SEGULA TECHNOLOGIES

AEROSPACE, A SECTOR OF PASSION

DISCOVER

OUR MANY AREAS OF EXPERTISE

OUR SOLUTIONS

FOR DECARBONISING THE SECTOR

AEROSPACE: AN INDUSTRY DRIVEN BY PASSION

We are proud to share our passion for aerospace with you and introduce you to our world, where innovation and performance combine to shape the future of this industry.

SEGULA Technologies is a global engineering group with over 13,000 employees working for all the major industrial sectors.

In the aerospace sector, SEGULA offers a wide range of services covering the entire lifecycle, from design to maintenance, including engineering, tooling, production and production services. These varied skills enable us to offer global solutions to meet the complex challenges faced by our clients.

Our strength? Our ability to quickly provide our clients with highly qualified resources to support their ramp-up, anywhere in the world, thanks to our 1,400 employees.

This magazine is an invitation to discover the breadth of our expertise. Convinced that technological innovation and digitisation are the key drivers for meeting future challenges and reducing the environmental footprint of the aerospace industry, we also look at our references in Industry 4.0.

“The significant increase in production rates currently being experienced by the major players in the aerospace sector is set to accelerate over the coming years. We need to adapt by increasing our productivity and recruiting new staff. 2023, 2024 and 2025 are going to be very good years for the sector. This is the time for us to be there for our clients, ensuring that we continue to provide our expertise and efficiency.

Richard Demoucelle, *Vice-President Global Aerospace*

ENGINEERING

SEGULA Technologies offers its clients a comprehensive range of engineering and services throughout the world, working on all types of products (civil and military aircraft, helicopters and satellites).

The group is involved in a wide range of aerospace engineering projects, from the design of new systems, to the modernisation and improvement of existing ones, as well as their logistics support.

OUR ENGINEERING SOLUTIONS

By covering the entire product development cycle, SEGULA is able to offer the following services:

PRODUCT ENGINEERING

We provide our clients with expertise in the design and calculation of metallic and composite airframes, on-board systems engineering (mechanical, hydraulics, fuel, electrical and electronic) and cabin fitting.

We have strong expertise in analysis and calculation (static, fatigue, damage tolerance, dynamic and multi-physics) with over 200 calculation engineers.

PRODUCTION ENGINEERING

We have process engineers who define the industrialisation dossiers for simple or complex parts (metal or composite). Our quality engineers validate the parts, operations and processes used.

We offer a range of tooling services, including design, production tooling, assembly and commissioning. Our expert teams around the world have in-house production capabilities, and we rely on a network of partners. We can also design and manufacture test benches for aeronautical systems.

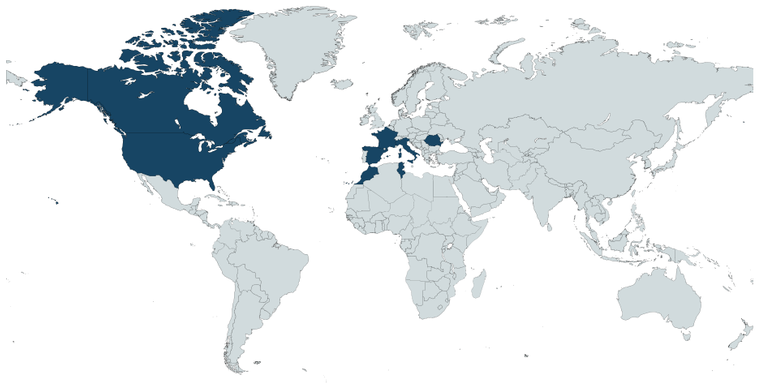
Aware of the global supply chain challenges (parts and raw materials) in aerospace industry, SEGULA is able to set up the various stages of the stream and support suppliers to help them in their production optimisation and quality management.

MAINTENANCE ENGINEERING

SEGULA provides its expertise in product improvement and operational maintenance studies, which are used to define the type of maintenance to be carried out. Our ILS (Integrated Logistics Support) engineers then define the maintenance plan and cost improvements.

INNOVATION

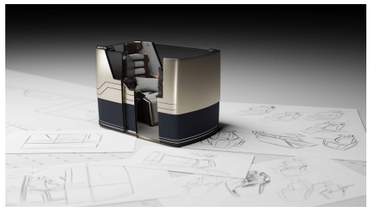
SEGULA has a dedicated R&D and start-up support structure. This structure enables us to support our clients in their innovation projects and their financing. In the context of preserving the environment and decarbonising the aeronautical industry, SEGULA offers its expertise in a wide range of areas, including structural lightening, the use of new green materials, additive manufacturing, life cycle analysis, fuel cell design and new technologies.



