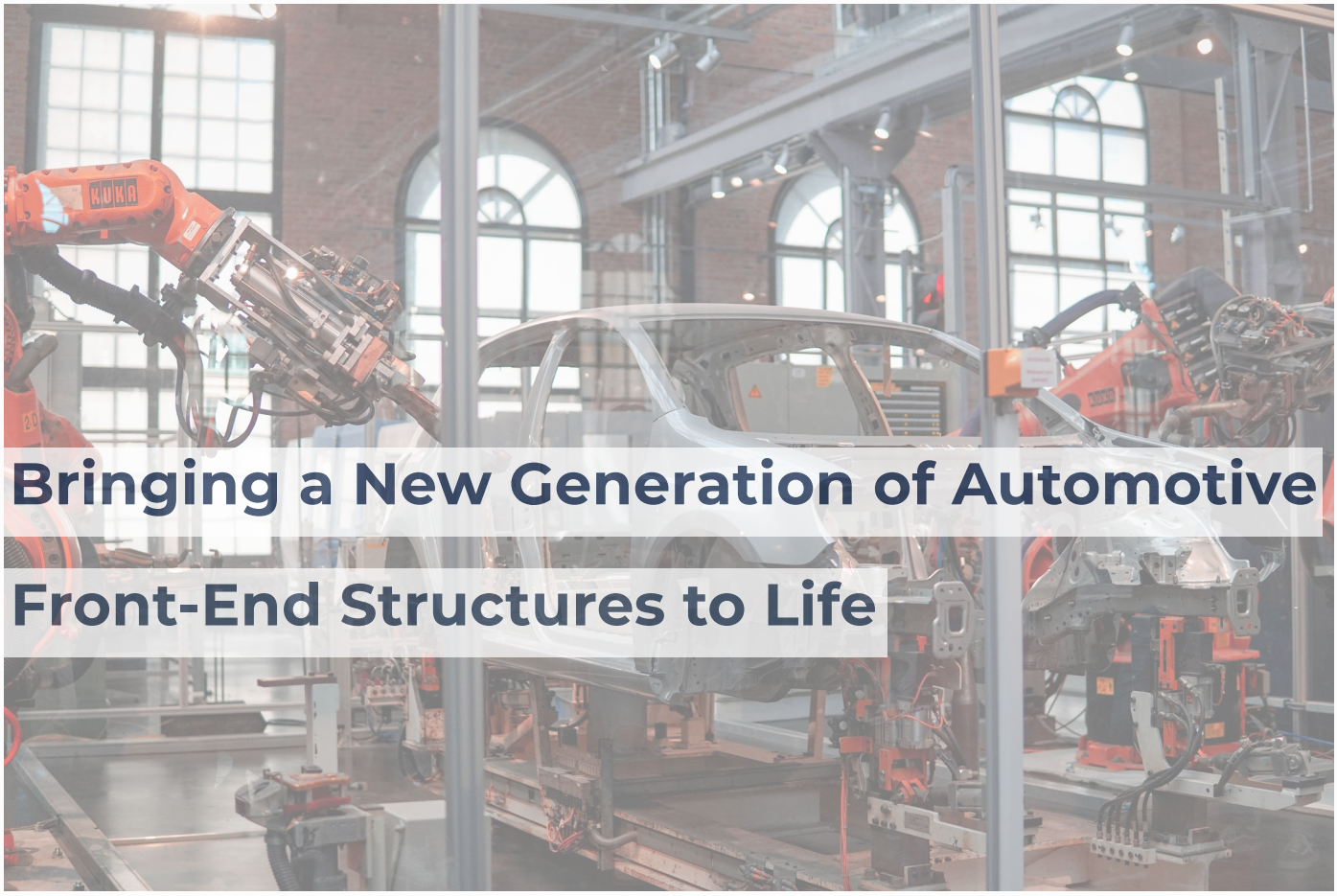
SALIENT

Safer, Lighter, Circular, Smarter



Bringing a New Generation of Automotive Front-End Structures to Life

Funded by the European Union

UK Research and Innovation

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Shaping the Future of the Automotive Industry

Dear Reader,

We want to thank you for taking the time to inform yourself about the SALIENT project. SALIENT is an EU-funded Research & Innovation Action, which kicked off in September 2022 and runs for a total of 3 years, ending in August 2025.

