

ARC Accelerates Time-to-Market of Thrusters by Over 50% with Rescale

“Rescale has allowed the team at ARC to change the way propulsion systems are designed by enabling a simulation-informed design methodology, without the added time or cost typically associated with big compute.”

Kyle Adriany, Founder and CTO of ARC

About Additive Rocket Corporation (ARC)

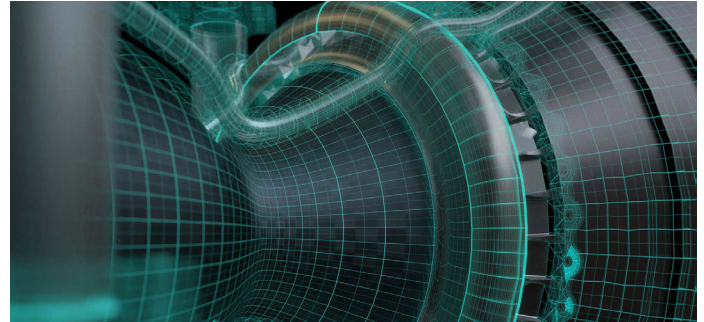
ARC is an innovative aerospace company that 3D prints metal rocket engines for the expanding space industry. They leverage additive manufacturing and industry-leading scientists to create high performance propulsion components. Additive manufacturing is the process of successively binding layers of various materials together to create complex, fluid systems that were previously infeasible with standard manufacturing methods. To design and direct the manufacturing of these complex systems, ARC utilizes ANSYS Fluent, Mechanical, and Additive Print to perform CFD, FEA, coupled thermo-structural, and thermo-fluid simulations. Coupling extensive high performance computing (HPC) and additive manufacturing methods, ARC is able to create propulsion systems in one-tenth the time of competitors and at 50% the cost. ARC is innovating the manufacturing and design process for essential components to further (and more affordably) explore space.



A prototype of one of ARC's engines that was tested and designed using HPC simulations and produced by additive manufacturing.

The Challenge

In order to accelerate their product development and better compete with SpaceX and Blue Origin, they needed to run an exceptionally large number of simulations. They were equipped with a local on-premise HPC system with 50-128 cores at 80% utilization. The constraints that ARC recognized were the lack of



A 3D matrix outlines the additive manufacturing of a rocket thruster.

scalability in computing resources and agility in resource diversity. The lack of computing resource diversity and capacity severely limited ARC's simulation-throughput and design of experiments (DOE). ARC recognized that this bottleneck in their product development pipeline severely delayed their potential time-to-market. Faced with the urgent demand for more computing resources, ARC had to decide between investing in a static on-premise HPC system or moving to a cloud-enabled HPC system.

Why Rescale

ARC considered several options to scale their computing resources such as adding to their local on-premise HPC system or using bare-metal cloud resources. Ultimately, they found the alternative options to be inadequate for their demands and decided to commit to Rescale for the following reasons:

- Rescale provides the ability to access a near-infinite inventory of the latest cloud computing resources, instantly.
- Access to multiple cloud providers offers a diverse inventory of computing hardware from AWS, Azure, and IBM, which allows users to select the optimal computing resources for specific applications.
- Coupling the latest HPC cloud hardware with +350 ported and tuned applications creates an unrestricted HPC environment.
- Due to extensive partnerships, Rescale accepts a broad range of computing credits from hardware and software providers.
- Rescale's easy-to-use, simulation-centric platform makes software integration, deployment, and use of the platform extremely simple when compared to open source cloud platforms and on-premise HPC systems.
- Rescale's Application Programming Interface (API) allows for direct interaction and modification of applications within the platform.

“The traditional process of having a team of people collect, collate, validate, check, and organize data, or write scripts to automate the process, is not required with Rescale.”

Kyle Adriany, Founder and CTO of ARC

- Rescale automates and simplifies +30 IT activities required to perform a single simulation.
- Rescale provides comprehensive support throughout the deployment of the platform and submission of simulation jobs.

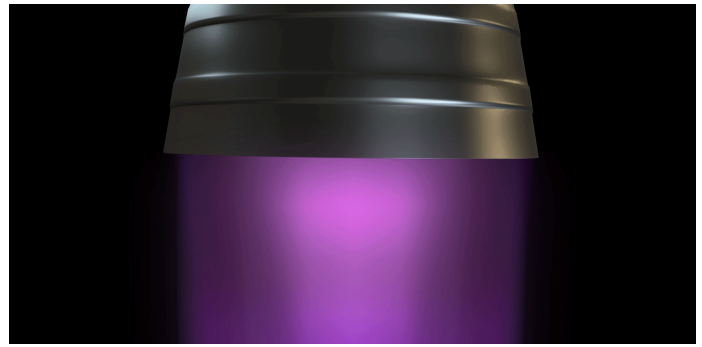
In summary, ARC committed to Rescale because they recognized the value in the platform’s scalability, agility, ease-of-use, credit transferability, back-end programmability, and support team.

Results of ARC and Rescale

ARC’s experience with Rescale’s platform has resulted in significant improvements to their product development cycle:

- A 475% increase in simulation-throughput by utilizing the latest computing resources that are optimized for their specific applications.
- Overall engine development time decreased from 6-12 month to 2-3 months.
- Access to cloud resources enabled ARC to instantly scale from 50 cores on-premise to +500 cores.
- Limitless computing resources and diverse architectures allowed ARC to perform a DOE simulation involving thousands of design iterations; an experiment that would not have been practical outside of the Rescale platform. The new DOE enabled them to reduce the weight of their thrusters and components by 50%, and decentralize their simulation engineering workforce.

In summary, Rescale’s easy-to-use platform has significantly impacted the efficiency of ARC’s engineering department, redesigned the staffing requirements, and has cut their product development time in third.



A thruster design is simulated to test its behavior under comparable propulsion conditions.

“In the future, we hope to take advantage of the other software tools available on the platform and move most, if not all, of our simulation workflows onto Rescale.”

Kyle Adriany, Founder and CTO of ARC

About Rescale

Rescale™ is the global leader for enterprise big compute. Trusted by the Global Fortune 500, Rescale empowers the world’s top executives, IT leaders, engineers and scientists to securely manage product innovation and perform groundbreaking research and development faster at a lower cost. Rescale’s ScaleX platform solutions transform traditional fixed IT resources into flexible hybrid, private, and public cloud resources—built on the largest and most powerful high-performance computing infrastructure network in the world. Rescale offers hundreds of turnkey software applications on the platform which are instantly cloud-enabled for the enterprise. For more information on Rescale, visit www.rescale.com.

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