



ANSYS® + ARC

“ANSYS provides the only software that allows for better visualization behind the design of ARC engines, delivering the most accurate and valuable data that lets us modify and develop our technology in a more efficient manner. Its products play a role in helping us further our mission to provide more affordable and reliable solutions for the space industry.”

Andy Kieatiwong
Chief Executive Office
Additive Rocket Corporation (ARC)
La Jolla, California

ARC Utilizes ANSYS Simulation to Increase Efficiency in the Development of 3D-printed Rocket Engines



With the importance of quick investigation into design performance, engineering simulation is an integral part of ARC's operational environment and the space/defense industry. Engineers use performance data to evaluate whether the design works as needed and as intended, and to make any necessary improvements. Simulation has become fundamental to the process of creating truly innovative and optimal designs for the industry.



ARC Nemesis - This rocket engine was 3D-printed by the Additive Rocket Corporation (ARC), which utilized ANSYS simulation software for the product's design.

Challenges

ARC sought to go beyond simply producing less expensive engines. Aside from cost and time benefits, the company aimed to leverage 3D printing's full potential and ability in order to enhance the engines being designed. Simulation gives us

the data needed to modify designs and optimize them for each use case. ARC needed software that was robust, accurate, fast, physically validated and had good multiphysics support.

Technology Used

- ANSYS Fluent
- ANSYS CFX
- ANSYS Mechanical

Engineering Solution

- ARC uses the simulation software to get an idea of the fluid-structural physical interactions happening within its engines. Using this data, we can modify designs to meet parameters.

- The powerful post-processing feature is incredibly valuable to ARC, as many of the inspirations for design modifications initially come from the visual representations created by the post-processing software. While raw data is important, this aspect is also significant because of the highly variable nature of ARC's designs. It is incredibly helpful to see the overall picture and use that to inform designing decisions.

Benefits

Engineering simulation benefits ARC's overall engineering and business goals of developing more efficient and less expensive engines faster than anyone else. ANSYS is the only software that can help us achieve our design objectives, providing the information we need to develop highly optimized, custom thrusters in a fraction of the time. It delivers the most accurate representation of the physics during the standard operation of ARC engines, such as the transfer of heat around materials and the movement of particles. Prior to ANSYS, ARC did not have the proper software to accomplish this.

Company Description

ARC aims to democratize space by providing more affordable and reliable propulsion solutions, using 3D printing technology to create rocket engines in one-tenth the time and at half the cost of traditional methods. What makes ARC unique is its design methodology that employs biomimetic fluid structures in the rocket engine to optimize fluid and heat flow.