SALIENT has taken form at a steady pace towards material development and we created an innovative CFRP (Carbon Fiber Reinforced Plastic) crash box featuring a unique lay-up and crash mechanism for the new Front-End Structure (FES).

In the following months, the Consortium partners are looking forward to diving deeper into the evaluation and validation of the FES design and materials development, taking SALIENT one step closer to the main goal, the creation of a new FES design for vehicles, which is more circular, lightweight, safe and smart than available components on the market today.

SALIENT consortium partners are working closely together from seven different countries to shape the future of the automotive sector!

While our project continues and we implement constant developments, we invite you to not only follow the project progress closely but also to subscribe to our quarterly newsletter “SALIENT In Action” and be the first to receive updates on our work and hear of upcoming events and milestones.

We have created a SALIENT Results Library on our website, providing information about our activities and uploading all deliverables and communication materials. The reader can access for free any open-to-the-public SALIENT material.

SALIENT plays a vital role in the automotive industry’s mission to expedite the adoption of lightweight materials.

Your SALIENT Consortium

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Project Introduction

SALIENT is an EU-funded Research & Innovation Action (RIA) focusing on future-proof light vehicle designs which have an increased compatibility with mixed traffic and are better prepared for crashes and collisions.

SALIENT makes roads safer and reduces serious injuries and fatalities. Throughout the project, novel structural and vehicle concepts will be presented for safer, lighter, circular, and smarter ways which can be adapted to accommodate crash scenarios.

A diverse Consortium of 12 partners from all across Europe represents the full automotive value chain, ranging from research institutes, automotive manufacturers, test houses, certification bodies and small to medium-sized enterprises (SMEs) to original equipment manufacturers (OEM).

The SALIENT project runs from September 2022 to August 2025 for a total duration of 36 months.

The quarterly newsletter “SALIENT In Action” provides updates & information about the project’s events & milestones.

The SALIENT Results Library is is a section on our website that provides materials relating to SALIENT project activities

Novel Concepts for Safer, Lighter, Circular and Smarter Vehicle Design

The project seeks to conceptualise, design and validate with both simulations and crash testing a new kind of vehicle FES - the frontal part of any car.

Our Vision

SALIENT focuses on developing several vehicle designs that will increase the safety of vehicles.

Our Mission

The creation of a new car part that will be lightweight, safer, circular and also smart, by adapting itself to predicted crash scenarios.

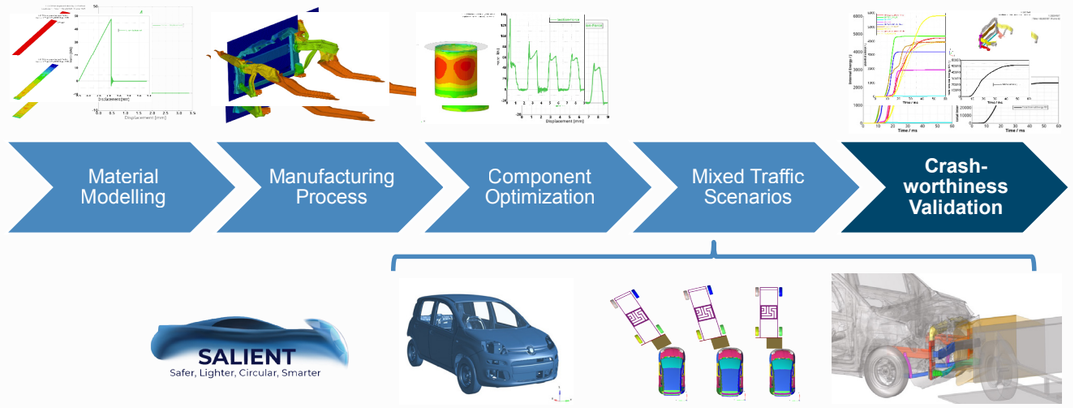
Our Goals

The project aims for an ambitious goal: to change the future of FES design & vehicle safety in the automotive sector.

