

# DATA ITEM DESCRIPTION

## Title: STRESS, FATIGUE, AND FRACTURE ANALYSIS REPORT

Number: DI-SESS-81939

Approval Date: 20130827

AMSC Number: N9424

Limitation: N/A

DTIC Applicable: N/A

GIDEP Applicable: N/A

Office of Primary Responsibility: AS/AIR 4.8.2.7

Applicable Forms: N/A

**Use/relationship:** The Stress, Fatigue, and Fracture Analysis Report is the primary documentation for mechanical analysis performed during design of equipment. Within this document resides the methods, assumptions, and results to stress, fatigue, and fracture life assessments.

This DID contains the format, content, and intended use information for the data product resulting from the work task described in the contract Statement of Work (SOW).

### Requirements:

1. Format. Contractor format.
2. Content.
  - 2.1. Title Page, containing the following:
    - a. Title/identification of the system/component/program/project.
    - b. Title of CDRL and CDRL number
    - c. Contract number.
    - d. Preparing activity or contractor's title.
    - e. Security classification, when required.
    - f. Distribution Statement.
  - 2.2. Table of Contents. The document shall contain a table of contents providing the number, title, and page number of each titled paragraph, figure, table, and appendix.
  - 2.3. Scope. This section shall be divided into the following paragraphs.
    - a. Identification. This paragraph shall contain a full identification of the system and the components to which this document applies, including, as applicable, part numbers.
    - b. System overview. This paragraph shall briefly state the purpose of the system and the components to which this document applies. It shall describe the general nature of the system and components of interest; summarize the history of system development, operation, and maintenance; identify the project sponsor, acquirer, user, developer, and support agencies; identify current and planned operating sites; and list other relevant documents.
    - c. Document overview. This paragraph shall summarize the purpose and contents of this document and shall describe any security or privacy considerations associated with its use.

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2.4. Referenced documents. This section shall list the number, title, revision, and date of all documents referenced in this document. This section shall also identify the source for all documents not available through normal Government stocking activities.

2.5. General analytical approach. This section shall detail the general approach to stress, fatigue, and fracture mechanics analysis used. If necessary it can be broken into sections to accommodate subsets of components which will fall under separate methodologies. This section shall include approach to modeling dynamic loads as applicable. This section shall include the acceptance criteria for stress, fatigue and fracture. This section shall also include what software tools are used for which components.

2.6. System and component load definition. This section shall detail internal and external loads acting on the system and component of interest. This section shall include justification for load assumptions as required. This section shall include or reference test data used to construct load assumptions.

2.7. System and component boundary condition definition. This section shall detail boundary conditions of the system and component of interest. This section shall include justification for boundary conditions.

2.8. Material Properties. This section shall detail material properties information of the component(s) of interest. This section shall include references to sources or test data.

2.9. Stress Analysis. This section shall detail stress analysis of the component(s) of interest. Focus should be placed on regions which show highest stress. This section shall demonstrate how stress is affected by changes in input conditions, environment, and other system parameters as applicable. If hand calculations are employed an example shall be explained in detail and reference made to an appendix with all additional calculations. Furthermore, any assumptions made for hand calculations shall be justified and documented in this section. For Finite Element analysis all modifications, simplifications, idealizations, and assumptions shall be explained, justified, and documented in this section.

2.10. Fatigue Analysis. This section shall present the component level fatigue analysis performed. The fatigue spectrum(s) with corresponding stress levels shall be presented in this section. Associate fatigue life damage per spectrum entry shall be presented. Fatigue knockdown factors shall be presented and justified in this section.

2.11. Fracture Mechanics. This section shall present the component level fracture mechanics analysis performed. The fracture spectrum(s) with corresponding stress levels shall be presented in this section. Associated fracture growth per spectrum entry shall be presented. Fracture factors shall be presented and justified in this section.

2.12. Validation Recommendations. This section shall include a listing of recommended validation approaches for each component stress, fatigue, and fracture life claim. Provide specific locations for sensor placement during testing.

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2.13. Notes. This section shall contain any general information that aids in understanding this document (e.g., background information, glossary, rationale). This section shall include an alphabetical listing of all acronyms, abbreviations, and their meanings as used in this document and a list of any terms and definitions needed to understand this document.

2.14. Appendixes. Appendixes may be used to provide information published separately for convenience in document maintenance (e.g., charts, classified data). As applicable, each appendix shall be referenced in the main body of the document where the data would normally have been provided. Appendixes may be bound as separate documents for ease in handling. Appendixes shall be lettered alphabetically (A, B, etc.).

3. End of DI-SESS-81939.