# CASE STUDY: GHandI - Pioneering UK Aerospace R&D to Revolutionize High Fidelity Geometry and Mesh Generation

GHandI Project Partners

- Airbus Operations Ltd
- Aircraft Research Association Ltd
- Altran UK Ltd
- BAE Systems plc
- International TechneGroup Ltd
- MBDA UK Ltd
- Rolls-Royce plc

CADfix Benefits to GHandI

- Advances in the unique CADfix medial object technology
- Automatic partitioning of the air close to the aircraft skin into connected regions for structured meshing
- Creation of a framework for integrating best in class meshing technologies to orchestrate the creation of a high quality hybrid CFD mesh
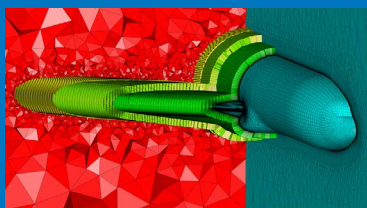
The ATI funded collaborative R&D project involved key organizations in the UK aerodynamics community, manufacturers, aerodynamic modeling and technology providers, and members of academia. GHandI is one of several UK government initiatives established to tackle the fundamental building blocks for next generation simulation tools in the aircraft industry.

ITI's CADfix team worked with GHandI program partners to develop new capabilities for extracting information from geometry from various sources, including CAD, for use elsewhere in the aerodynamic simulation process.

Overview

The Geometry Handling and Integration (GHandI) project is one of seven major collaborative research and development projects intended to enhance capabilities to support innovation in aerospace technology. GHandI was specifically aimed at improving the methods and processes for generating and manipulating high fidelity aircraft and turbo machinery component geometries and their associated computational meshes.

This initiative explored alternatives for CAD processing for a wide range of geometric components, specifically to substantially reduce the time required to generate airframe geometry and meshes for high fidelity aerodynamic analysis.

Challenges

A key challenge in the aerospace industry is creating geometry for complex high quality mesh. This is often a costly, time-consuming and manual process. The GHandI project was established to address a range of complex geometry handling and integration challenges that are key to the UK's future competitiveness in aerodynamic design.

Solution

Because the shape of an aircraft body is one of the most fundamental properties affecting the aerodynamic integrity, demands for improved performance and optimization of airframe shape via advanced simulation and analysis continue to increase. The need to explore and optimize the performance of novel airframe shapes rapidly and with robust, efficient processes is increasingly important.

Traditionally creating the geometry for complex high quality Computational Fluid Dynamics (CFD) meshing is a costly, time-consuming and semi-manual process, often suffering from reliability and repeatability issues. The new CADfix capability enables the automatic generation of a high quality CFD mesh for the simulation of the airflow around the aircraft.

Result

The GHandI project demonstrated that CADfix technology effectively handles complex geometries and generates high-quality CFD meshes for aerospace applications, validating its use for next-generation simulation tools. This technology benefits internal airflow simulations in aero-engines, hypersonic missiles, and various military aircraft.
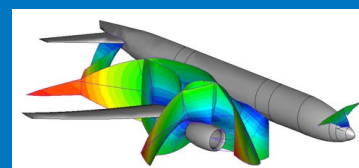
CADfix Medial Object of the air volume

CADfix Medial Object technology applied advanced academic theory to practical geometries, providing precise data about the air volume around aircraft for accurate simulation and analysis.

The technology enables engineers to partition air around the aircraft into connected blocks that match its shape, crucial for generating high-quality meshes and accurately simulating airflow.
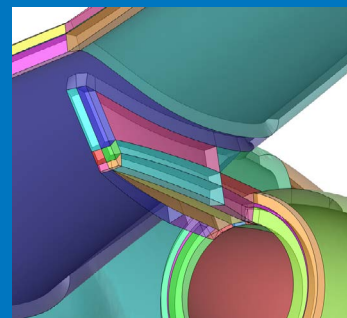
Automatically generated partitions

CADfix supports automatic generation of high-quality meshes for CFD simulations, integrating best-in-class meshing technologies to optimize mesh quality and simulation accuracy.