

LTA Testing in Sandia's HWT

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Motivation

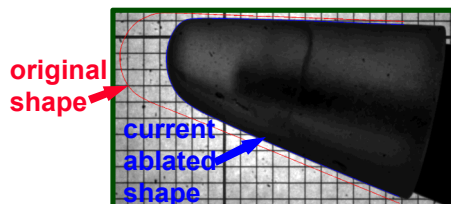
- **Ablative shape change is particularly important for maneuvering flight vehicles, affecting:**
 - Aerodynamic Forces
 - Boundary Layer Transition
 - Heating
 - Vehicle Survivability
- **No ground facility replicates all conditions of flight**
 - Traditional arc-heated facilities often lack high Mach number/ Re and flow uniformity of flight
 - Low temperature ablators (LTA's) sublime like real nosetip TPS in flight, but at much lower enthalpies attainable in hypersonic wind tunnels.

Results

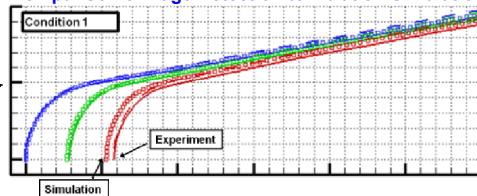
- **The success of LTA tests in the HWT has been proven, resurrecting a national hypersonic test capability after 25 years of dormancy.**

- **Ablation results compare well with simulation.**

- **Further ablation tests to be performed on full-scale flight vehicle nosetip in mid-April.**

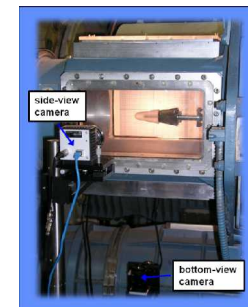
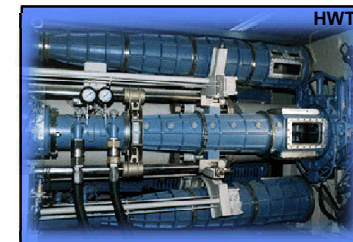


Comparison of Edge Detection to Ablation Simulation



Testing

- **Sandia teamed with Southern Research Institute to design and test 13 LTA spherecone nosetips in Sandia's HWT.**
 - Flight Mach & Reynolds numbers
 - Several Angles of Attack
 - Run times of 60 seconds
- **Photogrammetry and custom edge detection algorithms used to measure time-resolved surface ablation.**



Acknowledgements

- This work is funded by the T&E/S&T Program through the Advanced Propulsion Test Technology (APPT) Area in cooperation with AFRL.
- Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.