

MAXIMAL (MANufacturing eXcellence in Metals for Aircraft Landing gear)

Safran Landing Systems (Lead), Advanced Manufacturing Research Centre (AMRC), Manufacturing Technology Centre (MTC).

MAXIMAL, a two-year collaborative project, was set up to develop key manufacturing technologies to technology readiness level (TLR) 6 and become a worldwide centre of excellence for titanium machining. Safran Landing Systems worked in partnership with the Advanced Manufacturing Research Centre (AMRC) and the Manufacturing Technology Centre (MTC) to develop technologies to challenge the current state of the art manufacturing system for complex landing gear components.

Some success stories from the project are:

1. Machining operations on titanium parts: developing new tools for more efficient finish process, significantly reducing manufacturing time
2. Automated inspection of main landing gear: developing a camera-equipped robot, leading to a major reduction in inspection time, whilst maintaining product standards
3. Additive manufacturing component: exploring techniques for a hydraulic component, with the potential to reduce weight by over 45% for that component, and also reducing the number of part.

The outcome of this project will lead to the upskilling and training of 10-15 people and help Safran Landing Systems to boost their productivity and achieve the required order ramp rates.

Table 1: Summary of the project grant details

Project	Funding	Lead Partner	No. of Partners	Partner Composition	Duration
MAXIMAL	Total: £2.4m Grant: £1.5m	Safran Landing Systems	3	1 Large Company 2 Catapults	July 2014 - Sept 2016

Table 2: Summary of the project focus areas

ATI Value Streams	ATI Enablers	ATI Attributes	Strategic Horizon
Whole Aircraft	Aerodynamics	Safety	Secure x
Structures	Manufacturing	Cost	Exploit x
Propulsion	Materials	Environment	Position x
Systems	Infrastructure	Fuel Burn	x
	Process and Tools	Operational Needs	
		Passenger Experience	

Technology Achievements:

Some of the successful stories from this project are:

1. Machining operations on titanium parts

The objective for this Work Package was to develop new tools and a machining strategy for a more efficient finish machining process. The project will significantly reduce the manufacturing time. This technology is scheduled to be implemented in the Shop Floor by the second quarter of 2016, with a UK cutting tool supplier identified and down-selected to provide the equipment.

2. Automated inspection of main landing gear:

The objective was to develop an automated inspection system to make sure the landing gear has been manufactured and assembled to the standard. Currently the process involves around 350 inspection check points and takes a significant amount of time to complete. The project has developed a robot equipped with a camera that will lead to a major reduction in inspection time.



3. Additive manufacturing component:

This work package aims at exploring additive layer manufacturing techniques for a hydraulic landing gear component. This technology has the potential to reduce the weight by over 45% for that particular component. In addition to that, it reduces the number of parts and the assembly process, as several components can be manufactured in one piece rather being separately assembled.

Economic Impact:

“The government support for this project has allowed Safran Landing Systems to investigate a broader scope of technologies in a shorter period of time”, stated Jean-Philippe Villain-Chastre, program manager at Safran Landing Systems.

“Without working closely with the catapult network, and its supplier members, we wouldn’t have been able to achieve such great results in this project”, he commented.

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