

## A380 HYBRID WING RIBS RETROFIT

### INTRODUCTION

ICEMM has participated in the calculation of the A380 Hybrid Wing Ribs Retrofit due to Fatigue and Damage Tolerance Requirements. Inspection Task revealed cracks emanating from the connection between Hybrid Wing Ribs to Wing Skin due to material selection and cyclic thermal loads.

### COMPLETED PROJECT

Client: CT-Ingenieros

Date: 2012

- Analytic calculations and FEM modifications of A380 Hybrid Wing Ribs due to cracks found at wing ribs feet connection to skin.

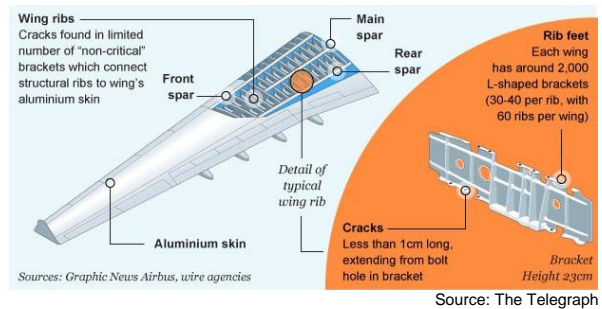


Figure 1. General sketch of the problem

### COMPLETED ACTIVITIES

- Detailed FEM modifications in Patran.
- Fatigue analyses of resized booms
- Static analyses: rib feet, splice strength, CFRP web and vertical stiffeners.
- Stability analyses: boom flange, CFRP web, vertical stiffeners
- Bolted joints static analyses: boom to rib web, new stiffeners, splice to flange and splice to rib web.
- Post-processing tools development with Python and Visual Basic.
- Documentation.

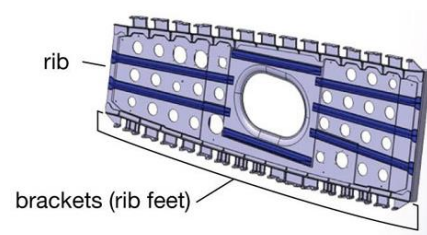


Figure 2. A380 Wing Rib

### TECHNOLOGY

Project has been analyzed with hand methods, by means of Excel sheets, based on Airbus methodologies. Finite Element Solver used has been NASTRAN and the pre/post processing has been carried out with PATRAN .

- Strength and Stability analysis at ultimate load and instability.
- Static Linear analysis.
- Linear Buckling analysis
- Excel+VBA.
- Python
- Airbus Military applications.



Source: The Guardian

Figure 3. Typical Rib