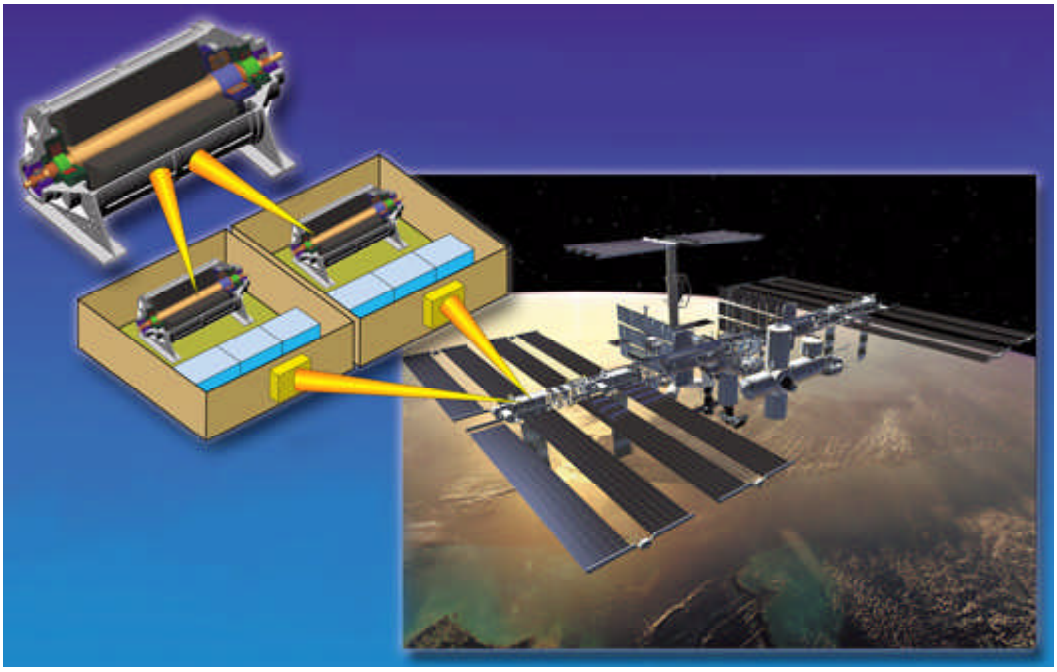
Flywheel Energy Storage System Designed for the International Space Station



Flywheel Energy Storage System (FESS) for the International Space Station. Architecture: 1 flywheel module + 1 set of electronics = 1 flywheel energy storage unit; 2 flywheel energy storage units = 1 flywheel energy storage system.

Long description Proposed approach to outfit the International Space Station power system with flywheel energy storage units, in place of the baseline nickel-hydrogen batteries. With the use of modular change-out units, the flywheel replacement system can be readily implemented on the space station.

Following successful operation of a developmental flywheel energy storage system in fiscal year 2000, researchers at the NASA Glenn Research Center began developing a flight design of a flywheel system for the International Space Station (ISS). In such an application, a two-flywheel system can replace one of the nickel-hydrogen battery strings in the ISS power system. The development unit, sized at approximately one-eighth the size needed for ISS was run at 60,000 rpm. The design point for the flight unit is a larger composite flywheel, approximately 17 in. long and 13 in. in diameter, running at 53,000 rpm when fully charged. A single flywheel system stores 2.8 kW-hr of useable energy, enough to light a 100-W light bulb for over 24 hr. When housed in an ISS orbital replacement unit, the flywheel would provide energy storage with approximately 3 times the service life of the nickel-hydrogen battery currently in use.

Significant progress was made in fiscal year 2001, including the flywheel module design,

avionics design, and test facility preparation. Glenn now has assets to conduct the flywheel cyclic spin test, flywheel module test, and integrated power systems test.

An independent peer review continued to advocate the advancement of flywheel technology to benefit the ISS. However, ISS funding is no longer available for continued development in fiscal year 2002. Plans are in place to continue development once new funding is secured.

Find out more about this research http://acts.grc.nasa.gov/fess/index.html.

Glenn contacts: Dr. Timothy E. Tyburski, 216-433-8616, Timothy.E.Tyburski@grc.nasa.gov; Ray F. Beach, 216-433-5320, Raymond.F.Beach@grc.nasa.gov; and Rex A. Delventhal, 216-433-5608, Rex.A.DeLventhal@grc.nasa.gov
Author: Rex A. Delventhal
Headquarters program office: OSF
Programs/Projects: ISS