

Cryogenic Capabilities

For decades, BAE Systems has been an industry leader in cryogenic solutions for critical science and security missions for the nation. Our experience spans over 150 space flights and 50 years of designing and building cryocoolers (cryogenic coolers or refrigerators).

BAE SYSTEMS

Overview

BAE Systems has one of the largest cryogenic teams in the space industry, with a dedicated staff of multi-disciplinary experts in thermal analysis, structural analysis, mechanical design, electrical design, test and project management. We deliver a wide range of cryogenics systems, from coolers and radiators to dewars, for a variety of mission needs.

Recent cryogenic programs include:

- >12 National Defense Infrared Instruments in last decade with detector temperatures from 45K to 130K
- 100K and 150K cryoradiators for the Nancy Grace Roman Space Telescope
- 40K cryocoolers for the Landsat Thermal Infrared Sensors (TIRS) flights 1 and 2
- 30K cryoradiators for the James Webb Space Telescope
- 20+ flight 2-stage cryoradiators for the Space Based Infrared System High
- Airborn 8-foot diameter 20K hydrogen fuel tanks for the Phantom Eye UAV

Enabling Capabilities

BAE Systems specializes in delivering low cost, high capacity, low exported vibration/jitter cryocooler technologies. Compared to standard space cryocoolers, our flight-qualified cryocooler product line offers 3-7 times lower cost, 50% greater efficiency/capacity, 33-50% shorter schedule, and 5-40 times lower exported force and torque (EFT). Our products include:

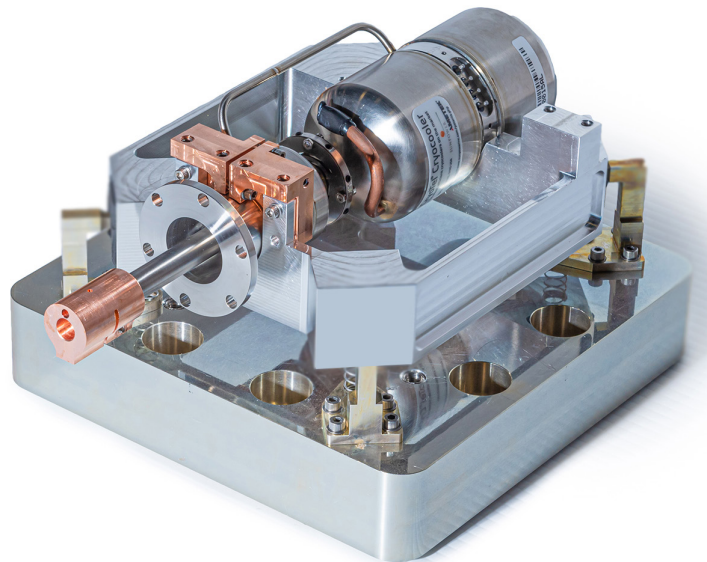
- Klondike: 30 W cooling at 80K, 30 mN EFT
- Kodiak: Klondike with scalable Mission Class A to C-
- Verne: 2 kg cryocooler assembly, 2.5 W at 80K
- Long term cryogenic propellant storage tanks with active and/or passive cooling

Other capabilities include:

- EFT test facilities with 1 uN resolution, 6-foot diameter in vacuum testing
- Multi-stage 4-35K cryocoolers
- High performance (ϵ^* of 0.004 and lower) multi-layer insulation (MLI)
- Flexible, high conductance thermal links
- High conductance conduction bars
- Metallic and composite low conductivity flexures and struts
- Electrical isolators with high thermal conductivity
- Low EFT transmission electrical cables and MLI

Quick Facts

- Over 50 years of experience in cryogenics
- 150 space flights of cryogenic systems
- One of the largest cryogenics organizations in the space industry
- Low-cost, high-capacity, low EFT cryocooler product line
- Toolbox of technology discriminators (MLI, struts, cables, links, etc.)



Images (Top): Webb 30K AOS Cryoradiator;
(Bottom): Verne 2 kg Cryocooler Assembly