

Unmanned aerial vehicle (UAV) battery pack manufacturers face several challenges in designing and producing battery packs such as reducing mass, maintaining full function at high altitudes and in extreme temperatures, and efficient heat dissipation.

Fralock provides component solutions to these challenging problems with unparalleled design, engineering, and manufacturing capabilities.

Our solutions offer superior performance, extended product life, and a competitive advantage. With decades of materials expertise, highly skilled engineering, and a wide array of product offerings, we solve seemingly “unsolvable” problems. Our high precision manufacturing outperforms the competition and satisfies your demanding requirements for quality, reliability, and durability.



***“We solve seemingly  
“unsolvable” problems”***

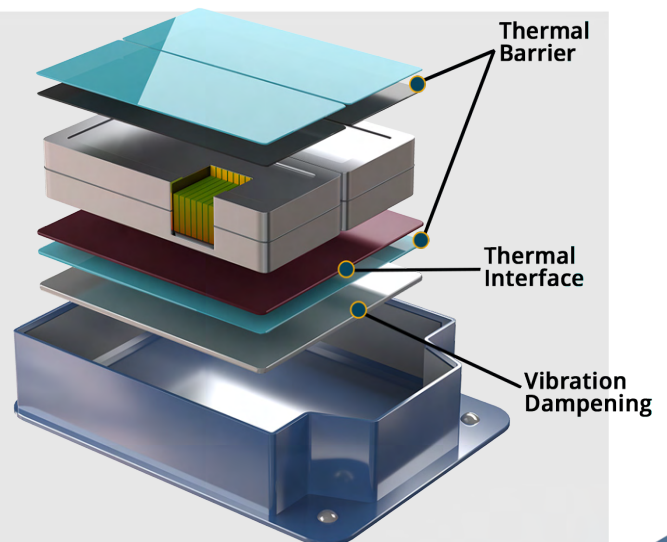
## FRALOCK SOLUTIONS: Low Mass Design and Extreme Temperature Operation

Achieving lightweight battery packs is crucial for UAVs. Fralock offers a variety of components to optimize weight and power in extreme environments. Our continual development in materials and fabrication technology enables us to support our customers with highly effective custom solutions.

### Fralock Addresses Your Challenges

**Thermal Management** – High energy density batteries are required in battery-powered aircraft to reduce weight. The high heat generation of these batteries pose a greater risk of overheating or thermal runaway, and requires a highly efficient, low mass thermal management system that dissipates, blocks, and insulates heat. Fralock provides superior engineered material solutions for thermal and other applications.

**BMS Weight Reduction** – The Battery Management System (BMS) is responsible for regulating temperature, voltage, current, capacity, and life cycle of cells. Reducing weight in the BMS can be accomplished in part by use of polyimide flex circuits to replace denser PCBs. Fralock’s polyimide flex circuits that are bonded without adhesives are highly durable, can withstand temperature and pressure extremes, and allow greater design flexibility.



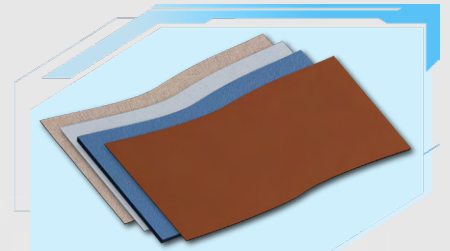
## FRALOCK ENGINEERED SOLUTIONS

Fralock provides custom engineered components made with materials that are highly suited for your UAV battery pack system.

### Interface Material Solutions

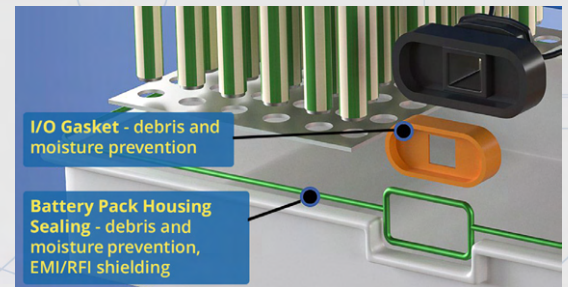
At Fralock we work closely with our customers to design, engineer, prototype, test, and manufacture your components to provide you with the optimal solution.

**Thermal Management Components** – We provide thermal pads, gap pads, gaskets, and thermal tapes made with materials such as graphite, silicone, and non-silicone materials. We help you select the right material and design to best fit your application.



