DATA ITEM DESCRIPTION

Form Approved
OMB No. 0704–0188

1. TITLE

Durability Analysis Report

2. IDENTIFICATION NUMBER

DI-MISC-81486

3. DESCRIPTION/PURPOSE

3.1 The report identifies the airframe locations analyzed for durability.

3.2 The report details the assumptions, methods, procedures, and results of the airframe durability analyses.

3.3 The report defines the material quality of honeycomb, bonded, and composite airframe structures.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
950731	F–ASC/ENFS	X	

7. APPLICATION/INTERRELATIONSHIP

7.1 This Data Item Description (DID) contains the format and content preparation instructions for the data product generated by the specific and discrete task requirement as delineated in the contract.

7.2 This DID supersedes DI–T–30722.

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8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER
		F7161

10. PREPARATION INSTRUCTIONS

10.1 Format. The contractor's format is acceptable.

10.2 Content. The report details the assumptions, computational methods, and analytical results of the durability analyses.

10.2.1 The report shall include revised analyses based on refined material data and other pertinent information from the design development test program and shall include any additional analysis of locations identified as critical in the full–scale test program. The report shall be updated to incorporate revisions of the durability analyses necessary as a result of subsequent evaluations.

10.2.2 The report states the criteria used to identify durability critical areas of the airframe.

10.2.3 The report lists the durability critical locations of the airframe and shall include sketches indicating those areas.

10.2.4 The report shall state the single highest component repair or replacement cost as of the reporting date from among all airframe components that contain no durability critical locations. The cost will define the contractor's concept of inexpensive–to–replace components.

10.2.5 The report shall include the material properties assumed in durability analysis of each component and additional data necessary for structural assessment of the materials.

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11. DISTRIBUTION STATEMENT

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Block 7, APPLICATION/INTERRELATIONSHIP (Continued)

7.3 The address for Defense Technical Information Center (DTIC) submittals is:

Administrator
Defense Technical Information Center
ATTN: DTIC–FDAC
Bldg 5, Cameron Station
Alexandria VA 22304–6145.

Block 10, PREPARATION INSTRUCTIONS (Continued)

10.2.5.1 For metallic materials, the data shall include material designations, pertinent geometries, thicknesses, product forms, yield strengths, threshold stress intensity values, critical fracture toughness, crack growth rate functions, and crack growth rate data plots for the critical grain directions. In cases where the government has approved classical fatigue for use as a principal durability analysis technique, the reports shall also include plots of the constant life or S–n data, the stress concentrations (K_t) assumed in the analyses and the K_t notch values of the test specimens from which the constant life or S–n data were derived.

10.2.5.2 For composite materials, the data shall include material designations, pertinent geometries, thicknesses, layup orientations, threshold strengths for tensile and compressive collapse, elastic moduli for the critical fiber or layup directions, glass transition temperatures, long–term moisture absorption rates, and plots of moisture absorption effects and temperature effects within the thermal envelope of the airframe.

10.2.5.3 For components utilizing bonded, honeycomb, or advanced composite types of construction, the report shall also describe assumed in–service material quality in terms of delamination and disbonding limits, temperature limits, potential moisture intrusion paths and ultraviolet radiation exposure locations, and maximum guaranteed porosity content.

10.2.6 The report shall state the sources from which the material properties assumed in the durability analyses were derived.

10.2.7 The report shall document the stress intensity solutions, the crack growth retardation or crack closure models, load interaction functions, spectrum load counting and arranging methods, crack growth rate shifting functions used to account for varying stress ratios, the methods used to account for bending, bearing, and tension, and the critical crack size estimation methods used in the crack growth analyses. The report shall also state the relationships between numbers of cycles in the load spectra and the numbers of flight hours and ground–air–ground or pressurization cycles.

10.2.8 The report shall document the results of each durability analysis. The report shall include plots of the flight hours, pressurizations, or ground–air–ground cycles and the dimensions of the predicted cracks from the initial durability flaw sizes to failure of the component, to the point of functional impairment of the aircraft, or to four lifetimes, whichever occurs first. If functional impairment is predicted to occur first, the report shall describe the potential impact to the operation of the aircraft. Based on the results of the crack growth predictions, the report shall state the projected minimum durable life of the airframe.

10.2.9 For each part analyzed that does not show two lifetimes of predicted stable crack growth without failure or functional impairment, the report shall describe the approach the contractor will take to bring the component into compliance with the two lifetime requirement of the contract.

10.2.10 As part of the report, the data points used to generate the plots of the dimensions of the predicted cracks, load cycles, and the corresponding values of stress intensity per applied stress level (K/σ) shall be labeled and stored in ASCII format on standard personal computer disks or magnetic tapes for delivery to the government upon request. Labeling of the tapes or disks and the information contained therein shall be adequate for the government to identify the crack lengths and depths, and corresponding load levels, accumulated load cycles, and K/σ values.

10.2.11 Also as part of the report, the design service loads and stress spectra used in the durability analyses shall be labeled and stored in ASCII format on standard personal computer disks or magnetic tapes for delivery to the government upon request. Labeling of the tapes or disks and the information contained therein shall be adequate for the government to identify the loads and stresses, stress types (bearing, bending, tension, and compression), and the associated load levels and number of applied cycles with the corresponding analyses that were conducted.