

# **ANALISIS PENGARUH TAKEOFF THRUST DERATE TERHADAP MASA PAKAI DAN KONSUMSI FUEL ENGINE CFM56-7B**

Yosia Adrian Winata  
14050118

## **ABSTRAK**

*Biaya maintenance memakan porsi 16% biaya operasional airline menurut ICF SH&E, dan 40% biaya maintenance tersebut digunakan untuk merawat engine. Tingginya biaya maintenance engine seringkali membuat operator mencari cara untuk menekan biaya maintenance. Salah satu cara yang efektif menurut CFM adalah dengan melakukan thrust derate atau pengurangan gaya dorong pada fase takeoff. Pada tugas akhir ini, penulis akan meneliti tingkat deteriorasi (ROD) EGT margin, pengaruh penggunaan thrust derate terhadap masa pakai engine, dan konsumsi bahan bakar pada engine CFM56-7B.*

*Sumber data yang digunakan dalam penelitian ini berasal dari ECMS dan diolah menggunakan bantuan software Microsoft Excel. Analisis dilakukan dengan menghitung penghematan engine flight cycle dan fuel saving ketika engine menggunakan thrust derate pada fase takeoff. Beberapa metode yang digunakan untuk analisis diantaranya regresi linier, regresi polinomial orde kedua dan ketiga, ekstrapolasi, dan korelasi kuantitatif.*

*Setelah dilakukan analisis, tingkat deteriorasi engine CFM56-7B versi thrust rating 24.200 lbf diketahui 0.0221 hingga 0.0373 °C/cycle. Penggunaan thrust derate mampu memperpanjang masa pakai engine hingga 5015 EFC dengan penggunaan 25% thrust derate pada fase takeoff. Fungsi penghematan engine flight cycle (EFC) diketahui  $y = 5.6052x^2 + 57.521x + 73.592$ . Thrust derate juga mampu menurunkan konsumsi bahan bakar hingga 173 kg pada setiap flight dengan penggunaan 25% thrust derate pada fase takeoff. Fungsi fuel saving diketahui  $y = 0.0349x^2 + 5.8254x + 5.5819$ .*

*Kata kunci: thrust derate, CFM56-7B, fuel saving, masa pakai*

# ANALYSIS OF TAKEOFF THRUST DERATE EFFECT ON THE LIFETIME AND FUEL CONSUMPTION OF THE CFM56-7B ENGINE

Yosia Adrian Winata  
14050118

## ABSTRACT

*Maintenance cost consume at least 16% portion of airline operating costs according to ICF SH&E, and 40 percent of the maintenance cost are used to maintain the engine. High engine maintenance cost makes operators look for ways to reduce that cost. One effective way according to CFM is to perform thrust derate on takeoff phase. On this final assignment, author will analyze the EGT margin rate of deterioration, effect of thrust derate on engine life and fuel consumption on CFM56-7B engine.*

*Data sources used in this final assignment are from ECMS and processed using Microsoft Excel software. The analysis is done by calculating the engine flight cycle saving and fuel saving when the engine uses thrust derate in takeoff phase. Several methods used for analysis are linear regression, second order and third order polynomial regression, extrapolation, and quantitative correlation.*

*Analysis result shows the EGT margin rate of deterioration of CFM56-7B engine with 24200 lbf thrust rating are 0.0221 to 0.0373 °C/cycle. Thrust derate application can extend engine life up to 5015 EFC when 25 percent thrust derate applied on takeoff phase. Engine flight cycle extension function is known  $y = 5.6052x^2 + 57.521x + 73.592$ . Thrust derate application can also reduce fuel consumption up to 173 kilograms when 25 percent thrust derate applied on takeoff phase. The fuel saving fuction is known  $y = 0.0349x^2 + 5.8254x + 5.5819$ .*

*Keyword: thrust derate, CFM56-7B, fuel saving, engine life extension*