# Airbus industrial applications and challenges involving Large Scale Nonlinear Models and Data Management
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## ABSTRACT

In Airbus Commercial Aircraft Division, the Linear and Non-Linear FE Solutions team develops and applies numerical solutions, based on advanced structure mechanics methods and non-linear finite element analysis technologies, to structural disciplines such as static strength, fatigue and damage tolerance. The team delivers nonlinear finite element analysis services to all Airbus programs and in all phases of the aircraft lifecycle (from concept, to development, to in-service) and at all aircraft structure scales (from coupon to full-scale).

The presentation will first summarize the main industrial challenges overcome with numerical simulation the last 5 years to support activities performed in the context of Research, Concept, Design, Manufacturing, Testing and In-Service. Some examples will show that it is today standard practice to build very detailed models up to aircraft component scale. All structural parts can be meshed at this scale with a level of detail of about 10 millimetres and all fasteners and contacts idealized, leading to non-linear finite element problems of several tens of millions of degrees of freedom to be solved.

In the second part of the presentation, the new challenges arisen with the increasing size of such models will be illustrated, like the requirements to manage simulation data (model, scenarios, results) in configuration with the design and loads, but also the need to get quick access to some data that are necessary to perform certain types of analysis (design, materials and processes, physical test, …).

Fostered by the digital transformation of the enterprise, new strategies and ways of working are currently experienced in order to accelerate development cycles and to ensure proper production ramp-up. To achieve this goal, structural models such as those described above must be better interconnected with models and data of other disciplines (aerodynamic, mass, systems, manufacturing) to allow higher fidelity simulations at earlier stage whilst ensuring data continuity between disciplines. Some examples will be shown to illustrate these different possible new ways of managing data and working between engineering domains in order to support the exchange between academic and industrial participants of this Invited Session.