Our Values

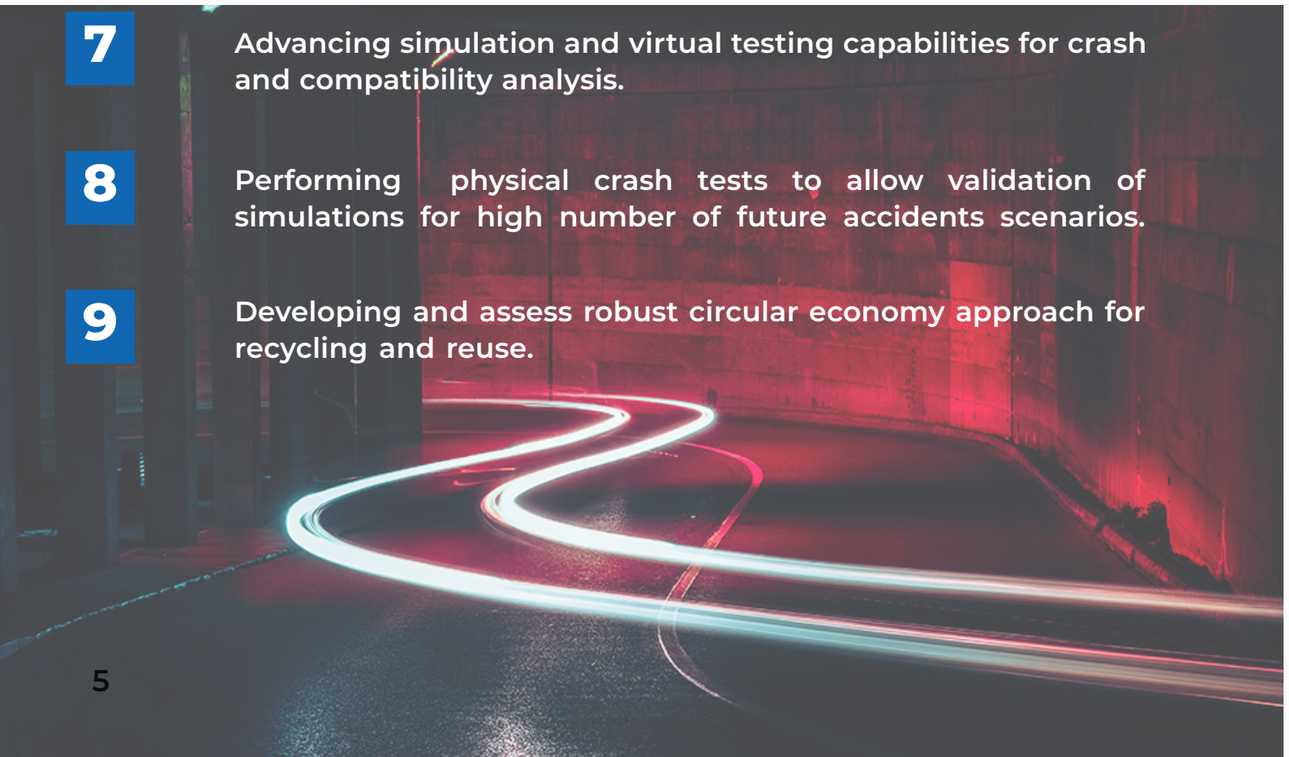
To ensure maximum impact for the automotive industry in particular and society as a whole.

Salient Holistic Virtual Development Process



Project Objectives

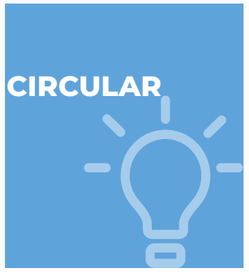
1. Full understanding of technical requirements and future accident scenarios involving light vehicles.
2. Developing of innovative and circular conceptual designs for vehicle FES.
3. Developing and validation of highly innovative & sustainable materials for new scalable structure concepts.
4. Optimising of high-throughput low-cost manufacturing technologies and processes.
5. Developing physical demonstrators of structural sub-system FES concept.
6. Developing ADAS sensing system algorithm for critical incident detection with optimised integration to BCFES.
7. Advancing simulation and virtual testing capabilities for crash and compatibility analysis.
8. Performing physical crash tests to allow validation of simulations for high number of future accidents scenarios.
9. Developing and assess robust circular economy approach for recycling and reuse.



SALIENT is focusing on making roads safer and reducing serious injuries and fatalities

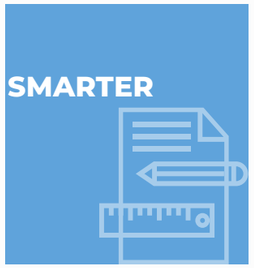
Throughout the project, novel structural and vehicle concepts will be presented for safer, lighter, circular, and smarter ways which can be adapted to accommodate different crash scenarios.