France, Spain, Morocco, Tunisia, Italy, Romania, Canada, United States

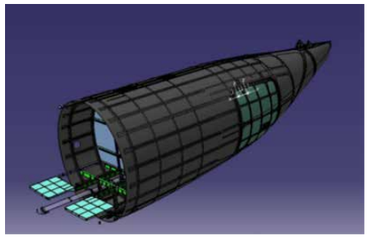
OUR TECHNICAL SKILLS

- Mechanical/Systems/ Electrical Engineer
- 3D Designer
- Computational Engineer
- ILS Engineer
- Manufacturing Engineering
- Quality Inspector
- Tooling Project Manager
- Supply Chain Quality Manager
- Project Manager
- Supplier Performance Manager



DESIGN

Rear fuselage for an American manufacturers Business Jet



Latécoère, as airframe major partner, was responsible for designing the rear fuselage of an 11 seat business jet.

SEGULA is a key partner in this project, providing engineering services for the calculations and design of the rear fuselage, which is specifically designed to accommodate baggage.

Our teams had to carry out the pre-dimensioning calculations and justification files, finalize the 3D studies and produce the definition drawings for the various parts making up the floor structure, the vertical and horizontal stabilisators, the baggages divider and various supports.

Achievements

Structure justification

F&DT analysis to validate the structural strength and service life of the fuselage.

Parts and sub assembly design

Production of side definition drawings and assembly drawings for the rear fuselage.

Our objectives met

OTD* greater than 95% and 90% quality on products delivered

OTD* : On Time Delivery

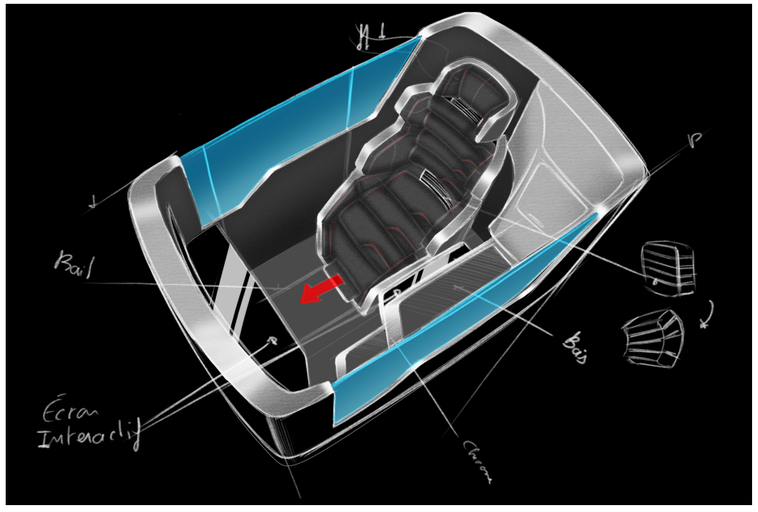
DESIGN TO COST

In a competitive economic environment, it is essential for companies to constantly seek ways of optimising their production costs.

That is why SEGULA offers Design-to-Cost services. The aim of this activity is to reduce the cost of a part or assembly by modifying its design. To carry out this activity, the engineering group draws on its various areas of expertise thanks to its international dimension. The Casablanca production site in Morocco is responsible for assessing manufacturing costs, while the design office in Vitrolles (France) is responsible for redefine the design.

In order to offer our clients the best results, our teams identify their needs and analyse the prices of current parts in relation to expected prices to define an estimate of manufacturing costs. Our staff then identify a number of product optimisation proposals based on different criteria: use of alternative materials that are less costly while retaining their mechanical strength, standardisation of hardware, tolerances and weight reduction, and optimisation of the manufacturing process.

For each stage, the teams in the design office and on the production site work together to determine a new price for the final part and the percentage reduction in production costs.



