POST DOCTORAL POSITION
(18 months)
Toulouse (31)

KEYWORDS: Aluminium; Corrosion; Protection; Surface treatment; Coating; Anodisation; Microstructure; Fatigue

1. Presentation of the company and its partners

SAFRAN LANDING SYSTEMS *is a strategic subsidiary of the Safran group and the world leader in aircraft landing and braking systems. The company designs, develops, manufactures and maintains landing gear, braking systems (particularly carbon brakes), extension/retraction and steering equipment, as well as sensors and monitoring solutions.*
Safran Landing Systems employs around 7,000 people worldwide. Its international industrial footprint includes major sites in France, the United Kingdom, Canada, Asia and the United States. Its systems equip a wide range of aircraft: commercial, regional, business and military aircraft, and helicopters.
The company stands out for its complete mastery of the technologies in its field and its capacity to innovate, particularly in terms of reducing the weight of equipment, improving safety and enhancing environmental performance.

CIRIMAT *(Centre Inter-universitaire de Recherche et d'Ingénierie des Matériaux) is a Joint Research Unit (UMR CNRS INPT UT3 5085) with around 220 staff, excluding trainees, including just over 100 permanent staff, 75 PhD students and 35 post-doctoral students, ATERs and contract engineers. It was created in 1999 by the merger of 3 laboratories and has been structured into 6 teams since January 2021. It brings together Toulouse's expertise in materials science and engineering, spread over 4 geographical sites: 3 on the Toulouse-Rangueil University campus (UT-Chimie, UT-Physique, UT-Pharmacie) and one on the INPT-ENSIACET campus. The MEMO team at Cirimat (Mechanics - Microstructure - Oxidation - Corrosion) aims to maintain the highest possible level of expertise in solidification, solid-state phase transformations, plasticity and mechanical behaviour, high-temperature oxidation and protection, corrosion and stress corrosion cracking.*

2. Context and objectives

One of the methods regularly used to protect 2XXX series aluminium alloys from corrosion in the aerospace industry is anodising. However, the anodising treatment leads to a more or less significant reduction in the fatigue strength of these alloys, including the latest grades developed, which are very promising in terms of mechanical behaviour. The challenge, both scientific and industrial, would be to find a new surface treatment that could advantageously replace the anodising process, in an attempt to get as close as possible to the fatigue life of unprotected alloys. In addition, the process will have to be suitable for use on Safran Landing Systems parts with complex geometries.
The initial studies carried out in-house at Safran Landing Systems focused on processes known to the aerospace industry, such as electro-deposited paint processes, electrolytic treatments and dry process treatments (PVD). Initial results suggest that electro-deposited paints do not appear to reduce fatigue life, while offering good corrosion resistance compared with anodising. Electrolytic coatings, on the other hand, appear to offer a relative gain over anodising in terms of fatigue life, while providing sacrificial corrosion protection. As electrolytic coatings are not originally intended for aluminium alloys, optimisations need to be considered for this application. As for dry process treatments, the initial results have not been conclusive and a more detailed analysis of their viability for this application is required.

Objectives:

Safran Landing Systems' objective is to identify a new surface treatment process that will protect aluminium alloys, particularly those in the 2xxx series, from corrosion without causing a drastic drop in fatigue strength, as an alternative to the anodisation process. There are already ways of doing this, but they need to be better understood and potentially optimised. In addition, it is possible that certain solutions have not been considered, even though they could be very promising. Particular attention will have to be paid to the implementation of the process on the complex geometries of Safran Landing Systems in the search for a solution.

3. Job description and profile sought

The person recruited must hold a doctoral thesis related to the study of the relationship between the microstructure of metals and their properties, in particular their resistance to corrosion and fatigue. Expertise in surface treatments would be a considerable asset. The person recruited will also have to demonstrate strong expertise in the analysis and characterisation of surfaces and/or corrosion phenomena, and the performance of mechanical tests, in particular through the use of the following techniques:

- Optical microscopy (OM), scanning electron microscopy (SEM) and transmission microscopy (TEM);
- Energy dispersive X-ray spectroscopy (EDS);
- Electrochemical techniques: stationary measurements (corrosion potential monitoring and polarisation curves) and electrochemical impedance spectroscopy (EIS);
- Mechanical testing (tensile and fatigue).

This 18 months position will be based in the CIRIMAT laboratory and will be available from early 2026, with occasional travel throughout France.

To send us your full application (CV with references and covering letter) before September 12, 2025:

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