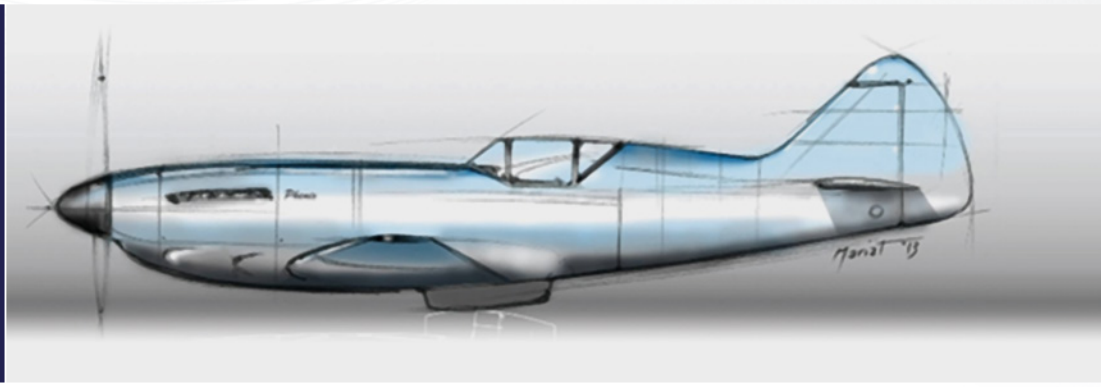
3D Printing Simulation Brings History to Life

Replic Air
TOULOUSE



Story

In the midst of a technological revolution, there tends to be an "out with the old, in with the new" mentality, whether it be autonomous cars, robots or drones. Everything new is exciting, but there is something to be said for recognizing beauty in history. The Réplic'Air Association not only found an appreciation for it, they made it their mission. Created in 2011 by a group of Aeronautic enthusiasts from various companies like Airbus and Safran, the Réplic'Air association seeks to revive the spirit of aviation pioneers by recreating and rebuilding historic planes. Currently, they are bringing the 1940's concept Dewoitine 551 to life – with a plan to fly it for the first time ever.

A key component to the success of this project is partner collaboration. Réplic'Air enlisted the support of Expleo (formerly Assystem Technologies) and PRISMADD to produce and deliver unique 3D printed metal parts to equip the aircraft – specifically for the engine's cooling system, an assembly of five manifold blocks of pipes and reservoirs. Expleo is an engineering group who assists its clients in their digital transformation whereas PRISMADD is dedicated to the realization of its client's parts – simple to complex, often through 3D printing.

Initially, the supporting partners redesigned and manufactured the 3D printed replicas for the engine's cooling system without the benefit of simulation. This led to unanticipated distortion, porosity and gaps between layers (particularly due to thin walls) – not to mention hours of time lost and materials wasted. An estimated 20K€ in materials and a one month delay resulted from every two defective prototypes produced. To meet their deadline for a fully functioning plane, they realized that simulation would help them identify the best design for their parts in the shortest timeframe possible. For this, Expleo turned to the simulation software they apply to their own 3D printing needs, ESI Additive Manufacturing simulation software.

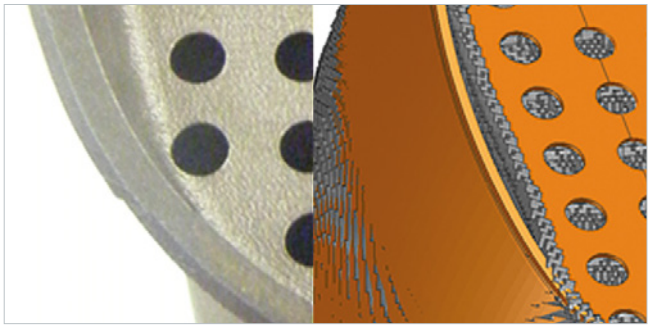
With confidence of highly accurate simulation results, established on more than 10 years of Additive Manufacturing project collaboration experience using ESI Services, the project team quickly identified the source of problems and modified by:

- increasing body wall thickness in specific areas to **limit distortion and porosity** of thin walls in the 3D printing process
- repositioning an anti-sloshing grid to **avoid the edge distortion** and enable a seamless, "watertight" assembly
- adjusting the surrounding support strategy to **significantly reduce the distortion-induced porosity**

Through effective simulation of the Additive Manufacturing process, the team was able to evaluate multiple iterations and arrive at an improved design. ESI Additive Manufacturing simulation enabled Expleo and PRISMADD to develop and produce all five components correctly, on the first try, in the shortest timeframe, and for the least amount of money – which certainly pleased Réplic'Air.

"Our collaboration with the ESI team has allowed us to address the manufacturing problems of the system. Thanks to the ESI Additive Manufacturing simulation solution, we were able to make the right decisions to launch a part of the engine cooling system in the shortest possible timeframe."

Wilfried DUFAUD
Cofounder Aura-Aero and Replic'Air Member
Innovation Leader Dedicated to AM Applications and Scientific Subjects



Simulation in ESI Additive Manufacturing shows distortion of the anti-sloshing grid due to incorrect geometry design and build orientation

for more information
www.replicair.fr
www.assystem.com
www.prismadd.com