Adaptable Holders for Arc-Jet Screening Candidate Thermal Protection System Repair Materials

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Reusable holders have been devised for evaluating high-temperature, plasma-resistant re-entry materials, especially fabrics. Typical material samples tested support thermal-protection-system damage repair requiring evaluation prior to re-entry into terrestrial atmosphere. These tests allow evaluation of each material to withstand the most severe predicted re-entry conditions.

In pursuit of this purpose, the holders are capable of supporting the material samples in a stagnation orientation (normal to the flow) with respect to the impinging plasma flow. The holder design allows rapid installation and change-out of 2.8 in. (≈ 71 mm) diameter samples and can accommodate sample thicknesses from fabrics to more than 0.5 in. (≈ 13 mm). Each holder consists of an interlocking set of rings, constructed of silicon carbide coated graphite, that clamp together concentrically in such a manner as to restrain the sample during a test. The sample is mounted in front of a washerlike backing plate to simulate the repair of a damaged section of reinforced carbon-carbon (RCC), such as that used on the Space Shuttle Orbiter.

This work was done by Joe Riccio of Johnson Space Center and Jim D. Milhoan of Lockheed Martin Corp. Further information is contained in a TSP (see page 1).MSC-24109-1

Seal With Integrated Shroud for Androgynous Docking and Berthing

Seal prevents gas leakage between the pressurized module and its external environment.

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A specially configured seal system (see figure) has been developed and produced that provides a barrier to gas leakage between a pressurized module and its external environment. The seal system includes a shroud covering that both protects the sealing surface from its environment when not in use and retracts to expose the sealing surface when engaged. The seal system is constructed and arranged to mate with a replicate seal system or with a flat surface. When mated with a replicate seal system, the seal system functions when the two sealing surfaces are aligned or misaligned. The seal system can operate over a wide range of temperatures, limited only by the glass transition and melt temperatures of the material from which the sealing surface is manufactured.

This work was done by Christopher C. Daniels of The University of Akron for Glenn Research Center. Further information is contained in a TSP (see page 1).

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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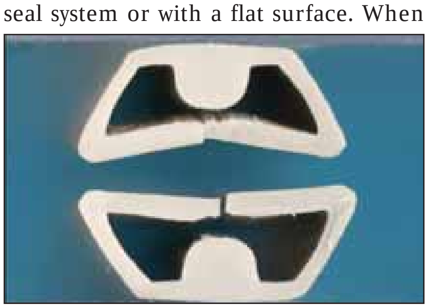
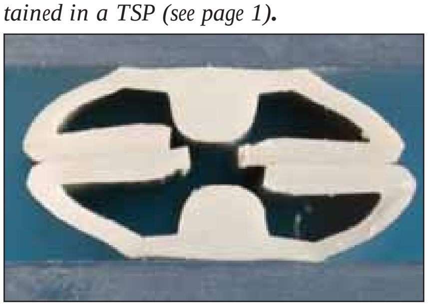
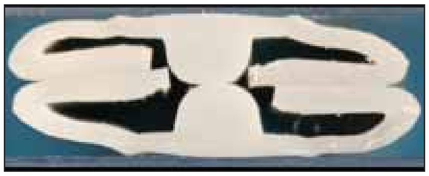
Refer to LEW-18442-1, volume and number of this NASA Tech Briefs *issue, and the*







The **Shroud Covering** protects the sealing surface from the environment when not in use (top) and retracts when mated (bottom).

Locking Nut With Stress-Distributing Insert

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An improved locking nut comprises (1) an internally threaded shell, partly resembling a conventional nut, that can be engaged by a wrench or other tool, and (2) an internally and externally threaded insert that engages the threads of the shell and a bolt. Whereas some prior locking nuts are plated over their entire surfaces for lubrication and prevention of galling caused by engagement of threaded surfaces, this nut includes plating (silver or other soft material) only on the threaded surfaces of the insert, which, during engagement, are enclosed. The elimination of external plating reduces the likelihood of contaminating adjacent equipment.

The insert makes an interference fit

with the bolt thread, helping to lock the shell against loosening during vibration. In response to bolt tension upon tightening, the insert undergoes slight elongation that helps distribute the tension along the full length of thread engagement. The locking nut helps to dissipate vibrational energy through microscopic frictional rubbing between the threads of the insert and the threads of the shell. The soft plating may contribute to damping of vibrations. Rounding of the outer end of the shell reduces the potential for damage to nearby equipment or injury to nearby persons.

This work was done by Rahmatollah F. Toosky and Scott Forest of McDonnell Douglas Corp. for Johnson Space Center. Further information is contained in a TSP (see page 1).

Title to this invention, covered by U.S. Patent No. 5,860,779, has been waived under the provisions of the National Aeronautics and Space Act {42 U.S.C. 2457 (f)}. Inquiries concerning licenses for its commercial development should be addressed to:

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Refer to MSC-23062-1, volume and number of this NASA Tech Briefs *issue, and the page number.*