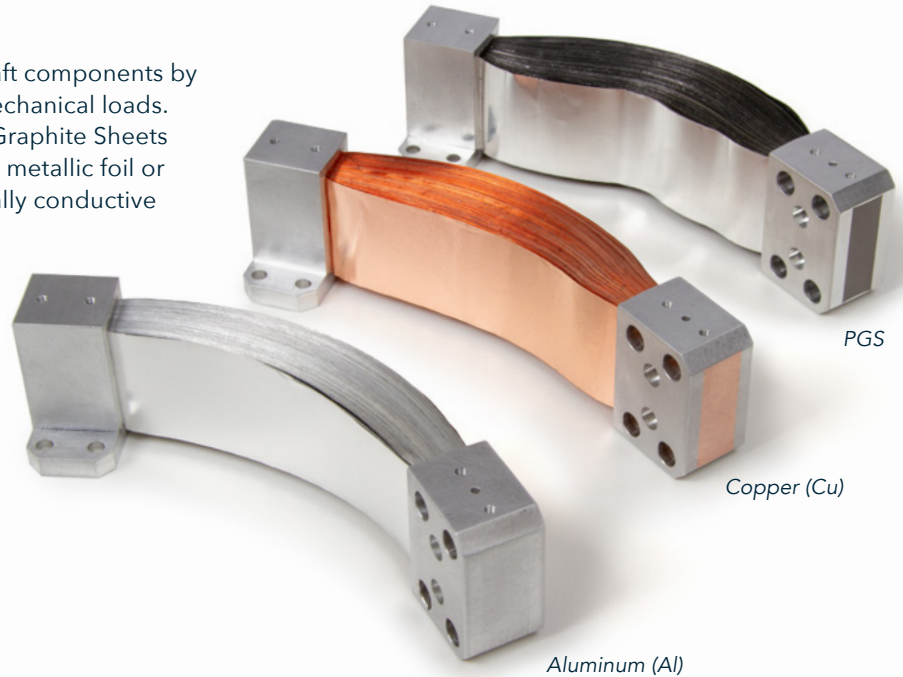


# PGS THERMAL SOLUTIONS

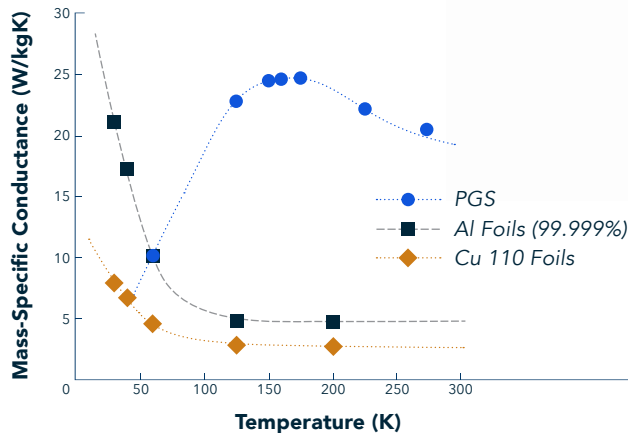
## Thermal Straps & Conductor Bars

### PGS THERMAL STRAPS

Thermal straps are used to cool sensitive spacecraft components by transferring heat while reducing the transfer of mechanical loads. The Space Dynamics Laboratory's (SDL) Pyrolytic Graphite Sheets (PGS) thermal straps provide several benefits over metallic foil or braid thermal straps. PGS is six times more thermally conductive than aluminum at room temperature and is only 72% of the density. The mass-specific thermal conductance of PGS straps is up to five times that of aluminum foil straps and up to eight times that of copper foil straps, with the same design. PGS straps are the ideal option for mass-sensitive spacecraft and applications designed for temperatures above 80 K.



### MASS-SPECIFIC THERMAL CONDUCTANCE



Thermal strap measured mass-specific conductance vs. temperature for 25  $\mu$ m PGS as compared to 99.999% Al foil and copper foil thermal straps of the same geometry.



