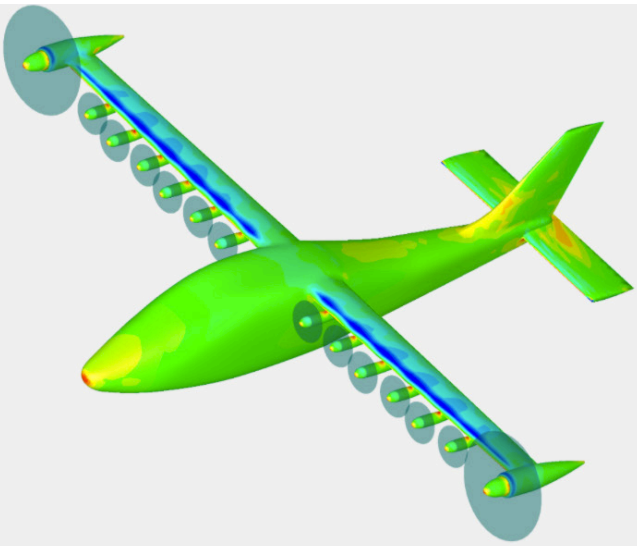
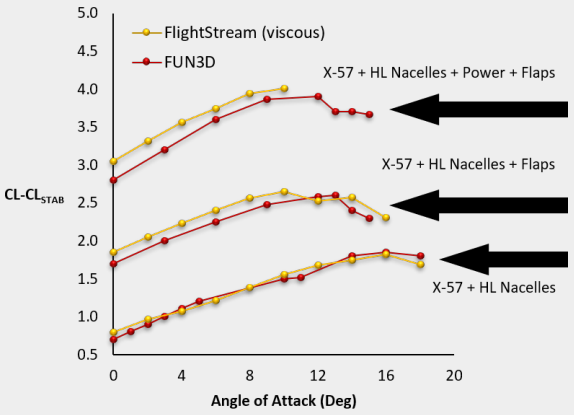
National Aeronautics and Space Administration





FlightStream® enables engineers to design and model aircraft concepts

FlightStream® Technology Empowers NASA Engineers to Design Unconventional Aircraft

Challenge

As aircraft continue to evolve, so should the technology that helps develop them. While engineers can design some aircraft based on empirical data, state-of-the-art models such as the X-57 electric airplane[1] and the Parallel Electric-Gas Architecture with Synergistic Utilization Scheme (PEGASUS)[2] are so revolutionary that they require computationally extensive and time-consuming analysis models to evaluate how these vehicles will perform.

Due to the large number of potential aircraft alternatives in conceptual design, engineers require analysis tools that are not only accurate but also fast in execution to allow comparison of these potential concepts. NASA needed a physics-based aerodynamics analysis tool that could allow engineers to design novel aircraft as accurately as possible in the absence of historical data.

Solution

Research in Flight, a small business established in Auburn, Alabama, developed its FlightStream® technology to enable users to calculate and model the aerodynamic performance and feasibility of novel air vehicles with a wide variety of customization. Founded in 2013, Research in Flight

[1]https://www.nasa.gov/specials/X57/index.html
[2]https://sacd.larc.nasa.gov/asab/pegasus/

Projects

FlightStream®, a physics-based aerodynamics software for designing aircraft concepts

Mission Directorate

Aeronautics Research

Post-Phase II Success

$1M in Phase-II and Phase II-E NASA SBIR awards

Snapshot

Research in Flight partnered with the NASA SBIR/STTR Program to enhance its FlightStream® software, which engineers use to calculate the aerodynamic performance and feasibility of aircraft concepts, particularly those with no historical performance data. The company has since gained industry recognition, with new customers and continued development with NASA.

Research in Flight, Inc.
1919 North Ashe Court
Auburn, Alabama, USA 36830

researchinflight.com

began its partnership with NASA through a contract with NASA's Langley Research Center in 2014. Shortly after, the company proposed to the NASA SBIR/STTR Program's 2015 solicitation.

Research in Flight has since received four SBIR awards and one STTR award through May 2020, collaborating with three NASA centers nationwide.

While a version of FlightStream® had been developed and commercialized prior to Research in Flight's SBIR awards, the company saw the SBIR/STTR partnership as a valuable means of improving their software with NASA's team. According to Research in Flight, "customers want a product that is validated, but they're not the ones who usually fund these activities, so you need to do it on your time. The SBIR/STTR Program allows us to validate the product."

FlightStream® aerodynamic analysis tool.

The partnership is mutually beneficial; NASA's engineers use FlightStream® to design aircraft and test conditions while providing direct user feedback to Research in Flight. The company has used this feedback loop to make improvements to the software's code that can then be tested in practice by the engineers. Irian Ordaz, an Aerospace Engineer who has been with NASA Langley for 10 years, notes how FlightStream® has enabled his team to model new aircraft.

"In the past, we have been able to rely on available historical data to predict the performance of more traditional aircraft concepts. We are currently investigating more advanced concepts for which no historical data exists, and we must rely on physics-based analysis tools, such as FlightStream®, that can predict flight performance with minimum setup and fast execution time," says Ordaz.

FlightStream® is capable of calculating key performance metrics for unconventional airplanes—such as electric and vertical take-off and landing vehicles, which are gaining interest in the aerospace industry—as well as for Uncrewed Aerial Vehicles (UAVs), military aircraft, high-altitude aerostats, and more. In addition, while other tools in aerodynamics design require several pieces of hardware and may be difficult to set up, FlightStream® can operate on a laptop, enabling simplicity and efficiency. Finally, FlightStream® can provide accurate assessments of aerodynamic loads and load distributions in minutes per case, facilitating higher speed evaluation of concepts than ever before.

Business Impact

In response to the successful partnership with NASA Langley, Research in Flight's Phase II contract was extended (II-E) with additional funding to improve the feedback mechanism, streamline analysis, and reduce the workload required by the user. These improvements support NASA's needs and will enhance the experience for future customers. Beyond the SBIR/STTR Program, the company has garnered recognition from government and industry partners—its portfolio of customers includes the U.S. Army, international aerospace and defense company Safran, aerospace engineer firm DARcorporation, and many others. As a result of the Phase II-E developments, Research in Flight says one of its aerospace customers is matching funds to continue maturing FlightStream®. The company sees its future in serving more industry customers as well as government.

> We now have maturity in the eyes of our industry partners. We think that's the future for us—NASA gave us an initial push and now the industry is taking over.
>
> – Research in Flight

SBIR·STTR America's Seed Fund™ POWERED BY NASA