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E1.63.057.201) STRUCTURAL STRESS ANALYSIS**Summary

This report presents the structural stress analysis calculations performed to substantiate the static and fatigue strength of the main rotor bearing support P/N E1.63.057.201 of the ES101 helicopter kit.

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**MODIFICATIONS RECORD**

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<b>A</b>	20/06/2010	ALL	FIRST ISSUE	Aviotecnica
<b>B</b>	16/10/2010	ALL	GENERAL MINOR UPDATE AND ADDITION OF CRASH CONSIDERATIONS	Aviotecnica

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## **1 Introduction**

This report presents the structural stress analysis calculations performed to substantiate the static and fatigue strength of the main rotor bearing support P/N E1.63.057.201 of the ES101 helicopter kit.

## **2 References**

### **2.1 R-101-10-01**

BASIC DESIGN CRITERIA FOR THE ES101 HELICOPTER TRANSMISSION SYSTEM  
May 2010  
Aviotecnica

### **2.2 R-101-10-02**

MAIN ROTOR MAST (P/N E1.63.039.202) STRUCTURAL STRESS ANALYSIS  
June 2010  
Aviotecnica

### **2.3 DOT/FAA/AR-MMPDS-01**

Metallic Materials Properties Development and Standardization (MMPDS)  
January 2003  
FAA

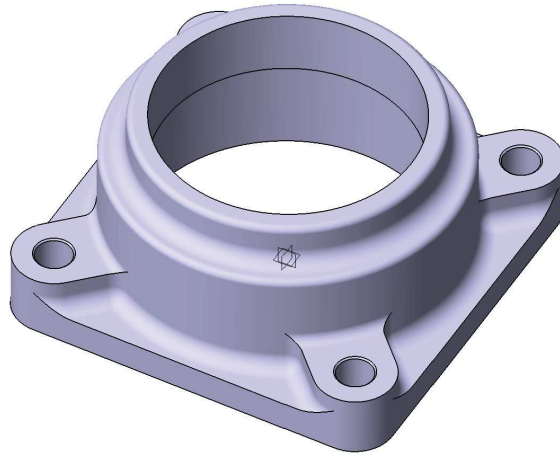
### **2.4 NASA Technical Memorandum 106943**

Preloaded Joint Analysis Methodology for Space Flight Systems  
Jeffrey A. Chambers  
December 1995  
Lewis Research Center

### 3 Acronyms and Abbreviations

FEA	Finite Element Analysis
FEM	Finite Element Method
g	gravity acceleration
MGB	Main Gearbox
MoS	Margin of Safety
MR	Main Rotor
MS	Margin of Safety
RPM	Revolutions Per Minute
TR	Tail Rotor

#### 4 Part description

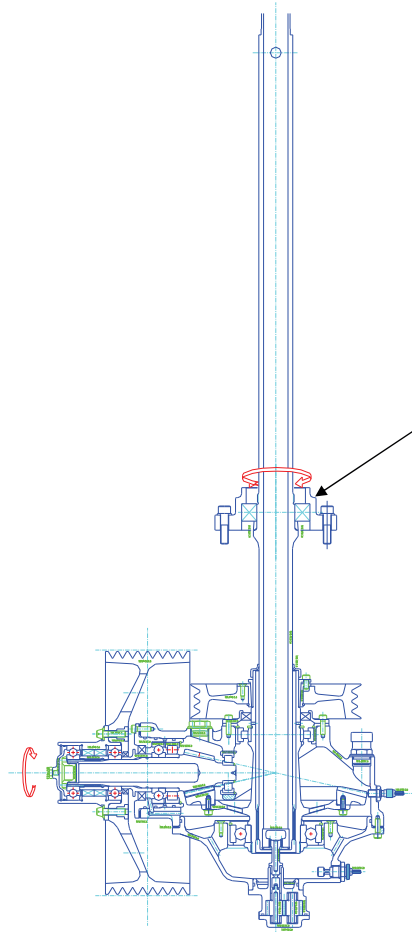


**Fig. 1 – Main rotor bearing support (P/N E1.63.057.201)**

The main rotor bearing support (P/N E1.63.057.2010) houses the upper bearing of the main rotor mast of the ES1010 helicopter.

It provides axial restraint (primarily in the upward direction but also in the downward direction for in stationary conditions or in hard landing or crash landing conditions) and lateral restraint to the reaction forces of the upper bearing.

The MR bearing support is a critical part since its structural failure will compromise any or all its functions so as to cause a catastrophic failure of the helicopter.



**Fig. 2 - MGB Assembly with MR bearing support  
(P/N E1.63.057.201)**