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AIRCRAFT PARAMETRIC MODEL IN CONCEPTUAL DESIGN

Executive Summary

Within the frame of Vivace, the **Prelude** use case intends to prepare an enhanced aircraft conceptual design environment. One objective is to set up a flexible and homogeneous description of the aircraft for all physics calculation disciplines, providing the capability to merge numeric and geometric design within a single aircraft model.

Today, each discipline module (aerodynamics, mass & structure, performances, flight handling qualities, engine, cabin, etc) manipulates its own aircraft model particularly dedicated to the needs of that discipline. Therefore data exchange between the modules is limited, due to the difficulty of sharing the different descriptions of the aircraft and identifying common parameters between the aircraft models.

To address these difficulties, we propose to take the aircraft description out of the discipline modules and provide a single aircraft model as a common resource for all the modules. The consequence of this re-organisation is that the overall model shall hold a multi-disciplinary description of the aircraft and its environment, driven by their physical properties.

To achieve this goal, the aircraft modelling activities shall focus both on the representation of the aircraft and the processing of the aircraft model. This document covers the former activity.

The representation of the aircraft must be seen as an evolution of the existing design environment running in an industrial context. Therefore, the legacy of knowledge, tools and studies appear as new constraints taking into account the "as-is" situation. Thus the new aircraft model shall provide all the discipline modules with the relevant information in order to ensure that the industrial development can continue. A so-called unified data model is then created, with the aim to gather all the existing numerical aircraft descriptions coming from various discipline modules into one model.

The implementation of the unified data model is done in two steps:

- the first step is to create a full hierarchical description of the aircraft to cover all the needs of the discipline modules
- the second step is to map the aircraft model with the input and output parameters of all the modules.

This document presents the successful results of this implementation having the following achievements: trans-national harmonisation and multi-disciplinary integration of the various aircraft descriptions into a unified data model operating in an industrial environment.