New vehicle designs, innovative use of energy-absorbing materials.



Application of ecodesign for economic & environmental sustainability.

Use of advanced light materials, adaptable to different crash configurations.

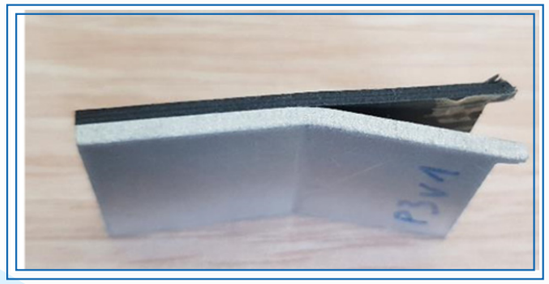


Optimised design of crash box to minimise impact in vehicle crashes.

FES Design

We are developing an innovative CFRP crash box featuring a unique lay-up and crash mechanism for the new FES. This design enables significantly greater specific energy absorption compared to metal crash boxes, resulting in a low mass while providing high energy absorption capabilities.

Furthermore, it promises exceptional durability, making it well-suited for circular economy approaches, as it can remain intact for extended periods.



Hybrid layer structure of aluminum & CFPA6 ((Source: ©Fraunhofer IWU

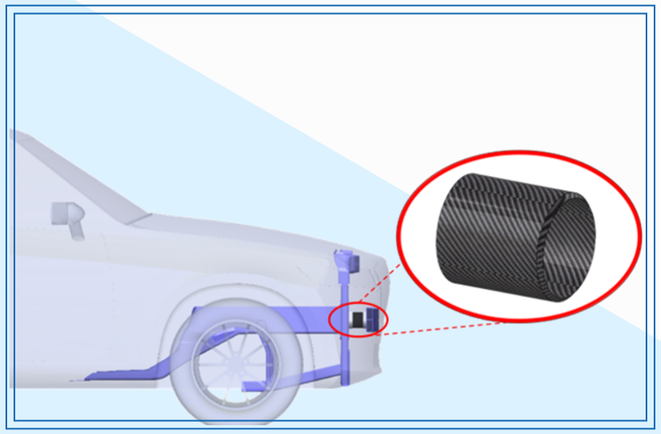
The crash tube features a bevel-trigger on one end, which allows for the initiation of a controlled crushing process upon impact.

The main manufacturing process to be used is Laser Assisted Tape Winding (LATW) in order to achieve the specific layer structure and fibre orientation.

SALIENT has also developed the initial ideas for the adhesive and mechanical joining of the CFPA6-Crashbox with the FES surroundings.

Additional components, such as the bumper, will be examined in the future for potential local reinforcement possibilities using the same process.

For this purpose, topology optimisation is required, which allows for the identification of load paths, and consequently strengthening the structure at the right location.



CFPA6 crash box in a novel lightweight FES (Source: ©Fraunhofer IWU)

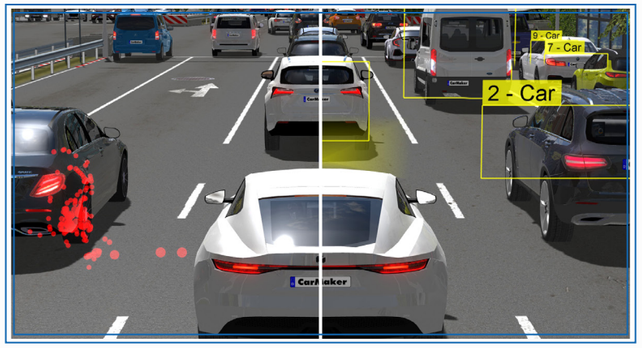
To achieve this, the adhesion strength between aluminum and CFPA6 structures was investigated and mechanically, as well as chemically optimized to enable such local reinforcements.

95% improvement in circularity & recyclability by weight of the demonstrator

+ € 2-3 cost/kg prolonged saved vehicle lifecycle

Simulation Environment

The development and testing of driver assistance functions can be slowed down by the high test efforts needed for modifying different vehicle components of the vehicle and testing of driver assistance functions.



ADAS sensor simulation in mixed traffic environment ((Source: ©IPG Automotive

CarMaker provides sensor models for all relevant technologies from ideal to phenomenological to physical sensor models.

