ESR Technology

*in collaboration with SpaceMech Ltd.*

SpaceMech

# Cubesat Thermal Shutter (CTS) Mechanism

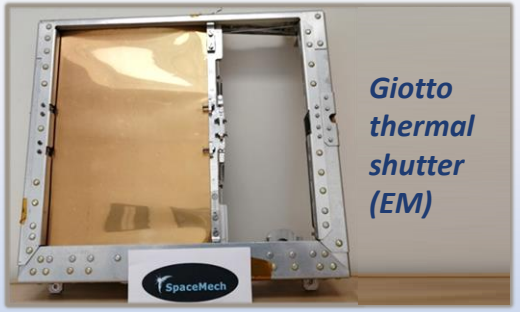

*Thermal Shutter Demonstrator*

- ✓ **Designed to stabilise cubesat payload orbital temperatures**
- ✓ **Slim Design Maximises remaining payload volume**
- ✓ **Low-power DC motor provides simple drive interface, with end-stop and position sensor options**
- ✓ **Readily scalable to larger cube-sats and micro-sats**

| Parameter | Details/Value |
|---|---|
| Applications | Thermal control, optical shutter |
| Suitable platform | 1U scalable to 2, 3, 6 or 12U |
| Developed Under | UKSA GEI (2nd call) – by Spacemech Ltd |
| Area Efficiency (%) | 80% (SSM radiator material) |
| Shield Film Properties | Tailorable (various coated polyimide materials available) |
| Mass Efficiency | 0.7 gm/cm$^2$ |
| Volume fraction in 1U | 0.14 |
| Operating Life (cycles) | >1,000,000 demonstrated |
| Power when actuated | < 2.0 W |

Developed under a UKSA GEI project, the compact thermal control device is to enable Cube-Sats and small spacecraft to actively regulate payload temperatures, using a design based on mechanism flown on the Giotto spacecraft (lower right) in the 1980's. This combination of deep space heritage, with more recent technology, allows for miniaturisation while achieving a high view factor to space in the open state.

Several design iterations were performed to reach an optimised design. Metallic and polymeric belt options were characterised for lifetime potential, en route to establishing a highly reliable, radiation tolerant design. A fully-functional Demonstrator unit was manufactured, functionally tested and incorporated into a dummy Cube-Sat (shown above).




*Giotto thermal shutter (EM)*

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