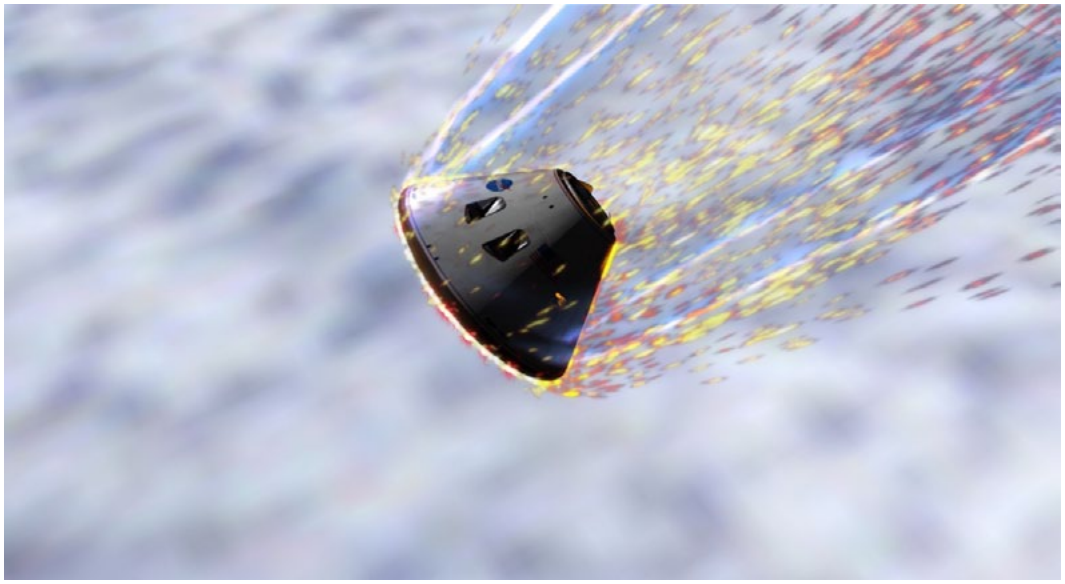
technology opportunity

Heat Shield

Heat Shield Employing Cured Thermal Protection Material Blocks Bonded in a Large-Cell



The innovation uses faceted subsurface under the honeycomb that provides a predictable surface with perpendicular cell walls for the majority of the blocks.

Researchers at NASA Ames Research Center have found a new way to integrate thermal protection materials on external surfaces of vehicles that experience the severe heating environments of atmospheric entry from space. Cured blocks of thermal protection materials are bonded into a compatible, large-cell honeycomb matrix that can be applied on the external surfaces of the vehicles. The honeycomb matrix cell size, and corresponding thermal protection material block size, is envisioned to be between 1 and 4 in. (≈2.5 and 10 cm) on a side, with a depth required to protect the vehicle. The cell wall thickness is thin, between 0.01 and 0.10 in. (≈0.025 and 0.25 cm). A key feature is that the honeycomb matrix is attached to the vehicle's unprotected external surface prior to insertion of the thermal protection material blocks. The attachment integrity of the honeycomb can then be confirmed over the full range of temperature and loads that the vehicle will experience.

Technology in Detail

Another key feature of the innovation is the use of uniform-sized thermal protection material blocks. This feature allows for the mass production of these blocks at a size that is convenient for quality control inspection. The honeycomb that receives the blocks must have cells with a compatible set of internal dimensions. The innovation involves the use of a faceted subsurface under the honeycomb. This provides a predictable surface with perpendicular cell walls for the majority of the blocks. Some cells will have positive tapers to accommodate mitered joints between honeycomb panels on each facet of the subsurface. These tapered cells have dimensions that may fall within the boundaries of the uniform-sized blocks.

Patents

This technology has been patented (U.S. Patent 7,662,459). Reference No. ARC-16018-1

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to inquire about licensing possibilities for this technology for commercial applications.

For More Information

If you would like more information about this technology, please contact:

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