DEMONSTRATION OF A NEW DUST RESILIENT THERMAL SHUTTER MECHANISM FOR LUNAR APPLICATIONS

Olly Poyntz-Wright (1), Andrew S Gibson (1), Matthew Oldfield (1), Angus Bishop (1), Angel Iglesias (2), Martin Humphries (3), Elena Cristina Paul (4),

(1) ESR Space, Warrington UK
(2) Almatech, Lausanne Switzerland
(3) Spacemech Ltd, Bristol UK
(4) ESA-ESTEC Noordwijk Netherlands

ABSTRACT

The ESA-funded Lunar Thermal Shutter (LTS) mechanism, developed by ESR Space and supported by Almatech and Spacemech, is a novel mechanism which provides a cover over radiators at or near the lunar surface. Consisting of a 710×410 mm frame, the LTS utilises a stepper-motor and arrangement of tensioned belts to draw an aluminised film over a radiator. The benefits of this system are two-fold: firstly, it protects the radiator from contamination with lunar regolith which can negatively impact thermal performance. Secondly, it allows the radiator area exposed to be varied, providing control of its effective emissivity. The mechanism is dust resilient and fully scalable, making it ideal for a wide range of future applications. These capabilities will extend system lifetimes through the maintenance of cleanliness and reliability, while enabling system level mass savings versus traditional radiators and lunar night survival by limiting dissipation of payloads such as for ESA Argonaut applications.

Link to full paper will be become available during ESMATS 2025….