



Raytheon

WIRE PERFORMANCE SPECIFICATION FOR AIRCRAFT ELECTRICAL SYSTEMS

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This work is being performed under contract to the FAA
Technical Center (Contract No. GS-23F-0263K)

Goal

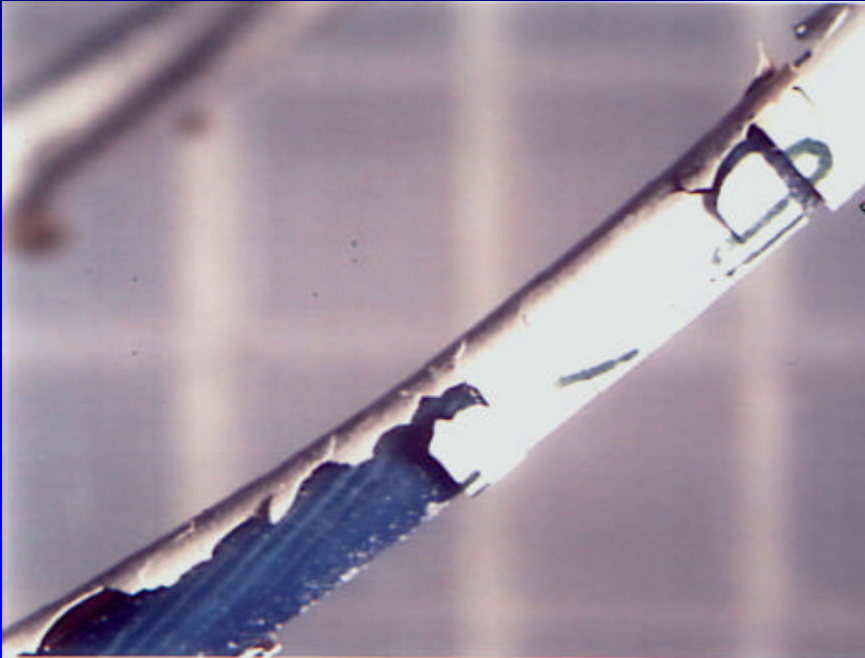
- **Develop the performance requirements for electrical interconnect wire necessary to assist the FAA to update to current standards the regulations related to insulated electrical wire used in commercial aircraft.**

- **WHY?**

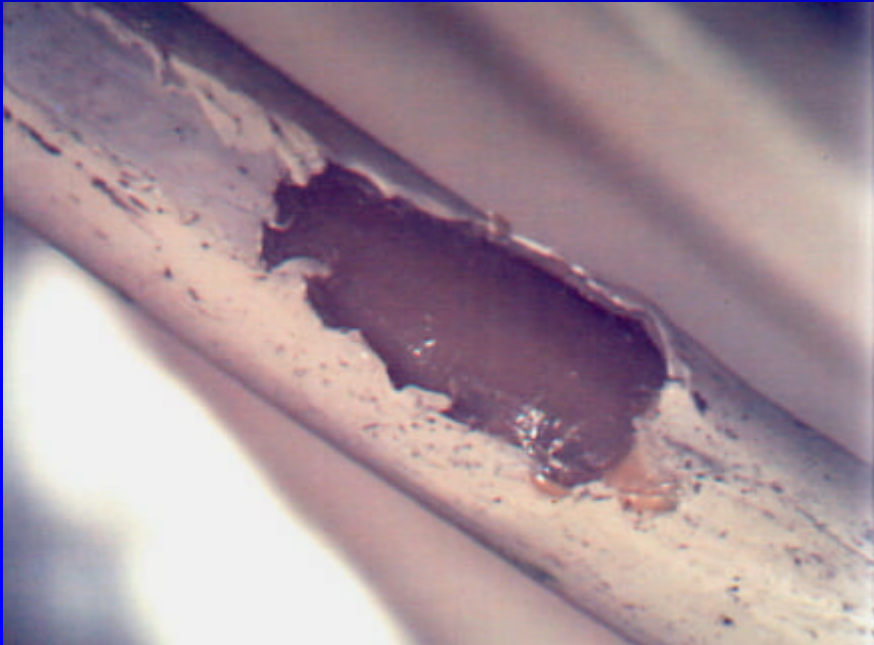
To improve safety of aircraft by creating up-to-date requirements for electrical wire used in aircraft.

