ABSTRAK

Mesin pesawat merupakan bagian dimana sistem mesin turbin gas akan bekerja untuk mendapatkan gaya dorong pesawat. Agar tidak terjadi kegagalan mesin pada saat *take-off* perlu diperhatikan salah satu parameter kualitas mesin yakni *exhaust gas temperature* (*EGT*). *High EGT* dapat menyebabkan terjadinya kerusakan pada *part* mesin pesawat serta mengancam keselamatan penerbangan. *EGT* sangat mempengaruhi nilai *Exhaust gas temperature margin* (*EGTM*) dalam menentukan kelaikan mesin tersebut untuk dapat beroperasi. Selain itu uji kelaikan mesin pesawat merupakan salah satu faktor penting dalam menentukan nilai *EGTM*. Mesin yang baru selesai dilakukan perbaikan *overhaul*, dengan keadaan semua *part* diganti baru tetapi pada saat uji kelaikan mengalami penurunan nilai *EGTM* sebesar -29,6 dan turunnya *pressure* pada saat kompresi sebesar 290 psig. *FMEA* dilakukan untuk melihat hipotesis yang mungkin terjadi pada saat terjadinya kegagalan sehingga didapatkan kerusakan pada *High pressure turbine clearance control air tubing* (*HPTCC* air tubing), *High pressure turbin, High pressure compressor rear stator case* (*HPCnrear stator case*), *High pressure compressor front stator case* (*HPC front stator case*), dan *High pressure compressor rotor blade* (*HPC rotor blade*). Analisa *air mode* untuk mengetahui penyebab terjadinya penurunan nilai *EGTM*. Pada *air mode,* perhitungan ini memiliki 3 mode yaitu *tested mode*, *nominal mode standard* day dan *nominal mode hot day*, ketiga mode ini akan diperhitungkan, hasil kalkulasi dari *air mode* akan mengetahui nilai *EGTM* yang diperbolehkan. Komputer *LX 2000* digunakan untuk memperoleh data perhitungan *air mode*. Hasil penelitian ini memberikan instruksi uji penerimaan dan kelaikan mesin dengan proses perhitungan *air mode* untuk mengetahui nilai *EGTM* terhadap standarisasi *original equipment manufacturer* (OEM) serta mengetahui penyebab kerusakan *part* pada mesin *turbofan* berdasarkan hasil *FMEA* akibat tingginya *EGT* 937,6 ℃ yang dihitung dengan *air mode*.

Kata Kunci: *exhaust gas temperature margin, air mode, high pressure compressor clearance control*

ANALYSIS OF THE EFFECT OF AIR MODE ON EXHAUST GAS TEMPERATURE MARGIN AT CFM 56-3C TURBOFAN ENGINE BOEING 737 CLASSIC WITH FMEA METHOD

ABSTRACT

The aircraft engine is the part where the gas turbine engine system will work to get the thrust of the aircraft. In order to avoid engine failure during take-off, it is necessary to pay attention to one of the engine quality parameters, namely the Exhaust Gas Temperature (EGT). High EGT can cause damage to aircraft engine parts and threaten flight safety. EGT greatly affects the value of exhaust gas temperature margin (EGT) to determine the worthiness of the engine to operate. In addition, the aircraft engine worthiness test is an important factor in determining the EGTM value. Machine that had just finished overhauling repairs, with all parts replaced with new ones but during the worthiness test the EGTM value decreased -29.6 and the pressure decreased during compression by 290 psig. FMEA was carried out to see hypotheses that might occur at the time of failure so that damage was obtained on High pressure turbine clearance control air tubing (HPTCC air tubing), High pressure turbin, High pressure compressor rear stator case (HPC rear stator case), High pressure compressor front stator case (HPC front stator case), and High pressure compressor rotor blade (HPC rotor blade). Air mode to determine the cause of the decrease in EGTM. In air mode, this calculation has 3 modes, namely tested mode, nominal standard day mode and nominal hot day mode, these three modes will be taken into account, the calculation results from air mode will know the allowed EGTM value. The LX 2000 takeoff test computer was used to obtain air mode calculation data. The results of this study provide instructions for acceptance and engine worthiness test with the air mode calculation process to determine the EGTM value against the original equipment manufacturer (OEM) standard and determine the cause of part damage to the turbofan engine based on the FMEA results due to the high EGT 937,6 ℃ calculated by air mode.

Keywords: *exhaust gas temperature margin, air mode, high pressure compressor clearance control*