iii) Characteristics of the alternative aircraft-taxiing system used.

2.3 From fuel savings point of view, fuel use is generally reduced for all types of alternative aircraft taxiing systems with associated reduction of carbon emissions and considerable cost savings due to reduced fuel use.

2.4 One of the alternate aircraft taxiing system TaxiBot has been certified for operations for narrow-body aircraft such as Boeing 737/A320 aircraft families. DGCA India has already approved Supplemental Type Certificate for use of TaxiBot on B737 aircraft.

2.5 TaxiBot is a pilot-controlled semi-robotic towing tractor that tows the aircraft close to the take-off point without running main engines and the aircraft/tractor combination is steered by the pilot thus providing all controls to the pilot as it is done in case of normal taxiing using main engines. It is specially designed to tow aircraft safely, efficiently and without causing fatigue damage to the nose landing gear. The TaxiBot tug can also function as an aircraft push-back tug and can replace existing traditional tugs. Most aircraft require no modifications to use TaxiBot.

2.6 TaxiBot provides significant reduction in air and noise pollution, major reduction in fuel consumption, improved airfield safety and FOD prevention, minor or no modification to airplane and no extra weight penalty and minor modifications to airports and its taxiways for using the system.

2.7 At Indira Gandhi International (IGI) Airport, New Delhi, fuel burnt by a Code C aircraft during departure taxiing is approx. 240 litres (200 kgs) for a 15 minutes of taxiing time. As a rough estimate, around 2,00,000 liters of ATF is wasted during taxiing leading to around 5,00,000 kgs of carbon emissions per day. It has been observed that in the last four years, there is an increase in taxiing time and an alternate solution to the problem is the need of hour. IGI Airport has recently introduced TaxiBot, which is the only solution to save the unnecessary fuel consumption and the carbon emissions thereon.

2.8 Though the benefits are multi-fold, however, utilization of such alternative aircraft taxiing system is also associated with many challenges. There is a financial implication towards purchase or lease of such infrastructure and its maintenance and is not suitable for airports having shorter taxiing time as minimum five minutes is required to warm up the main engines before take-off. Apart from this, there is an additional expenditure required towards training of pilot and ground personnel for using such system.

2.9 In addition, there are few major challenges associated with use of TaxiBot system such as failed engine start or critical system failure can cause unnecessary delays to other aircraft waiting in queue for take-off, its ability to cross active runways within a safe time period, etc.

2.10 Even though there are few challenges, however, the potential benefits of using TaxiBot makes it a prime system as alternative aircraft taxiing system leading to fuel savings and reduction in carbon emissions from environmental protection point of view.

### **3. ACTION BY THE CONFERENCE**

3.1 The Conference is invited to note information contained in this paper.

- a) States shall be committed to reduce carbon emissions from aircraft operations in line with ICAO's carbon neutral growth goal,
- b) States shall also explore using alternate aircraft taxiing systems to reduce carbon emissions and noise from aircraft operations during taxiing,
- c) Alternate aircraft taxiing system is an environmental friendly system, which not only helps in reducing carbon emissions but also help the airlines to have cost savings from fuel used.