Next Generation Combat Aircraft Technologies - NGCAT

DiComEx

Digital Composite Expertise

Duration of the project: 1/05/2025 – 1/02/2028

Key words: Composite SQRTM Process, Digital Expertise, Data Analytics, Defect Analysis, Multi-Physics Simulation, Digital Twin

Budget: 1 199 777€

of which RHID contribution:

1 175 000€

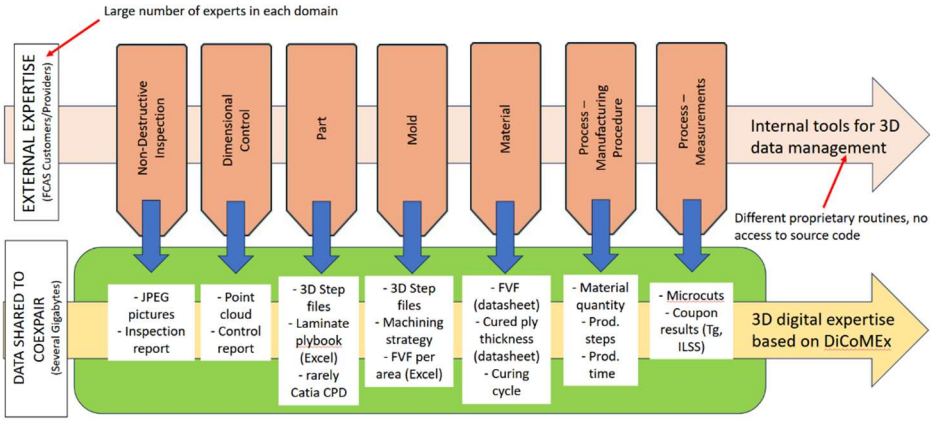
PROJECT DESCRIPTION

To maintain Belgium's military and technological edge in the face of evolving security challenges, the Ministry of Defence has launched the Defence-related Research Action (DEFRA), aiming to increase its Research & Technology contribution to 2% of the total defence effort by 2030. Within this strategic framework, the DiComEx project - Digital Composite Expertise - was selected under the thematic call for Next Generation Combat Air Technologies (NGCAT), specifically addressing Theme 4: Transversal Disruptive Enabling Technologies. DiComEx brings together a balanced consortium of industrial leaders and academic institutions: Coexpair (project coordinator), Sonaca, Pégard Productics and the University of Liège.

The project builds upon Belgium's unique leadership in the SQRTM (Same Qualified Resin Transfer Molding) process, a cutting-edge composite manufacturing technique critical for next-generation combat aircraft structures and engine components.

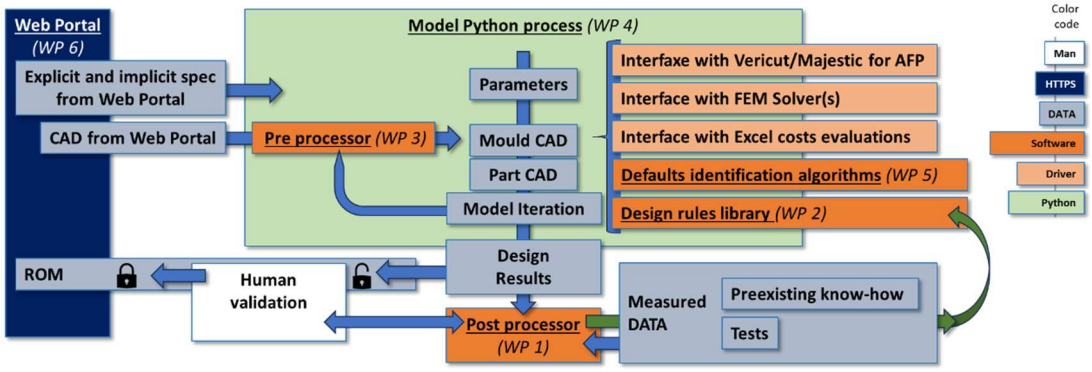
DiComEx aims to develop a Belgian-made digital analytics system to consolidate and enhance national expertise in composite manufacturing. The project seeks to reduce development time and cost of complex composite parts, minimize defect rates, improve production reliability and strengthen Belgium's strategic autonomy in defence manufacturing. It also supports long-term innovation in composite design, simulation and defect analysis. The level of expertise required to produce composite parts is significantly higher than for metal parts, as the material and the part are created simultaneously. SQRTM enables the replacement of tens of elementary parts with a single monolithic component, eliminating assembly steps and reducing costs while enhancing performance. However, this benefit comes with a risk: a single defect can lead to the rejection of a high-value part. To mitigate this, a higher level of expertise and robust IT tools are essential.

Currently, developing a complex SQRTM part takes two to three years, even for top experts. The process relies on separated pieces of information and individual workflows. DiComEx addresses this challenge by integrating all data analytics in a single tool to ease understanding and decision-making. Existing commercial systems are limited to elementary parts, prompting Coexpair to develop its own software toolkit to manage datasets and expertise flows. The motivation behind DiComEx is the growing interest from major aerospace players such as Airbus-CTC, Sonaca, and Safran Composites in Coexpair's digital solutions to scale up composite expertise.



Data digitalization based on DiComEx

DiComEx will deliver a functional proof of concept (PoC) for a digital expertise system, a comprehensive system specification and a structured knowledge base of datasets, workflows and analysis tools. It will also produce workshops, technical reports and scientific publications to disseminate findings. The project methodology includes mapping all relevant data and workflows, developing a digital toolkit, conducting multi-physics simulations and performing root cause analyses of part defects. End-users like Sonaca will be involved to validate the system's relevance and usability.



DiComEx SaaS workflow diagram

The project will directly enhance the competitiveness and autonomy of the Belgian Defence Industry by enabling faster, more reliable development of high-performance composite parts, reducing the risk of costly rejections and supporting the development of advanced materials, adaptive manufacturing, digital twins and energy-efficient processes. DiComEx will also ensure secure and structured knowledge exchange between stakeholders, which is essential for scientific progress and national security.

In the short term, the DiComEx toolkit will be deployed within Coexpair to improve internal development processes. Medium-term perspectives include industrial adoption by partners like Sonaca and Pégard Productis, integration into national and European defence programs, commercialization of the digital toolkit for broader aerospace applications and training programs to upskill Belgian engineers and technicians in digital composite expertise. By consolidating Belgium's leadership in SQRTM and embedding it in a digital framework, DiComEx will help prevent cost overruns in future defence programs, such as those experienced in the F-35 development. In summary, DiComEx is a cornerstone project for Belgium's defence innovation strategy, ensuring that data-driven composite manufacturing becomes a national strength for decades to come.

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LINK(S)

To be developed shortly.