TOOLING

TOOLING

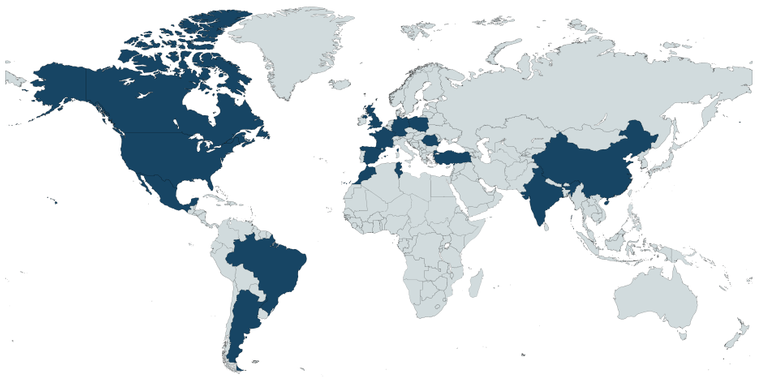
SEGULA is continuing to develop its tooling business for the aerospace sector by focusing on high added-value projects. At a time when manufacturers are increasingly looking to robotise their workshops, SEGULA is drawing on its expertise in robotisation acquired over several years in the automotive sector to meet the needs of the aerospace industry. This expertise has enabled the global engineering group to produce intelligent and automated platforms with advanced positioning interfaces for assembling aircraft sections.

SEGULA offers its clients turnkey solutions for assembling elementary parts in their structure assembly and sub assembly. Our world-renowned engineering group undertakes design in its engineering offices; manufacturing in its factories in Romania and through its partners, and installation and commissioning of tooling directly on the customer's site.

Turnkey projects
95%

+ 400 employees
20%

TAS* activity in BCC countries
70%



USA - Canada - Mexico - Brasil - Argentina - France - Germany - Romania - Polond - Spain - United Kingdom - Turkey - Marocco - Tunisia - India - China

TAS* : Tooling Automation Systems

OUR EXPERTISE

Production and installation of tooling and test benches

Studies and design on the market's leading software

Project management

Process engineering

Static, dynamic and vibration calculations (Nastran and Hypermesh)

Manufacturing (machining, welding, assembly, metrology, painting, etc.)

Industrial start-up on our premises (blank assembly) and commissioning on the customer's premises

The processes involved in our turnkey projects:

Study

Manufacturing

Mounting / focusing

Site installation

Automated cells

Workstation layout

PRODUCTION SERVICES

SEGULA Technologies provides production support activities for aerospace, from manufacturing engineering to supply chain management, including the set up of Autonomous Work Teams for series stations or OSW, quality inspection, documentation and continuous improvement.

ASSEMBLY AND SHEET METAL WORK

Benjamin Leturcq,
Business Engineer (Hauts-de-France)

Can you tell us about your background and your role at SEGULA?

After working as a production supervisor at a Dassault site, I went back to school to study business development and management. I then joined SEGULA as a business engineer for the Hauts-de-France region.

What type of activity do you offer?

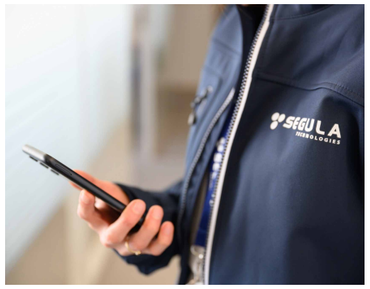
We offer fitting services, which involve finishing the part after machining. Our role is to complete the remaining work that the machines cannot do on the part. Most of our activities are based on fitting, with a range of services:

- Deburing the part
- Scratch repair, final shaping and sanding of parts after boiler making
- Adjusting and finishing wings (drilling, reaming, rebating, scoring, laminating, adjusting mechanical bearing zones)
- Work on canopies, central planes and small and medium-sized parts
- Equipment, assembly and painting of parts (riveting, gluing, conductivity measurement, paint touch-up, fastener coating).

Our teams are made up of fitters in charge of working the parts (drilling, sanding, etc.) and quality inspectors who check the conformity of the parts according to the technical data sheets (conformity of the implementation of the operations through the technical data sheet, measurements, dimensional measurements, conductivity measurements).

What does SEGULA have to offer in this business?

Our ability to provide our clients with qualified staff quickly, despite the shortage of human resources!



OUTSTANDING WORK

Guillaume Petit de la Rhodière,
Head of the Remaining Works activity

Can you tell us about your business and SEGULA's added value?

Our business is 80% repair and 20% mass production kickboard assembly services, with 130 employees.
Within our teams, we have all the necessary skills to cover the entire scope, from start to finish: aircraft manager, technical coordinator, structural assembler, quality inspector.
We work directly on the production lines with the customer's teams. We are recognized for our responsiveness and flexibility, major assets in OSW performance. Our role is to deal with any non-conformities in the Airbus information systems and to repair them quickly, in accordance with Airbus quality standards, so as not to impact on the customer's delivery times. The projects we are asked to work on can sometimes require several hundred hours of work and different types of expertise.

Can you give us an example of a customer success story?

