

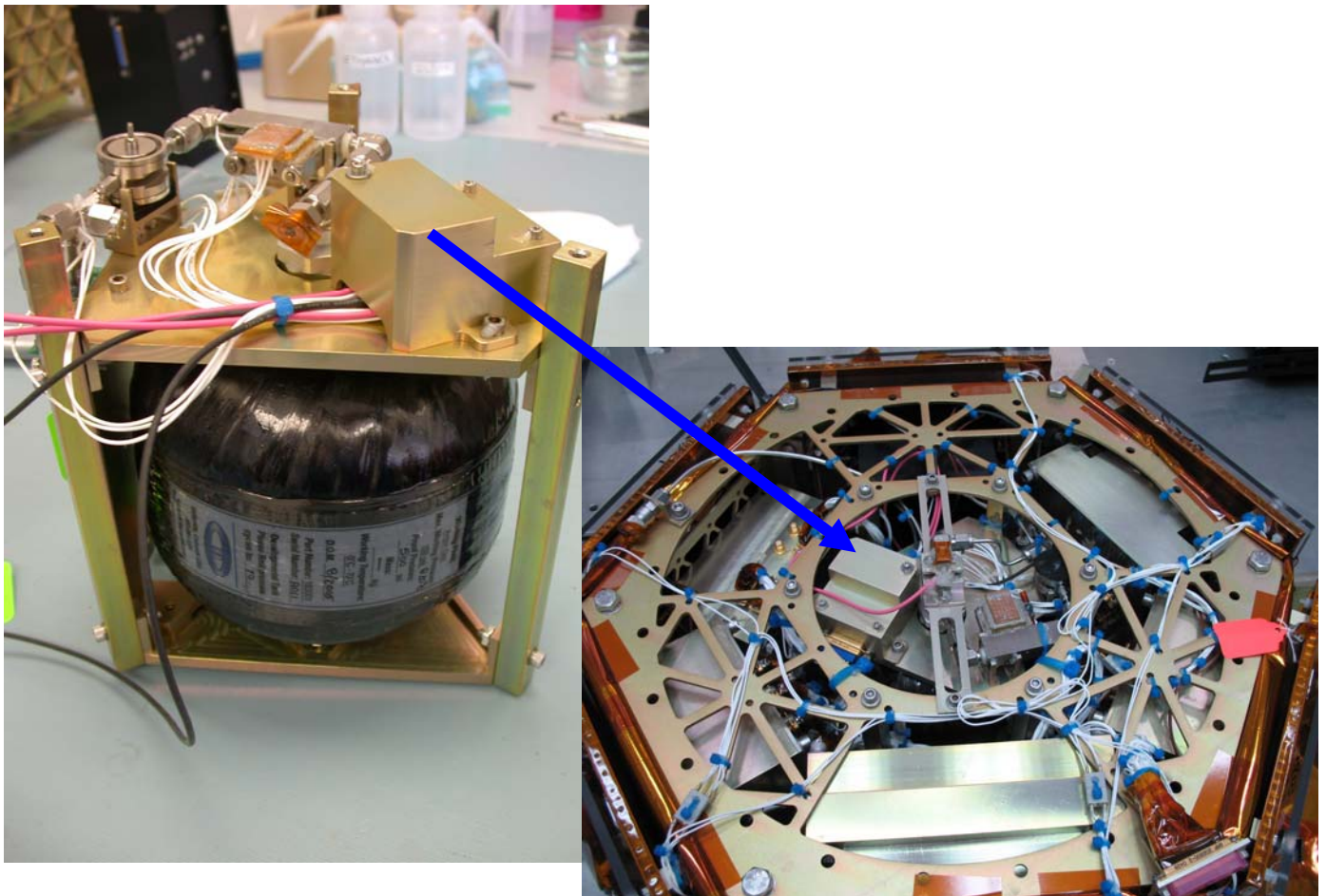


Air Force Research Laboratory | AFRL

*Science and Technology for Tomorrow's Air and Space Force*

SUCCESS STORY

## AFRL DELIVERS LINERLESS COMPOSITE TANKS FOR NANOSAT-3



**Under a SBIR Phase II, AFRL and Composite Technology Development, provided linerless composite tanks to solve a critical hardware failure on the NanoSat-3 satellite. The tanks, shown integrated into the NanoSat-3 FASTRAC Thruster, are 40% lighter, have 18% more volume, and 12X the pressure capability of the metallic tanks that failed during pressure proof testing.**



**Air Force Research Laboratory  
Kirtland AFB, NM**

**Space Vehicles  
Emerging Technologies**

## **Accomplishments**

Under the guidance of AFRL, Composite Technology Development (CTD, of Lafayette, CO) acted quickly to solve a critical hardware failure, and delivered four flight ready linerless composite fuel tanks for inclusion on the University of Texas' NanoSat-3 research satellite. The tanks were manufactured at the composite manufacturing facility at Kirtland AFB, NM, with on-site support from Jackson and Tull Engineering (J&T) and United Industrial Engineering (UIE). Within a 6-week timeframe, the AFRL/CTD team designed the composite tanks and required tooling, manufactured the tooling, produced 20 tanks (2 flight, 2 back-up, and 16 test articles), tested the tanks, and delivered 4 flight articles to the University of Texas for integration into the satellite. The CTD-designed tanks weighed 40% less, had 18% more volume, and 12X the pressure capability of the custom-built aluminum tanks they replaced. The flight of NanoSat-3 will mark the first use of linerless composite tanks for spacecraft operations.

## **Background**

The University NanoSat program is an annual competition amongst US universities to develop small satellites that demonstrate technologies with military utility. Last year's winner, the University of Texas, has developed the FASTRAC (Formation Autonomy Spacecraft with Thrust, Relnav, Attitude and Crosslink) nanosatellite pair to demonstrate technologies that enable formation flying. Propulsion for the required maneuvering will be provided via microdischarge plasma thrusters. The fuel tanks for the maneuvering satellite are required to contain the argon fuel at 100 psi (implying a proof pressure test at 150 psi before integration).

During proof testing of the custom aluminum tanks, the dome sections yielded, necessitating their immediate replacement. With only six weeks remaining before full spacecraft integration, the University of Texas contacted AFRL/VS for a possible solution; CTD was selected as the contractor most capable of meeting the flight program's requirements. An important point to make is that CTD could have produced an even more mass-efficient design (possibly saving an additional 15%), had time not been the primary consideration.

## **Additional Information**

To receive information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (VS-?-06-??)

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