The raw signal interfaces provide physically correct raw sensor data which can be further processed to detect and track objects.

By using virtual test driving simulation a driver can estimate how advanced driver assistance systems (ADAS) will react in specific test scenarios, and which evaluation criteria will be met by the functions early in the development process.

The software is a comprehensive ADAS simulation environment from a single source, including vehicle traffic participants and environment simulation and helps in enabling the direct implementation of relevant interactions with other systems, the driver and vehicle dynamics in the virtual prototype.

Materials Simulations

Future vehicles will need to become progressively lighter to increase the transportation range and reduce energy consumption.

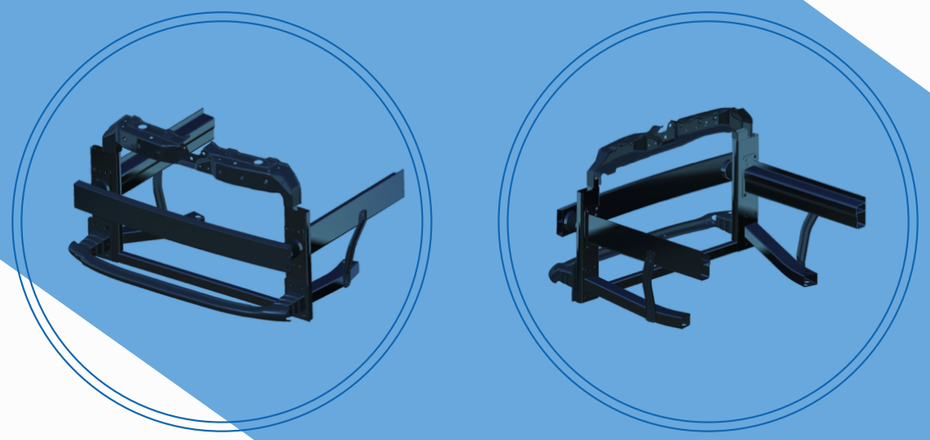
However, this means potentially decreased safety when colliding or crashing.

Additionally, developing new structural ideas for vehicles must prioritise the sustainable use of materials and circularity at the end of their life.

Notably, this is more challenging when a mixture of lightweight materials is used. This requires a new way of conceiving structures and their components to ensure that all requirements (Lightweight, Safety and Circularity) are met at the same time.

The SALIENT project aims to re-think the FES of vehicles to be lighter and safer. The consortium adopted an eco-design approach coupled with innovative active systems able to adapt themselves to react to an imminent crash.

To evaluate the entire life cycle of the designs, from raw material extraction and manufacturing to use and end-of-life, a comparative life cycle analysis will be conducted, including the assessment of the environmental and economic impacts of the design.



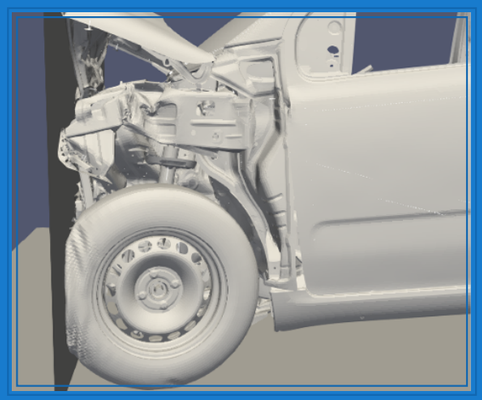
Front End Structure (FES) model build (Source: ©CTAG)

The front end of the designed vehicle will be based on aluminium and thermoplastic reinforced with carbon fibre (TP-CRFP) to achieve the ambitious goal of 42% weight reduction at the system level.

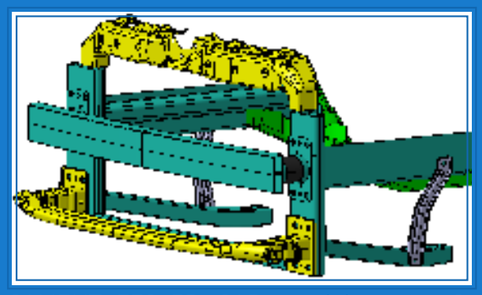
The first draft of the new design baseline was already overreaching this goal, with approximately a 50% reduction, thanks to subsequent crash simulation loops that helped refine the concept.