We got through a crisis involving a technical component affecting around twenty aircraft, with over 100 hours of repairs for each. We managed to put the right skills in the right places by reinforcing our teams. We supported the customer in reorganising the schedule and the specific monitoring of the technical components in order to repair them with minimum impact on production!

MAINTENANCE

MAINTENANCE ON CIVIL PROGRAMS

The SEGULA Technologies Group has been offering helicopter maintenance services since 2007. Thanks to investments in training and a controlled increase in skills, MRO (Maintenance, Repair & Overhaul) activities are now deployed on civil heavy and light helicopter programs operated by the main French operators, for which SEGULA Technologies offers support solutions.

Fire-fighting: SEGULA is involved in the maintenance of RTE helicopters.

As part of its fire-fighting efforts, the French Civil Security has hired a special helicopter from RTE, capable of carrying up to 4,000 litres of water. The purpose of this helicopter is to extinguish forest fires, which are becoming more and more frequent every summer. Three mechanics and a logistician from SEGULA have been part of the mission since July 2022 to ensure that it runs smoothly.

Their role is to keep the helicopter and the “Bambi bucket” (containing the water) operational by carrying out maintenance and pre- and post-flight checks.

As part of this mission, SEGULA mechanics provide a maintenance service for the helicopter and the “Bambi bucket”. They work at the Avignon base, but also on site when the alert is triggered. SEGULA’s logistician remains at the base and is responsible for anticipating orders for spare parts.

Thanks to their expertise and know-how, the SEGULA Technologies team helps RTE maintain a high level of equipment availability.

MAINTENANCE ON MILITARY PROGRAMS

The SEGULA Technologies Group specialises in the main heavy helicopters in the Airbus Helicopters range:

- Since 2007 for SUPERPUMA
- Since 2009 for the TIGRE
- Since 2015 for the NH90

The skills of our technicians have been recognised for many years, with a high level of customer satisfaction.

Moreover, the teams working on this type of program include former military personnel who play an active role in training younger people by passing on their experience.

In addition to a high level of activity at the Airbus Helicopters Marignane plant, our services have also been deployed for the past 3 years at ALAT military bases and in the French Navy.

This partnership with Airbus Helicopters is making a significant contribution to improving the availability of the NH90 and TIGRE fleets.
For several years now, the engineering group has been investing in the training of employees, with individual support and well-supervised career development. These services are a real source of pride for SEGULA and its employees.

PRODUCTION

Certifications :

ISO 9001
EN 9100
Airbus, Bombardier, Collins, Dassault, Safran, Ariane

Qualifications :

NADCAP CP, NDT & TIG welding
NADCAP HT in progress
MASE

In the aerospace sector, SEGULA and its subsidiaries are partners to the world's leading manufacturers, meeting their specific needs and helping them to achieve their aeronautical production objectives. Our production activities are carried out at three sites in France, Morocco and Romania, employing over 300 people.

We offer production services with a wide range of expertise, including surface treatment, machining, welding, airframes, sheet metal work, prototyping and production series. Our site in Romania specialises in the design and manufacture of tooling.

Our Casablanca plant manufactures and equips basic sheet metal and boilerwork parts, as well as providing surface treatment services (chromating, chromic acid anodising, sulfuric acid anodising, painting, surtec, tartric sulfuric anodising) for the aerospace industry.

The Saint-Nazaire site offers a wide range of services, including assembly, sheet metal work, stamping, engineering, painting, welding, sheet metal work, heat treatment and machining.

INDUSTRY 4.0

SEGULA has also developed a range of services to support its clients in their digital transformation journey and their quest for operational excellence. Augmented reality, artificial intelligence, 3D scanning, additive manufacturing...

The Group is working on numerous projects incorporating these technologies. SEGULA's added value lies in its mastery of the industrial environment, combined with in-depth expertise in all 4.0 topics - a combination that enables the Group to respond to its clients' issues in a relevant and proactive way.

FOCUS ON ADDITIVE MANUFACTURING

Additive manufacturing is a vast field, with a range of technologies for solving complex industrial problems (creating specific shapes by integrating functions, optimising mass, preserving physico-chemical properties, etc.) for an industrial application tailored to each case. This cutting-edge technology is part of the Factory 4.0 vision, imagining the factory of the future in the same way as augmented reality, artificial intelligence and 3D scanning. It offers exceptional potential for reducing mass, costs and the number of parts, as well as simplifying industrial processes.

So, against this backdrop of innovation, SEGULA Technologies has participated in the development of numerous scientific advances in additive manufacturing, initiating in-house research projects as early as 2017.

