Press Release

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3D Systems' Additive Manufacturing Solutions Enable Pioneering Research on Advanced Thermal Control Systems for Next Generation Space Missions

- 3D Systems' applications expertise, technologies foundational to research projects led by Penn State, Arizona State & NASA Glenn Research Center
- Additive manufacturing enabling novel titanium and nitinol passive heat pipes for space applications with 50% reduced weight enabling more efficient thermal management
- Researchers advance state-of-the-art for thermal management of CubeSats with projected 6× greater deployed-to-stowed-area ratio with one of the first additively manufactured shape memory alloy (nitinol) radiators
- 3D Systems' solutions accelerating the adoption of additive manufacturing use in space applications — a total addressable market anticipated to reach nearly $4 billion by 2030

ROCK HILL, South Carolina, June 3, 2025 – Today, 3D Systems (NYSE: DDD) announced the Company is collaborating with researchers from Penn State University and Arizona State University on two projects sponsored by the National Aeronautics & Space Administration (NASA) intended to enable ground-breaking alternatives to current thermal management solutions. Severe temperature fluctuations in space can damage sensitive spacecraft components, resulting in mission failure. By combining deep applications expertise with 3D Systems' leading additive manufacturing (AM) solutions comprising Direct Metal Printing (DMP) technology and tailored materials and Oqton's 3DXpert® software, the teams are engineering sophisticated thermal

management solutions for the demands of next-generation satellites and space exploration. The project led by researchers with Penn State University, Arizona State University, and the NASA Glenn Research Center[1] in collaboration with 3D Systems' Application Innovation Group (AIG) has resulted in processes to build embedded high-temperature passive heat pipes in heat rejection radiators that are additively manufactured in titanium. These heat pipe radiators are 50% lighter per area with increased operating temperatures compared with current state-of-the-art radiators, allowing them to radiate heat more efficiently for high power systems. Additionally, a project led by researchers at Penn State University and NASA Glenn Research Center[2] with 3D Systems' AIG yielded a process to additively manufacture one of the first functional parts using nickel titanium (nitinol) shape memory alloys that can be passively actuated and deployed when heated. This passive shape memory alloy (SMA) radiator is projected to yield a deployed-to-stowed area ratio that is 6× larger than currently available solutions, enabling future high-power communications and science missions in restricted CubeSat volume. When deployed on spacecraft, such as satellites, these radiators can raise operating power levels and reduce thermal stress on sensitive components, preventing failures and prolonging satellite lifespan.

Traditionally, heat pipes have been manufactured with complex processes to form porous internal wick structures that passively circulate fluid for efficient heat transfer. Using Oqton's 3DXpert® software, the Penn State/Arizona State/NASA Glenn/3D Systems project team embedded an integral porous network within the walls of the heat pipes, avoiding subsequent manufacturing steps and resulting variability. Monolithic heat pipe radiators were manufactured in titanium and nitinol on 3D Systems' DMP technology. The titanium-water heat pipe radiator prototypes were successfully operated at temperatures of 230°C and weigh 50% less (3 kg/m^2 versus over 6 kg/m^2), meeting NASA goals for heat transfer efficiency and reduced cost to launch for space-based applications.

The Penn State/NASA Glenn/3D Systems team is also pushing the boundaries of what is possible with metal AM by developing a process to 3D print passively deployed radiators with shape memory alloys. The chemistry of these materials can be tuned to change shape with application of heat. SMAs can withstand repeated deformation cycles without fatigue and exhibit excellent stress recovery. The team again used 3DXpert to design the deployable spoke structure of the

[1] NASA STMD 80NSSC22K0260 (https://tfaws.nasa.gov/wp-content/uploads/TFAWS2024-PT-3.pdf)

[2] NASA 80NSSC23M0234 (https://govtribe.com/award/federal-contract-award/cooperative-agreement-80nssc23m0234)

radiator. This was then 3D printed in nitinol (NiTi), a nickel-titanium shape memory alloy, using 3D Systems' DMP technology. When affixed to a spacecraft such as a satellite, this device can be passively actuated and deployed when heated by fluid inside, thus removing the need for motors or other conventional actuation in space. The passive shape memory alloy radiator developed by the team offers transformative advances with projected deployed-to-stowed area ratio that is 6× larger than what is currently considered state-of-the-art (12× versus 2×) and 70% lighter (<6 kg/m^2 versus 19 kg/m^2).

