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**Quartus Awarded NASA Phase II SBIR to Further the Development of  
Semi-Custom CubeSat Optical Payloads**

**Program will build upon the successes of the SAGE IV Pathfinder telescope development, and Phase I SBIR results, aimed at reducing development time and cost to future imaging missions.**

*San Diego, CA, June 1, 2020* – Quartus Engineering Incorporated was selected to be awarded a NASA Phase II Small Business Innovation Research (SBIR) contract, building upon the work done developing the telescope for the next generation Stratospheric Aerosol and Gas Experiment (SAGE) IV Pathfinder program. This is the second award granted to Quartus through NASA's SBIR program to further develop small format, high performing, semi-custom optical payloads based on the SAGE IV telescope design.

The SAGE mission is tasked with measuring levels of gasses and aerosols (including ozone) in the earth's atmosphere using a multi-spectral imaging approach to measure specific spectral absorption due to the presence of these elements. The monitoring and measuring of ozone is mandated as part of the Clean Air Act to establish air quality standards, but is also useful for monitoring the fallout of volcanic eruptions and other events. The SAGE IV program proposes following the larger SAGE III instrument, currently mounted on the International Space Station (ISS), with a smaller CubeSat multispectral imager with the eventual goal of flying a constellation of satellites to accelerate the refreshing of the global data product with increased coverage.

On SAGE IV pathfinder, Quartus leveraged their depth of analytical capabilities to not only focus on the design of the optics and hardware, but also on mitigating risks associated with harsh space environments through simulation driven engineering. These environments include, but are not limited to launch vibration loads and the transient thermal environments present in a small orbiting satellite. The result of this engineering effort was a relatively thermally agnostic high performing telescope. Alexander Halterman, Program Manager and Lead Engineer for the SAGE IV project at Quartus, noted, "The optical elements of this telescope are varied in size and function with a common mounting methodology. With validated analytical models, optical components could easily be modified and repositioned to meet the needs of other complex optical system for future missions." He added that while repurposing some elements and subsystems, and leveraging past designs into future missions is common, it's unusual to see this level of proposed implementation to accelerate through technical readiness levels for scientific instruments.

The focus of the SBIR work is the validation of performance over these environments beyond just the SAGE IV use case, such that the designs can be leveraged to accelerate other program development efforts. As these analytical models are validated, Quartus is able to refine modeling practices for adhesives, optical materials, and non-linear relationships, continuing to build upon industry leading analytical capabilities. Designing modular optical components that can be utilized in future missions, with validated analytical models, could save NASA millions of dollars per mission and significantly decrease the time it takes to create a new one-off science instrument, allowing more science for the same limited funding. Mr. Halterman noted, "NASA's SBIR program is tailored to specifically this type of opportunity. Providing funding to develop tools and validated models that specific program budgets generally cannot justify developing outside a single use case. These tools will be used to the benefit of many programs going forward for NASA, Quartus clients, and the community as a whole."

This SBIR is a great example of development work that serves two purposes, it greatly benefits a current program, but also has huge implications going forward. Michael Obland, the NASA Langley Research Center (LaRC) SAGE IV Project Manager had this to say about the breadth of value for this SBIR. "Quartus' SBIR Phase II program will not only significantly advance the SAGE IV satellite's readiness for spaceflight, but could positively impact future NASA satellites both large and small. This project will help SAGE IV improve NASA's abilities to sustainably monitor ozone and aerosols and potentially other constituents in our atmosphere important for our quality of life. The SAGE IV team is excited to continue working with Quartus on this important work."



**About Quartus Engineering, Inc.**

Quartus Engineering Incorporated was founded in 1997 to provide quality advanced engineering services. Quartus specializes in the high-end mechanical analysis and the multi-disciplinary engineering of complex and precision systems for various applications and markets. The company is committed to serving the needs of the engineering community in a timely and cost-effective manner. In 2019, Quartus was awarded the NASA Langley Research Center Small Business Subcontractor of the Year Award.

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