**Housing and Sealing Gaskets** – Fralock is highly experienced in providing gaskets and seals for protection from external debris, vibration/shock, and leakage prevention. These include:

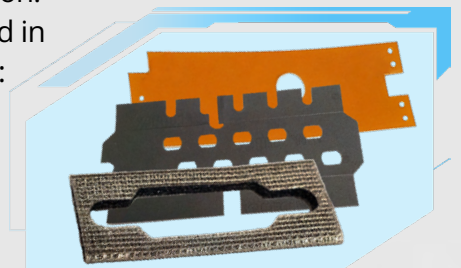
- Fire-Resistant Foams
- Silicones
- Neoprene Rubbers
- Polyurethane
- Ethylene Propylene Diene Monomer (EPDM)
- Polyolefins
- Fluorosilicone
- Elastomers
- Other Options – contact us



### Thermal Blocking and Electrical Insulation

Preventing heat transfer and electrical shorting in the battery pack is essential to mitigate premature degradation of cells or modules and even thermal propagation. Thermal barriers and electrical insulation/dielectrics can sometimes be achieved in the same material component, saving space and weight. Our materials include:

- DuPont™ Cirlex®
- DuPont™ Kapton®
- Tapes with ceramic fibers
- Polypropylene
- Polyurethane
- Polycarbonate
- Other Options – contact us



Cirlex® and Kapton® are registered trademarks of affiliates of DuPont de Nemours, Inc. used under license by Fralock.



Get in touch with us to discuss your project

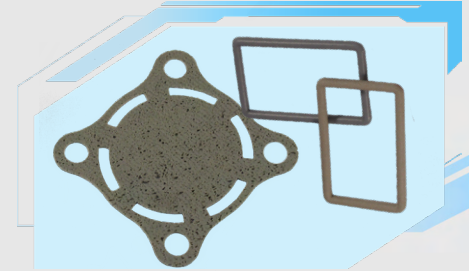
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## EMI-RFI Shielding

EMI and RFI shielding in battery packs is highly important in preventing interference from external sources. In some cases, the same component can be used for sealing the housing and EMI shielding by choosing a material with properties that satisfy both criteria, for example a compressible elastomer with EMI shielding capabilities. Fralock provides EMI/RFI shielding components made with:

- Electrically Conductive Elastomers
- Foils
- Fabrics
- Other Options – contact us
- Tapes and Adhesives
- Wire Mesh
- Mesh/Elastomer Combinations



## Shock Protection and Vibration

Fralock offers a variety of materials to suit your unique needs. Our materials include:

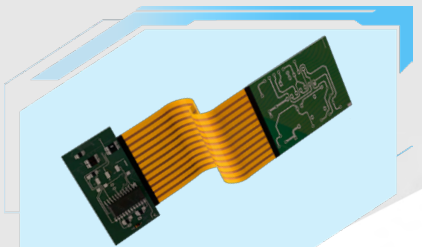
- Silicone
- Polyurethane
- Polyolefins
- Rogers Poron® (urethane foam)
- Rogers Bisco® (silicone foam)
- Neoprene
- NBR (natural Buna rubber)
- 3M™ VHB™ (very high bond adhesives)
- Fluorosilicone Foam and Solids
- Specialty Laminates
- Other Options – contact us



## Flexible and Rigid Flex Circuits and Heaters for BMS

Fralock provides **Adhesiveless Lamination Technology (ALT Dura™)** flex products that are laminated without any adhesives. These circuits provide several benefits for UAV applications compared with traditional adhesive laminated products:

- 30% lower mass
- Polyimide layers are joined in a monolithic bond, mitigating delamination
- Fully foldable with repeated flexing without cracking
- Can operate in more extreme temperatures, from -269° to 220° C (-452° to 428° F)



**We can provide additional material options to meet your specific requirements. Contact us for assistance.**

# Quality

Product quality is built into Fralock components at every step including evaluation and selection of materials, design, prototyping, and testing.

**Compliance and Certifications:** Fralock is highly experienced in selecting materials that satisfy essential certifications and approvals. We can provide documentation and support throughout the manufacturing process, ensuring the chosen materials are compliant with your required specifications.



**Testing and Inspection:** Through rigorous testing and analysis, we evaluate the performance and reliability of materials and components in real-world conditions, ensuring that your requirements are met.



By leveraging Fralock's knowledge and expertise, our customers benefit from optimal material selection, precision manufacturing, superior product performance, and a competitive edge.

**FRALOCK**<sup>®</sup>



USA Manufacturer



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Get in touch with us to discuss your project  
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