Large SDL PGS thermal strap

### FEATURES

- Higher flexibility than metallic counterparts
- Higher thermal conductance above 80 K than metallic straps
- Lower density than metallic foils
- Proven fabrication processes
- No solders, adhesives, or additives of any kind (completely organic)
- TRL-7

### SPECIFICATIONS

- PGS strap cleanliness
  - No visible particles from the PGS after vibration testing
  - Effluent analyzed per IEST-STD-CC1246E at Level 350 R5E-1 after standard cleaning at SDL
  - Outgassing per ASTM E595 measured 0.01% total mass loss (NASA requirement is <1%), 0.002% CVCM & 0.008% WVR
  - Filtered particle containment sleeve (PCS) design available for contamination-sensitive applications
- Vibration survivability
  - Survived exposure up to 58 GRMS & +/-0.5" relative displacement (one end relative to the other) with no degradation to thermal performance
- Radiation survivability
  - 40 Mrad (215.17 rad/sec) with no degradation to thermal performance

## PGS CONDUCTOR BARS

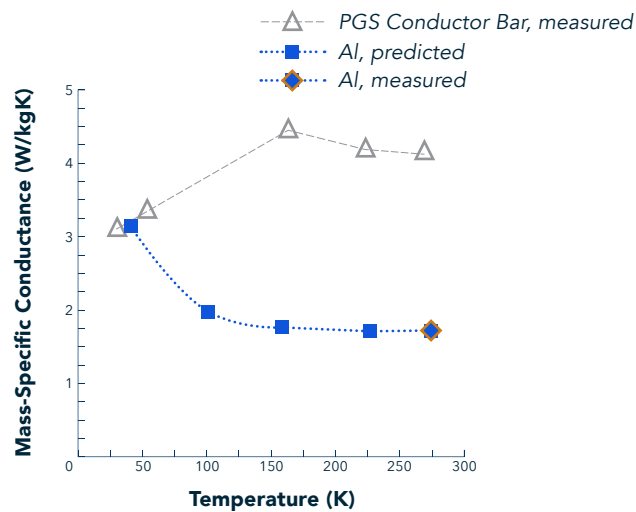
PGS conductor bar technology combines the superior thermal performance of PGS with the rigid structural integrity of aluminum. Many applications demand a rigid conductor bar to efficiently remove heat from multiple sources simultaneously while providing structural support.

Initial SDL PGS conductor bars significantly outperform traditional aluminum conductor bars with more than double the measured mass-specific thermal conductance. Optimization for specific customer interfaces can further increase performance.

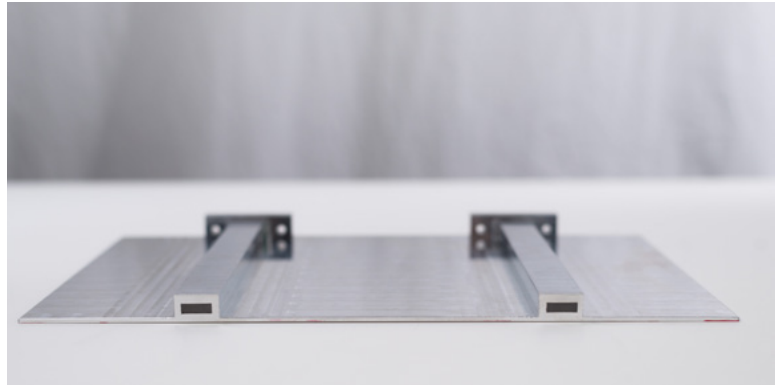
## FEATURES

- Lower mass than traditional conductor bars
- Multiple mounting locations along the length of the bar to enable simultaneous thermal sink for multiple components
- TRL-5

## MASS-SPECIFIC THERMAL CONDUCTANCE



PGS conductor bar mass-specific conductance vs. temperature as compared to solid-aluminum equivalent.



PGS-embedded aluminum radiator



PGS-embedded conductor bar



PGS-embedded conductor bar with integrated thermal strap

Questions? SDL welcomes all inquiries. For more information about SDL's thermal strap solutions, please contact:

435.713.3930

[thermalstraps@sdl.usu.edu](mailto:thermalstraps@sdl.usu.edu)