Wire Issues

Topcoat flaking



Chaffed wire



Wire Issues

Notch propagation at hot stamp



Notch propagation (not to conductor)



Wire Issues

Arcing Damage / Flammability



Background

- **Indianapolis facility**
 - **Formerly part of NAVAIR**
 - **Performed the qualification of wiring components to military specifications**
 - **Technical lead for wiring standards**
 - **The center of excellence for wiring in NAVAIR**
 - **Raytheon Technical Services Co., Engineering and Production Support (RTSC EPS)**
 - **Privatized in 1997 (BRAC)**
 - **Contracted to NAVAIR for wiring support**
 - **Continued to provide qualification and standardization support**
 - **Other wiring contracts with AF, FAA, NTSB, OEMs, etc.**
 - **Wiring design, installation, repair, modifications, etc.**
 - **Wiring and wiring component test facilities**

Tasks

- **Identify the current requirements for electrical wire in aerospace applications**
- **Collect Field Data**
- **Evaluate the data**
 - **Identify deficiencies in the wiring requirements related to incidents and accidents**
 - **Review current wire specifications for inadequacies**
- **Develop the requirements for a performance based specification for electrical wiring in commercial aircraft**

Task 1: Current Wire Specifications

- **Identify all current wire performance and component specifications for general-purpose aircraft wire**
- **Collect current wire specifications**
 - **Major Original Aircraft Manufacturers (OAMs)**
 - **Military Specifications (Mil-Spec, Def-Stan)**
 - **Wire Manufacturer's Specifications**
 - **Industry Standard's Bodies (SAE, NEMA, UL, ASTM, AECMA)**
 - **Governing Bodies**

Task 2: Collect Field Data

- **Collect field data related to electrical wiring**
 - **Incident and accident data (NTSB AAIDS and ASRS)**
 - **Maintenance and inspection data (ATSRAC data)**
 - **Airworthiness Directives (AD)**
 - **Service difficulty reports (SDR)**
 - **Other related sources (Navy Safety Info, NALDA Cable & Connector/Electric Shop)**
- **Field data collected utilizing key word searches on public available data.**
 - **Wire, wiring, short, arc, smoke, cable, and derivatives**
- **Identify field data potentially related to wire deficiencies.**

Task 3: Evaluation of Data (cont.)

- **Analyze the field data**
 - **Identify data which may indicate wire deficiencies.**
 - **Categorize the causes of failure. Filter data.**
 - **Wire Deficiency**
 - **Design Deficiency**
 - **Maintenance**
 - **Installation**
 - **Modifications**
 - **Use / Misuse**
 - **Source Non Wire Related**
 - **Non Wire Related**
 - **Not Enough Data**
 - **Very little specific data to perform good analysis.**

Task 3: Evaluation of Data (cont.)

- **Analyze the wire specifications**
 - Review and analyze the requirements of electrical wire
 - Determine the adequacy of the specifications
 - Identify areas where the specifications may lack sufficient requirements. Some examples that have been identified include:
 - Arc track resistance
 - Smoke
 - Toxicity
 - Mechanical strength at temperature
 - Identify areas where the specifications are not pertinent
 - Purchasing data

Task 4: Develop Wire Performance Specification Requirements

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- **Draft a Performance Specification for general purpose aircraft electrical wire**
 - **Minimum requirements for electrical wire used on aircraft**
 - **Not to be a design guide and not to tell designer how to do his job**
- **Recommendations to the FAA Technical Center**
 - **Possible inclusion in a technical standards order (TSO)**
- **Status: About to begin this phase**