In addition to the optimised design of the vehicle's FES, three adaptive systems will be considered in the final design of the FES to enhance vehicle crashworthiness, e.g., inflatable components, smart components using shape memory alloys, and load path tapes.

The final optimised design will be released in April 2024 offering an innovative solution for lighter and safer vehicles.



SALIENT FES simulated front impact crash test (Source: ©Virtual Vehicle Research)



SALIENT FES 3D CAD model version 1 (Source: ©CTAG)

Improved forming technology, optimised TP-CFRPs & hybrid materials production processes

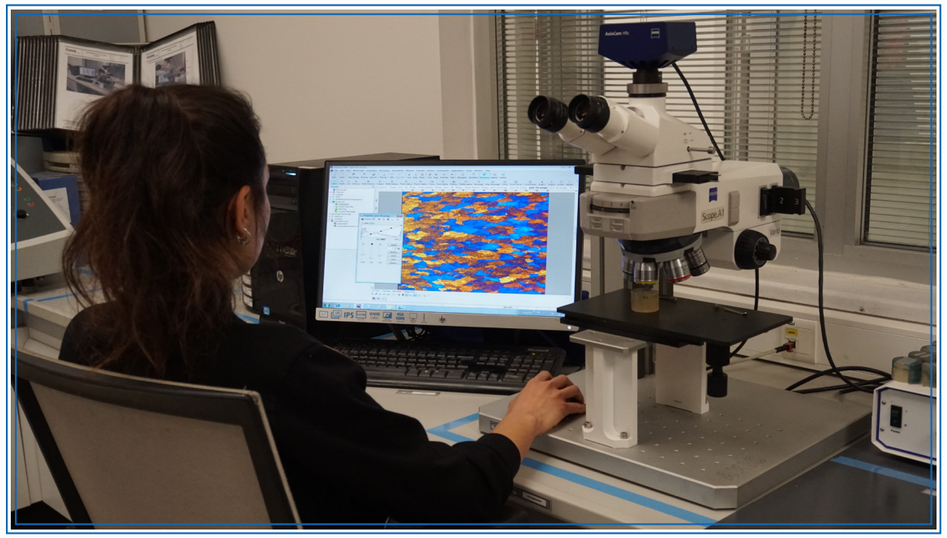
25% saving in energy

20% reduction in production time

10% saving in production cost

5% reduction in waste

Materials Development



Within this groundbreaking project, the Consortium steers the development of a lightweight aluminium alloy, specifically the 6063 variant.

The 6063 aluminium alloy, has been chosen for its exceptional properties and manufacturing excellence; lightweight yet robust, having high extrusion feasibility, corrosion-resistant, and 100% recyclable.

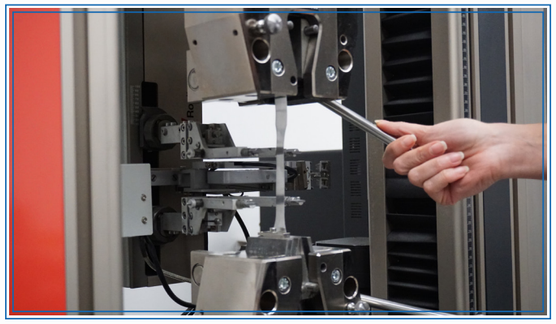
Overall, the allow provides a lightweight solution without compromising strength, ensuring durability and longevity. It stands as the cornerstone for the future of crash components.

Aluminum alloy material testing (Source: ©ASAS)

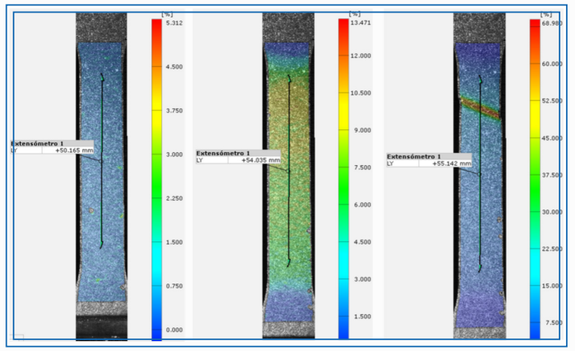
Materials Testing

SALIENT's impact extends to the FES of vehicles, where the 6063 aluminium alloy will play a pivotal role.

Producing critical components like the crash-box, bumper, and various extrudable parts, it is expected that this material meets the requirements of strength, durability, and weight efficiency, reshaping the future of automotive engineering.



