



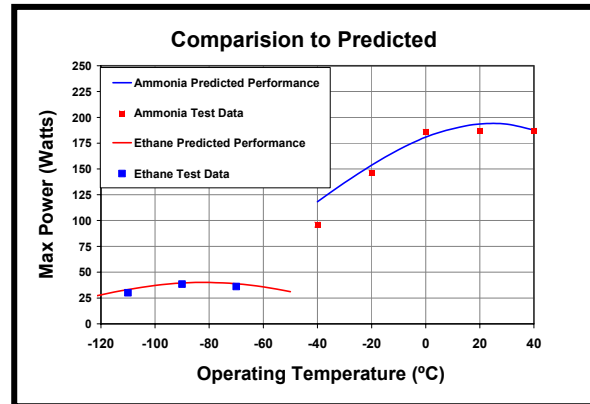
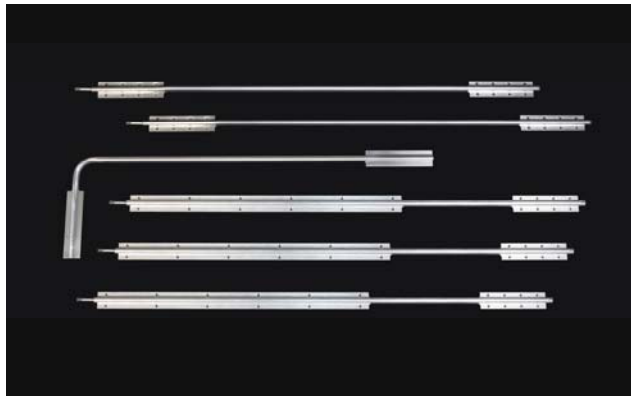
AEROSPACE PRODUCTS

Advanced Cooling Technologies, Inc. (ACT)'s Aerospace Products Group offers cost effective heat pipe products to a variety of aerospace thermal control applications.

Products:

Constant Conductance Heat Pipes (CCHPs):

ACT's CCHP's use axially groove wick structures to provide large capacity of heat transport for spacecraft and satellite thermal control. Working fluids include ammonia, propylene and ethane for different operating temperatures. Applications range from heat transport from satellite payloads to isothermalization of radiator panels.



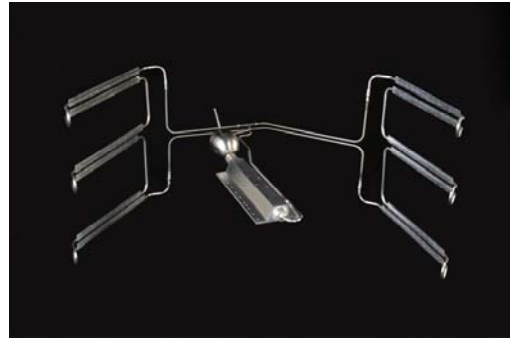
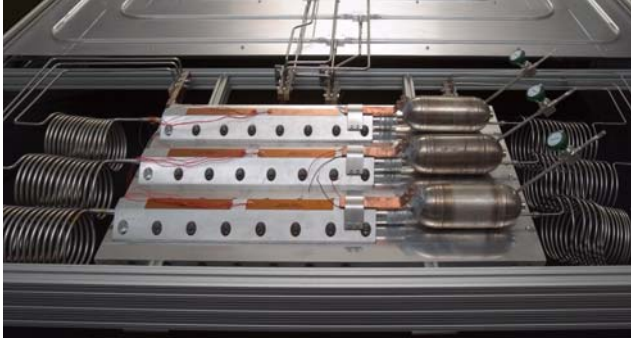
Variable Conductance Heat Pipes (VCHPs):

ACT's VCHPs use specially designed gas reservoirs to provide passive temperature control over a wide variety of heat inputs, sink temperatures and other operating conditions. Applications include heat transport and temperature control of spacecraft electronics in varying thermal radiation environments.



Loop Heat Pipes (LHPs):

ACT's LHPs use fine pore, inverted meniscus wicks to transport large amounts of heat (multiple kW) over long distances (10's of meters). Applications include transporting waste heat to large spacecraft radiators, aircraft anti-icing, and aircraft avionics and actuator cooling.



Advanced Products Under Development:

- Titanium/water heat pipes, VCHPs and LHPs (20 to 250°C)
- Intermediate temperature heat pipes (250 to 500°C)
- Pressure Controlled Heat Pipes for Milli-Kelvin Thermal Control
- High temperature VCHPs for radioisotope Stirling cooling
- Oxygen production from Lunar regolith (850-1050°C)

Life Testing:

ACT maintains an ongoing life test program of aluminum/ammonia CCHP's to demonstrate that ACT's manufacturing processes meet stringent reliability requirements. Each new extrusion profile is manufactured in a standard configuration, thermally characterized and placed on life test at an elevated operating temperature. Periodically, the heat pipes are placed back into a performance test fixture and operated at very cold temperatures to look for signs of non-condensable gas (NCG).

Processes:

ACT's quality system is certified to AS9100-B and ISO 9001:2000. Stringent processes are used to manufacture all aerospace heat pipe products, including:

- Material certification
- Six stage flush, etch and rinse with bath monitoring
- Working fluid triple distillation and processing
- Aerospace (AWS D17.1) certified welders
- Helium mass spectrometry leak detection
- Proof and burst pressure verification
- Accelerated aging and thermal cycling.

Personnel:

The Aerospace Products Group's personnel have a combined experience of over 120 years, are inventors on over 40 patents, and have authored over 200 technical papers. They have established track records in technology development and commercialization. Some key personnel include: • John Hartenstine • William Anderson • David Sarraf • Peter Dussinger.