

## INTISARI

Ukuran dan berat pesawat berpengaruh terhadap susunan *landing gear* sebagai instrumen distribusi beban pesawat terhadap landasan, pesawat bermuatan berat dan berbadan lebar menggunakan jenis *multiple gear* seperti: *dual-tandem*, *dual-tridem*, dan lain-lain. Tujuan studi ini meliputi: (1) analisis pengaruh pembebanan *dual-tandem* pesawat terhadap kekuatan dan fatik struktur perkerasan apron, (2) analisis beban roda tunggal ekuivalen (ESWL) terhadap beban gear *dual-tandem* pesawat B767-300 dengan Metode Elemen Hingga.

Terdapat dua studi dalam tesis ini, antara lain: studi pertama yang dilakukan dengan memodelkan struktur perkerasan bandara dan menganalisis reaksi strukturnya menggunakan Abaqus, berdasarkan output tegangan dapat dianalisis kekuatan dan kelelahan struktur menggunakan *stress ratio* dan *Cumulative Damage Factor*. Tinjauan kedua dengan membuat percobaan bidang kontak lingkaran ekuivalen ( $A_e$ ) dengan luas sekian kali luas segiempat bidang beban gear ( $A_R$ ), percobaan menggunakan Abaqus untuk memperoleh  $A_e$  yang menghasilkan lendutan sama dengan beban gear  $A_R$ .

Hasil analisis menunjukkan respon struktur berupa lendutan 0,018 mm dibawah lendutan ijin, tegangan maksimum sebesar 0,38 MPa menghasilkan *stress ratio* 0,09 dengan prosentase fatik 92% setelah 20 tahun. Beban roda tunggal ekuivalen dengan kriteria *equal vertical deflection* terhadap beban gear *dual-tandem* B767-300 diperoleh pada percobaan ( $A_e = 2,25 A_R$ ). Berdasarkan perhitungan ESWL diperoleh beban roda tunggal ( $P_s$ ) = 39.988 N ekuivalen terhadap beban gear *dual-tandem* B767-300 ( $P_{2d}$ ) = 184.172 N.

Kata kunci: ESWL, Perkerasan kaku, Bandara Soekarno-Hatta, Metode Elemen Hingga, Fatik

## ***ABSTRACT***

The size and weight of the aircraft affect the landing gear configuration as an instrument of loads distribution to airfield pavement, heavy and wide-body aircraft using multiple gear types such as dual-tandem, dual-tridem, and others. The objectives of this study include (1) analysis of aircraft loading effect for dual-tandem gear on the strength and fatigue of apron pavement structure, (2) analysis of equivalent single wheel load (ESWL) under dual-tandem gear loading of B767-300 aircraft using the Finite Element Method

There are two studies in the thesis which are the first study that carried out by modeling the airport pavement structures and analyzing the structural response using Abaqus, the output of stresses can be used to estimate strength and fatigue of pavement structure using the stress ratio and the Cumulative Damage Factor. The second study is conducted by some experiments to obtain an adequate equivalent circular contact area ( $A_e$ ), which the circular area is many times to rectangular loading area of dual tandem gear ( $A_R$ ), the experiment using Abaqus to derive the  $A_e$  that generate an equal vertical deflection to the  $A_R$ .

The output of the analysis indicates that structure response of deflection 0.018 mm is underneath the allowable deflection, the maximum stress of 0.38 MPa results the stress ratio of 0.09 with fatigue percentage 92% after 20 years. The equivalent single wheel load with equal vertical deflection criterion for the dual-tandem gear load B767-300 is obtained in the fourth experiment ( $A_e = 2.25A_R$ ). Based on the calculation of ESWL obtained a single wheel load ( $P_s$ ) = 39,988 N which is equivalent to B767-300 dual-tandem gear load ( $P_{2D}$ ) = 184.172 N.

**Keywords :** ESWL, Rigid Pavement, Soekarno-Hatta Airport, Finite Element Method, Fatigue