

INDUSTRY AEROSPACE

REGION NORTH AMERICA

L&T Technology Services overcame the challenge of material change in elevator assemblies of old aircrafts with minimum data to support the refurbishment process. The ideation was to support innovation while bearing significant cost reduction during the material overhaul in aircrafts aged five decades and more.



CLIENT PROFILE

The client is a leading manufacturer of business, special-mission, trainer and light combat aircrafts. Their service portfolio includes – designing and marketing aviation products and services for industries, governments and individuals worldwide.

BUSINESS PERSPECTIVE

L&T Technology Services was approached to refurbish the structural design of old aircrafts with minimal data to support the overhaul and with an additional challenge to provide alternatives for change in material. We recommended replacement of magnesium (Mg) parts with aluminium (Al) in elevator assemblies in the old aircrafts which were designed and developed during 1960s.

The overhaul in material was influenced by the restricted supply of Magnesium (limited suppliers), and considering the fact that Mg is priced 5.5 times higher than Al. The decision of material shift from Mg to Al was rational considering the imperfections in Magnesium skin, which do not show up until after it is painted, which may eventually require the skin to be scrapped.

SCOPE OF ENGAGEMENT

The scope of involvement included structural design support activity, engineering change management, executing testing and certification processes for material change in the project.

CHALLENGES INVOLVED

L&T Technology Services took an unconventional leap to accept the challenge of delivering structural design amendments despite the lack of basic data to support the refurbishment process.

The interpretation of the manual drawings along with implementing material change became the focus of our engineering endeavour. We dealt with :

- Non availability of 3D data of the aircraft (including NMG)
- Interpretation of the initial (drafted in 1960) handmade drawings of the aircraft and its components
- Simulating 3D drafts with very limited available I/P data.
- Adherence to recommendations in material change with minimal modification in the existing assembly
- Implementation of material change from Magnesium to Aluminium in the elevator assemblies

OUR APPROACH

L&T Technology Services partnered in the structural design and material change process with its client on multiple aspects during the execution of this project. We adhered to engineering processes suggested by the client and worked in sync with specifications for design and replacement of Magnesium parts with Aluminium. During the phased project, L&T Technology Services team was updated Onsite with client methodologies for specific processes that were essential in the execution of this project.

Our Offshore support synchronised with the project devised road map for training and development purpose. This specialized requirement saw our team deciphering manual drawings made in 1960s and changing the same into 3D drafts. Material optimization was achieved with significant cost reduction.

We worked on CATIA V5 3D modeling and drafting techniques to execute the project as per Customer Standard.

TOOLS & TECHNOLOGIES

- CATIA V5
- Q Checker
- PATRAN / NASTRAN, HYPERMESH

FINAL RESULT

Refurbishment of old aircrafts (more than five decades old) was beyond anticipation. We started from scratch, by making 3D models of the aircrafts to providing solutions on material change in the components that are low on cost and maintenance and are readily available.

Our technical support enabled the client in following ways:

- Total replacement of magnesium components with aluminium in the elevator, yielding significant material cost savings.
- Eliminated scope of utilizing special 'corrosion preventive procedures' for Magnesium with the effective implementation in design change.
- Averted potential line stoppage instances due to ready availability of the alternate material.
- Created comprehensive 3D models that aided the FEM analysis

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IMPACT

We worked closely with the client to make sure that the assembly issues were resolved. The team concentrated on design modifications like proposing correct Engineering Design (ED), pitch for rivets and other alterations that reduced cost significantly during the process of manufacturing and serviceability.

The discrepancies between part list and drawings were corrected by checking and making comparisons with the face of the drawings.

The drawings and contextual supplements were cross checked for accuracy. Any errors in input drawings, item callouts considering multiple assemblies, delta note usage, inconsistencies in next assembly data, and zone callouts were identified and rectified.

ABOUT
AEROSPACE

Aerospace offers mechanical and embedded services in the Aerospace sector. Our service offerings span the entire product life cycle including concept design, reverse engineering, modelling and analysis, virtual testing, flight control testing systems, prototyping, physical testing certification support and manufacturing. We exert ownership in Mechanical/System related testing and certification activities using DER's. Our services include support to critical aerospace functions, expertise in technical publication activities and development of on-board software for Defense and Commercial projects.

ABOUT
L&T
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SERVICES

L&T Technology Services is a wholly owned subsidiary of Larsen & Toubro with focus in the engineering services space, partnering with many of the Fortune 500 companies globally. It offers design and development solutions throughout the entire product development chain across various industries such Industrial Products, Medical Devices, Transportation, Telecom and Hi-tech and Process Engineering. The company also offers solutions in the areas of Mechanical Engineering Services, Embedded Systems Services, Product Lifecycle Management (PLM), Engineering Analytics, Power Electronics, M2M and the Internet of Things (IoT)

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