

# Low-Mass, Low-Power Hall Thruster System

## *For radioisotope electric propulsion (REP)*

NASA is developing an electric propulsion system capable of producing 20 mN thrust with input power up to 1,000 W and specific impulse ranging from 1,600 to 3,500 seconds. The key technical challenge is the target mass of 1 kg for the thruster and 2 kg for the power processing unit (PPU). In Phase I, Busek Company, Inc., developed an overall subsystem design for the thruster/cathode, PPU, and xenon feed system. This project demonstrated the feasibility of a low-mass power processing architecture that replaces four of the DC-DC converters of a typical PPU with a single multifunctional converter and a low-mass Hall thruster design employing permanent magnets.

In Phase II, the team developed an engineering prototype model of its low-mass BHT-600 Hall thruster system, with the primary focus on the low-mass PPU and thruster. The goal was to develop an electric propulsion thruster with the appropriate specific impulse and propellant throughput to enable radioisotope electric propulsion (REP). This is important because REP offers the benefits of nuclear electric propulsion without the need for an excessively large spacecraft and power system.

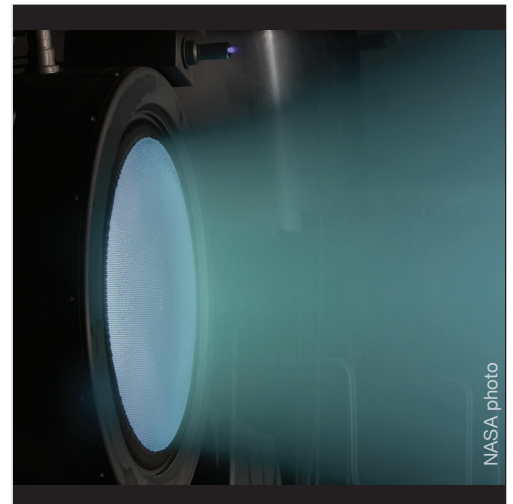
## Applications

### NASA

- ▶ Orbiters around Pluto, Neptune, and Uranus
- ▶ Rendezvous and Centaurs, Kuiper belt objects, and primitive bodies in the outer solar system
- ▶ Extensive surveys of major asteroid groups

### Commercial

- ▶ Low-power electric propulsion systems
- ▶ Low-power Hall effect thruster systems
- ▶ Commercial satellite manufacturers:
  - Primary propulsion on low Earth orbit spacecraft
  - Station keeping on geostationary satellites



## Phase II Objectives

- ▶ Develop a low-mass BHT-600 Hall thruster system, with the primary focus on the low-mass PPU and thruster
- ▶ Design, fabricate, and demonstrate an engineering model version of a low-mass (2 kg) PPU and a low-mass (1 kg) version of the BHT-600 thruster
- ▶ Conduct an integrated system test and deliver a prototype PPU and thruster system

## Benefits

- ▶ Low mass
- ▶ Low power

## Firm Contact

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