BOEING

Flight Operations ***REVIEW***

A MESSAGE TO FLIGHT CREWS FROM THE BOEING COMMERCIAL AIRPLANE GROUP

727-09
737-10
747-09
757-08
767-08

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TAXIING WITH CARBON BRAKES

Introduction

Carbon brakes are now standard equipment on the Boeing 747-400, 757, 767-200 (increased gross weight models), and the 767-300. The use of these brakes provides a substantial reduction in airplane operating empty weight, but in-service experience has generally shown lower brake life than originally expected.

Analysis has revealed a difference between the wear characteristics of carbon versus steel brakes. It is believed that improvements in carbon brake life can be achieved through better understanding of the operational factors affecting carbon brake life.

Discussion

The majority of airplanes currently in service are fitted with steel brakes. Most pilots are familiar with the fact that steel brake life is primarily dependent upon the severity of brake application during the landing rollout. For steel brakes, heavy braking and/or high speed braking will normally result in greater brake wear than light and/or low speed braking. Carbon brakes do not exhibit the same wear characteristics in this regard. For carbon brakes, the number of brake applications largely determines brake life.

Dynamometer tests have confirmed that the severity of brake application has less of an effect on the life of carbon brakes than the cumulative number of brake applications. It is therefore not surprising that the majority of carbon brake wear occurs during taxi to and from the ramp where frequent brake applications are typically required. For carbon brake equipped aircraft, it becomes more critical to observe recommended taxi braking techniques to extend brake life.

From the pilots perspective, there should be no difference in braking techniques during taxi for carbon or steel brake equipped airplanes. The techniques noted in all current Boeing Flight Crew Training Manuals should be followed. From the standpoint of brake wear however, it is more critical that these techniques be observed on carbon brake equipped airplanes.

The Boeing recommended taxi braking technique is as follows (quoting from page 1-13 of the 767 Flight Crew Training Manual):

> “Avoid “riding” the brakes to control taxi speed as brake heat build-up could become excessive. If taxi speed is too high, reduce speed with a steady brake application and then release the brakes to allow them to cool. Continuous braking should be avoided. Allow for decreased braking effectiveness on slick surfaces.”

Recommendations

While all brake wear is dependent on frequency of brake applications, carbon brake wear is more sensitive to frequency of brake applications than steel brakes. The following recommendations should help improve brake life and are applicable to both steel brakes and carbon brakes:

1. Anticipate traffic conditions to minimize taxi braking requirements.

2. Avoid the use of excessive thrust during taxi accelerations and/or during sustained taxi runs.

3. Anticipate engine spool-up and spool-down characteristics to avoid overshooting the desired taxi speed.

4. Minimize brake applications by planning ahead, not by "riding" the brakes during taxi.

These above recommendations are intended as general taxi guidelines only: SAFETY AND PASSENGER COMFORT SHOULD REMAIN THE PRIMARY CONSIDERATION.