Tensile strength testing of hybrid materials (Source: ©ASAS)



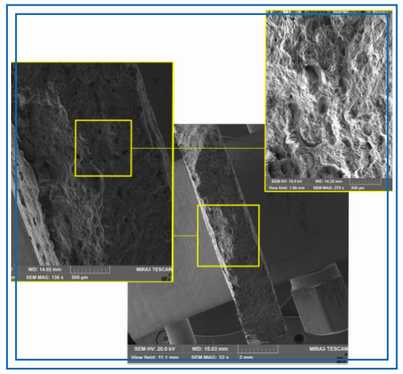
Strain fields measured during QS tensile test. Left: early stage; Centre: intermediate stage; Right: stage right before failure (Source: ©Cidaut)

Material testing bridges the gap between the physical and digital domains. For the novel 6063 Al and TP-CFRP materials developed, comprehensive testing campaigns have been designed and carried out, aiming to generate knowledge about their macro- and microscopic behaviour and failure mechanisms.

The data is then employed to create the material cards that are used in the simulation models.

Prototyping is a critical phase in material development, and SALIENT employs cutting-edge prototyping techniques to ensure the seamless and efficient transition from concept to reality.

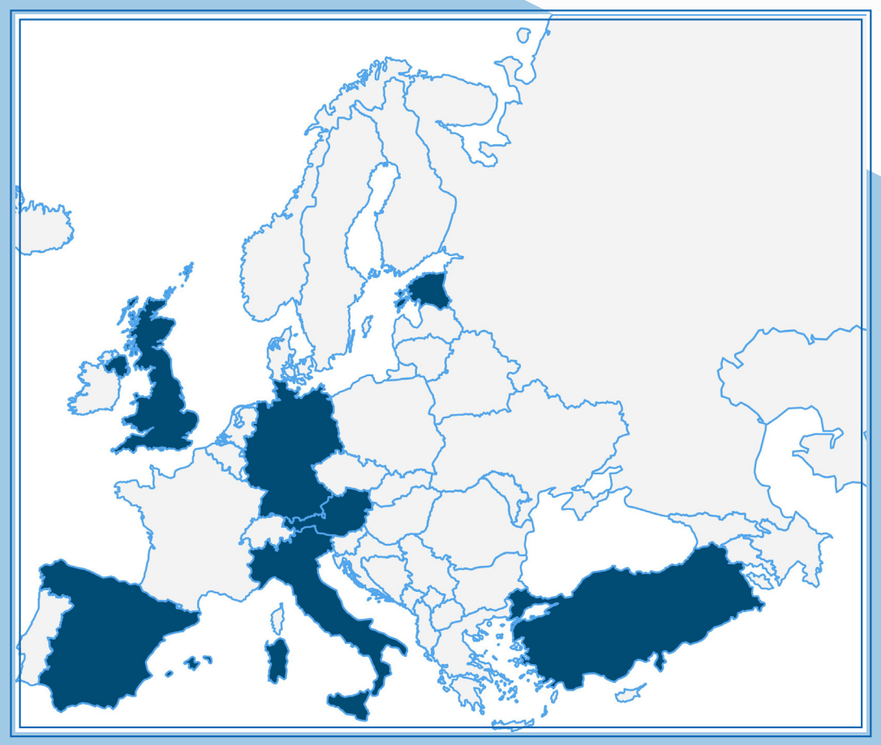
SALIENT's focus on innovation extends to the prototyping phase, where it pushes the boundaries of what's possible, laying the groundwork for a new era in the automotive sector.



Microscopic testing of TP-CFRP material (Source: ©University of Northumbria at Newcastle)

Get to know us!

Meet the SALIENT Consortium



SALIENT Consists of a Diverse Consortium of 12 Partners

SALIENT consists of a wide range of different partners from 7 different countries: Austria (1 partner), Estonia (1 partner) Spain (4 partners), Germany (2 partners), Italy (1 partner), Turkey (1 partner)and the United Kingdom (2 partners).

SALIENT Website

CTAG

Northumbria University NEWCASTLE

BAX & COMPANY
VALUE FROM SCIENCE AND TECHNOLOGY

Cidaut

CRF CENTRO RICERCHE FIAT

ASAŞ

etelätär innovation

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IPG AUTOMOTIVE

virtual vehicle

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