"Our long-standing R&D partnership with 3D Systems has enabled pioneering research for the use of 3D printing for aerospace applications," said Alex Rattner, associate professor, The Pennsylvania State University. "The collective expertise in both aerospace engineering and additive manufacturing is allowing us to explore advanced design strategies that are pushing the boundaries of what is considered state-of-the-art. When we complement this with the software capabilities of 3DXpert as well as the low oxygen environment in 3D Systems' DMP platform, we are able to produce novel parts in exotic materials that enable dramatically improved performance."

"3D Systems has decades of leadership developing additive manufacturing solutions to transform the aerospace industry," said Dr. Mike Shepard, vice president, aerospace & defense, 3D Systems. "Thermal management in the space environment is an ideal application for our DMP technology. These latest projects, in collaboration with the teams at Penn State, Arizona State, and NASA Glenn Research Center, demonstrate the potential of our DMP technology to create lightweight, functional parts that advance the state-of-the-art in thermal management for spacecraft applications. Thermal management is an extremely common engineering challenge and the DMP process can deliver solutions that are effective for many industries including aerospace, automotive, and high-performance computing/AI datacenters."

According to Research and Markets[3], the global market for additive manufacturing in the aerospace industry was estimated at $1.2 billion in 2023 and is projected to reach $3.8 billion by 2030. Additive manufacturing is making a significant impact by enabling the production of airworthy parts with reduced weight and improved performance. In the last decade alone, 3D Systems has worked alongside aerospace industry leaders to produce more than 2,000 structural titanium or aluminum alloy components for space flight, and over 200 critical passive RF flight

[3] Revolutionizing Aerospace: How Additive Manufacturing is Set to Transform the Industry by 2030 (January 2025).

parts. There are currently more than 15 satellites in orbit with 3D Systems-produced flight hardware on board. For more information, please visit the Company's website.

Forward-Looking Statements

Certain statements made in this release that are not statements of historical or current facts are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements involve known and unknown risks, uncertainties and other factors that may cause the actual results, performance or achievements of the company to be materially different from historical results or from any future results or projections expressed or implied by such forward-looking statements. In many cases, forward-looking statements can be identified by terms such as "believes," "belief," "expects," "may," "will," "estimates," "intends," "anticipates" or "plans" or the negative of these terms or other comparable terminology. Forward-looking statements are based upon management's beliefs, assumptions, and current expectations and may include comments as to the company's beliefs and expectations as to future events and trends affecting its business and are necessarily subject to uncertainties, many of which are outside the control of the company. The factors described under the headings "Forward-Looking Statements" and "Risk Factors" in the company's periodic filings with the Securities and Exchange Commission, as well as other factors, could cause actual results to differ materially from those reflected or predicted in forward-looking statements. Although management believes that the expectations reflected in the forward-looking statements are reasonable, forward-looking statements are not, and should not be relied upon as a guarantee of future performance or results, nor will they necessarily prove to be accurate indications of the times at which such performance or results will be achieved. The forward-looking statements included are made only as of the date of the statement. 3D Systems undertakes no obligation to update or review any forward-looking statements made by management or on its behalf, whether as a result of future developments, subsequent events or circumstances or otherwise, except as required by law.

About 3D Systems

For nearly 40 years, Chuck Hull's curiosity and desire to improve the way products were designed and manufactured gave birth to 3D printing, 3D Systems, and the additive manufacturing industry. Since then, that same spark continues to ignite the 3D Systems team as we work side-by-side with our customers to change the way industries innovate. As a full-service solutions partner, we deliver industry-leading 3D printing technologies, materials and software to

high-value markets such as medical and dental; aerospace, space and defense; transportation and motorsports; AI infrastructure; and durable goods. Each application-specific solution is powered by the expertise and passion of our employees who endeavor to achieve our shared goal of Transforming Manufacturing for a Better Future. More information on the company is available at www.3dsystems.com.

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