OUR ADDITIVE MANUFACTURING SERVICES

Design: SEGULA Technologies 'Additive Manufacturing' entity provides high added value scientific consulting services across industrial segments and functional organisations. Services include assisting customers in their adoption of technologies linked to the exploitation of design for Additive Manufacturing with maximum efficiency and always in view of user satisfaction.

Prototyping: 3D printing is often used to produce working prototypes for Proof-of-Concept (POC) and testing. SEGULA Technologies offers rapid prototyping services to accelerate the time-to-market of new products.

Small batch production: Additive manufacturing can be used to produce parts quickly and cost-effectively. SEGULA Technologies can produce series ranging from a few parts to several hundred.

Parts production: Additive manufacturing technology can also be used to produce parts. SEGULA Technologies offers additive additive manufacturing services to produce final parts that meet the most stringent quality standards.

Success story - Redesign and additive manufacturing of an engine blade.

Thesis and project in collaboration with the Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SupAero) for a world-renowned engine manufacturer.

With additive manufacturing, SEGULA Technologies is revolutionising the manufacture of this part at every level:

- Integration of functions, considerable simplification of manufacturing processes,
- Saving in production time (the entire part is produced in less than a month, compared with
- several months with the conventional method),
- Overall gain in mass and volume of over 20%,
- Lower manufacturing costs
- Optimising performance

Industrial optimisation

SEGULA Technologies supports its clients in their efforts to increase productivity and reduce the carbon footprint of their industrial sites, using all of the following levers:

- Audit of production sites
- Analysis of operating modes
- Lean management
- Factory shrinkage
- Automation and robotisation
- Process digitalisation

DECARBONISATION IN THE AEROSPACE SECTOR

DECARBONISATION IN THE AEROSPACE SECTOR

Today, air transport accounts for 2.5% of CO_2 emissions. Despite the progress made on the latest generations of aircraft, air transport must continue to reduce its worldwide emissions to achieve carbon neutrality by 2050.

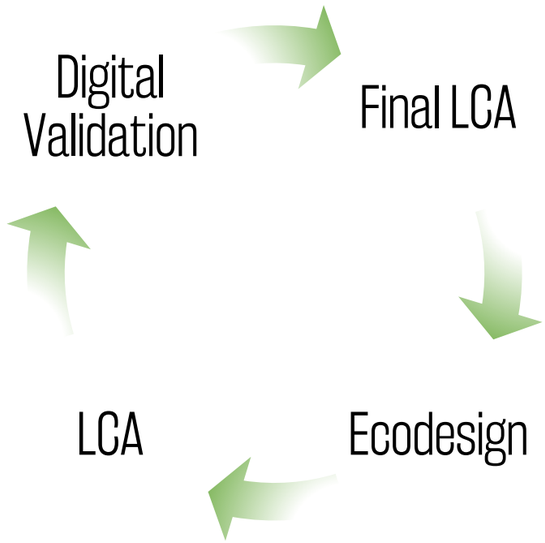
As an engineering specialist,
SEGULA is working on a number of areas to achieve these objectives and accelerate the development of low-carbon aircraft. These include the reduction of aircraft weight, with numerous projects involving additive manufacturing, composite materials and design optimisation, as well as the use of new energy sources: fuel cells, electric engines or engines running on carbon-neutral fuels.

Environmental issues are taken into account throughout the life of the aircraft, thanks to Life Cycle Analysis (LCA), from manufacture through to the dismantling and recycling phase.

Understanding Life Cycle Assessment

Life Cycle Assessment (LCA) is a method for evaluating the environmental impact of a product, process or service throughout its life, from the extraction of raw materials to the end of its life. It takes into account the different stages, such as manufacture, use, maintenance and recycling. The main objective of LCA is to identify opportunities for environmental improvement and to reduce the overall carbon footprint by quantifying greenhouse gas emissions, energy consumption and discharges into water and the air.

Thanks to its mastery of LCA methodology, SEGULA is able to assist major players in the aerospace sector in the intelligent design of systems, while guaranteeing economic gains. Thanks to this comprehensive assessment, engineers and designers can make informed decisions from the earliest stages of development. They can analyse the different design options before choosing the most sustainable solution, thanks to the use of materials with a low environmental impact that also guarantee the required performance.



Our life cycle assessment certifications

ISO 14040
ISO 14044

What about hydrogen?

SEGULA Technologies is leveraging its automotive and naval hydrogen expertise to deploy it in the aerospace sector. The Group supports its clients in the fuel cell sector by developing special applications and test benches dedicated to aeronautics. Fuel cells will offer decarbonisation opportunities for general aviation and potentially regional aviation.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