National Aeronautics and
Space Administration

NASA COMMERCIAL SPACE

NASA's Technology Transfer Program was designed to proliferate the innovative technology developed at each of the 10 NASA agencies to the widest possible audience. Kennedy Space Center is uniquely situated–both geographically and programmatically. KSC has 24 Research and Technology Focus Areas, within those focus areas we engage in R&T development to enhance the long-term success of our resident spaceflight programs, enable NASA's Exploration Mission on the earth and on other planetary surfaces, and support the growth of US economic competitiveness through technology partnerships and commercialization.

At the Kennedy Space Center (KSC), the Technology Transfer Team works closely with the engineers and scientists in the labs to understand the work that they are doing and determine if it has commercial potential. KSC has eight recognized research and technology capability areas wherein broadly applicable technologies are developed for launch operations, planetary travel, and eventually, planetary habitation.

As the launch operations center, KSC sees a tremendous amount of activity and collaboration with the commercial space entities that share its location. KSC is much more than just a multi-user spaceport, there is also a robust research component that generates new technologies in support of launch/landing activities, as well as research related to living and working in space, so a great deal of it is commercially viable for commercial space companies.

The Technology Transfer Program is interested in partnering with commercial space companies to transfer existing technology and co-develop new technologies to advance the common mission of interstellar exploration and research.

NASA **TECHNOLOGY TRANSFER** PROGRAM

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COMMERCIAL SPACE TECHNOLOGIES

In Situ Wire Damage Detection and Rerouting System
The In Situ Wire Damage Detection and Rerouting System consists of a miniaturized inline connector containing self-monitoring electronics that use time domain reflectometry (TDR) to detect wire faults and determine fault type and fault location on powered electrical wiring. When a damaged or defective wire is identified, the system is capable of autonomously transferring electrical power and data connectivity to an alternate wire path.

Cryo Flux Capacitor
This technology capitalizes on the energy storage capacity of liquefied gases. By exploiting a unique attribute of nano-porous materials, aerogel in this case, fluid commodities such as oxygen, hydrogen, methane, etc., can be stored in a molecular surface-adsorbed state. This cryogenic fluid can be stored at low to moderate pressure densities, on par with liquid, and then quickly converted to a gas, when the need arises. This solution reduces both safety-related logistics issues and the limitations of complex storage systems.

Polyimide Wire Insulation Repair System
The Polyimide Wire Insulation Repair System is a kit consisting of thin film polyimide patches that are applied to damaged areas of wire insulation with a heating device that adheres the polyimide repair film into place. The technology has been prototyped and successfully tested by NASA and the Naval Air Systems Command (NAVAIR). Wire repairs made with this system are permanent, flexible, and much less intrusive than repairs made using current techniques and materials.

Layered Composite Insulation
This easy-to-use system can benefit multiple industries that depend on regulation of low temperatures in equipment and products. The synergistic effect of improvements in materials, design, and manufacture of this new insulation technology exceeds the performance of current multi-layered insulation (MLI) or foam insulation products.

Harsh Environment Protective Housings
This technology is a novel ruggedized housing for an electrical or fluid umbilical connector that prevents intrusion of dust, sand, dirt, mud, and moisture during field use under harsh conditions. The technology consists of a pair of hand-sized protective umbilical interface housings, each containing a connector with an integrated end cap. When the end cap covers the connector, the connector is protected.

Lighting System to Improve Circadian Rhythm Control
NASA has developed a programmable solid state general illumination fixture with full intensity and color temperature control. This new lighting assembly uses a microcontroller with power relay to adjust color temperature and perceived intensity to simulate a practical diurnal cycle.

Regolith Advanced Surface Systems Operations Robot (RASSOR) Excavator
RASSOR is a teleoperated mobile robotic platform with a unique space regolith excavation capability. Its design incorporates net-zero reaction force, thus allowing it to load, haul, and dump space regolith under extremely low gravity conditions with high reliability.

Multidimensional Damage Detection System
The ability to detect damage to composite surfaces can be crucial, especially when those surfaces are enclosing a sealed environment that sustains human life or critical equipment or materials. Minor damage caused by foreign objects can, over time, eventually compromise the structural shell resulting in loss of life or destruction of equipment or material.

Self-Healing Wire Insulation
The self-healing properties of the film are provided by embedded microcapsules containing a solvent soluble polyimide. When cut or otherwise damaged, these capsules release their contents, which dissolve and heal the damaged area. Aerospace and ground vehicles often contain miles of high performance electrical wire insulation that are prone to damage from abrasion and cuts during vehicle operation and maintenance.

Autonomous Flight Termination Unit (AFTU) System
The AFTU evaluates data from onboard navigation sensors and then uses configurable, rule-based algorithms to make flight termination decisions. The mission rules are developed by the local range safety authorities. NASA is making this reference design hardware, software, and technical package available as a royalty-free technology transfer to other US Government agencies and ITAR-qualified companies.