

Advanced Control Surface Seal Development for Future Space Vehicles



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(Alex Jenkins)

ADVANCED CONTROL SURFACE SEAL DEVELOPMENT FOR FUTURE SPACE VEHICLES



BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 26 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. NASA's Glenn Research Center (GRC) has been developing advanced high temperature structural seals since the late 1980s and is currently developing seals for future space vehicles as part of the Next Generation Launch Technology (NGLT) program. This includes control surface seals that seal the edges and hinge lines of movable flaps and elevons on future reentry vehicles. In these applications, the seals must operate at temperatures above 2000 F in an oxidizing environment, limit hot gas leakage to protect underlying structures, endure high temperature scrubbing against rough surfaces, and remain flexible and resilient enough to stay in contact with sealing surfaces for multiple heating and loading cycles. For this study, three seal designs were compared against the baseline spring tube seal through a series of compression tests at room temperature and 2000 F and flow tests at room temperature. In addition, canted coil springs were tested as preloaders behind the seals at room temperature to assess their potential for improving resiliency. Addition of these preloader elements resulted in significant increases in resiliency compared to the seals by themselves and surpassed the performance of the baseline seal at room temperature. Flow tests demonstrated that the seal candidates with engineered cores had lower leakage rates than the baseline spring tube design. However, when the seals were placed on the preloader elements, the flow rates were higher as the seals were not compressed as much and therefore were not able to fill the groove as well. High temperature tests were also conducted to assess the compatibility of seal fabrics against ceramic matrix composite (CMC) panels anticipated for use in next generation launch vehicles. These evaluations demonstrated potential bonding issues between the Nextel fabrics...



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