



## NASA Awards PADT and Penn State University a \$375,000 Phase III STTR Research Grant



Alex Grishin, PhD

Matt Sutton



Nathan Huber

Tyler Shaw, PhD

*The Grant is a Continuation of PADT's Topology Optimization Research, Which Will Fund "Thermo-Fluid and Structural Design Optimization for Thermal Management"*

**TEMPE, Ariz. - Sept. 29, 2021 - [PRLog](#)** -- In a move that acknowledges its excellence and expertise in R&D for numerical simulation and 3D printing, [PADT](#) today announced NASA has awarded a \$375,000 Phase III Small Business Technology Transfer (STTR) grant for PADT to collaborate with Penn State University. The partners will expand research into thermo-fluid and structural design optimization to provide engineers who design next-generation launch and space crafts with better ways to design more robust and efficient structures that experience loading fluids, forces, vibration, and temperatures.

The Phase III STTR grant is a continuation of the original \$127,000 Phase I and \$755,000 Phase II grants awarded to PADT and ASU's Ira A. Fulton Schools of Engineering in August 2018 and December 2019 respectively. This is PADT's 17th [STTR/SBIR grant](#) since the company was founded in 1994.

"Furthering our research in simulation and 3D printing for topology optimization and thermal management is critical to the future of aerospace development," said Alex Grishin, Ph.D., consulting engineer, PADT. "This Phase III award underscores how valuable NASA found the work we did earlier with ASU and signals their desire to have PADT work with other universities to transform it into a tool that engineers can use to design better launch and space-based structures."

The objective of the joint effort between PADT and Penn State University is to successfully demonstrate the integration of 3D data output from Penn State Mechanical Engineering Experimental and Computational Convection Laboratory's ([ExCCL](#)) thermo-fluid optimization code, developed under a NASA Aeronautics Fellowship grant, into PADT's topology optimization tool. The latter was developed by PADT under the STTR Phase II contract.

In Phase II, PADT partnered with Arizona State University (ASU) to develop and test a novel shape

optimization tool that used a unique methodology for topological optimization, taking both the thermal and stress response of a part into account. 3D printing was also used to create the geometry produced by the optimization approach. Phase III will connect PADT's tool to Penn State's tool, which uses genetic algorithms to better handle the optimization found in thermo-fluid problems.

"Taking our tool and connecting it with the optimization capability that Penn State developed has the potential to benefit aerospace design engineers worldwide," said Tyler Shaw, PhD, PADT's VP of Engineering and the leader of the group responsible for this work. "This project will take the joint research one step closer to delivering on an optimization approach that, just as in nature, takes into account all loads, regardless of physics."

The ultimate goal of the project is to continue research with internal and government funding to create a commercial product that engineers can use as an alternate way to optimize the shape of structures that see loading from multiple physics.

To learn more about PADT and its advanced capabilities, please visit [www.padtinc.com](http://www.padtinc.com).

### **About Phoenix Analysis and Design Technologies**

Phoenix Analysis and Design Technologies, Inc. (PADT) is an engineering product and services company that focuses on helping customers who develop physical products by providing Numerical Simulation, Product Development, and 3D Printing solutions. PADT's worldwide reputation for technical excellence and experienced staff is based on its proven record of building long-term win-win partnerships with vendors and customers. Since its establishment in 1994, companies have relied on PADT because "We Make Innovation Work." With over 80 employees, PADT services customers from its headquarters at the Arizona State University Research Park in Tempe, Arizona, and from offices in Torrance, California, Littleton, Colorado, Albuquerque, New Mexico, Austin, Texas, and Murray, Utah, as well as through staff members located around the country. More information on PADT can be found at [www.PADTINC.com](http://www.PADTINC.com).

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