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# Failure Investigation: in Flight Loss of a Main Landing Gear Door of a Transport Aircraft.

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## Abstract

An executive transport military aircraft experienced the loss of the left main landing gear door during a standard flight. In the aftermath of this serious occurrence, at the Chemistry Department of the Flight Test Center of the Italian Air Force (IAF), a technical investigation started to identify the root causes of the failure and to prevent other similar incidents.

The investigation was carried out jointly with the representative of the manufacturing company and was focused on the fracture surfaces of the hinges connecting the door to the fuselage.

This paper shows the results obtained by fractographic (optical and electronic microscopy), metallographic, chemical analysis and numerical simulation: the root cause of the cracks was a phenomenon of pitting corrosion mainly located on the door back hinge and due to a local loss of coating. This made possible a fatigue fracture mechanism under normal operative cyclic loads.

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*Keywords:* Transport aircraft, Fatigue Fracture, Corrosion Pitting, Aluminum 7075, landing gear, FESEM, Finite Element Analysis, Failure Analysis

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## 1. Introduction

An executive transport military aircraft assigned to the 14<sup>th</sup> Support Wing, Pratica di Mare Air Force Base, experienced loss of the main landing gear (MLG) left door during a standard flight (Fig. 1). In the aftermath of this serious occurrence, the Chemistry Department of the Italian Air Force (IAF) Flight Test Center was tasked to lead a technical investigation aimed to clarify the root causes for the failure and to recommend how to prevent similar

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accidents.



Fig. 1: Location of Main Landing Gear left Door.

The investigation was carried out in agreement and collaboration with the representatives of the manufacturing company (OEM) and with the Support Wing maintenance personnel. The activity was focused on the hinges fracture surfaces connecting the door to the fuselage. In particular, the rear hinge is actuated through a leverage directly linked to the landing gear opening mechanism, while the forward one is only hinged to the fuselage (Fig. 2).

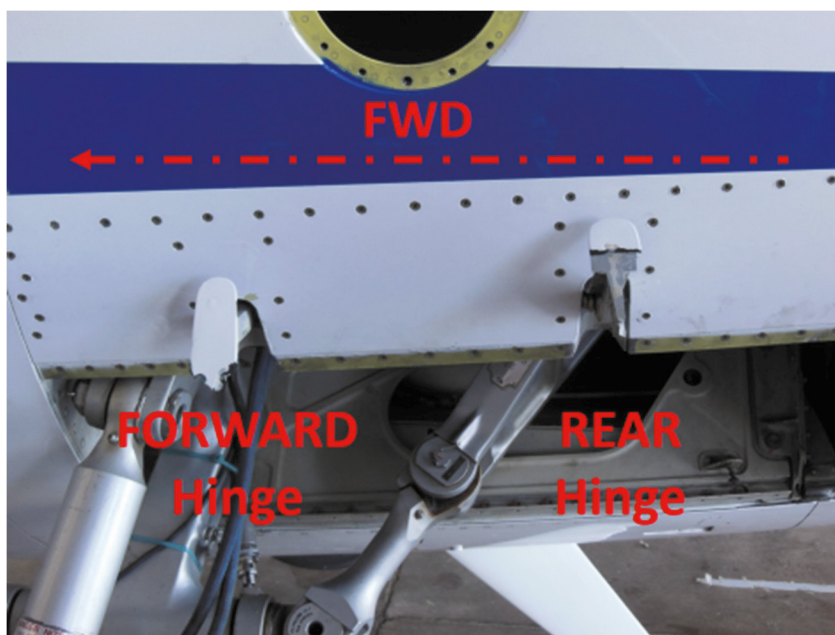


Fig. 2: Detail of Main Landing Gear Door.

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