



High Surface Area to Volume Ratio

The surface area of a 65" TV screen fits within the volume of a 2" cube of Duocel® foam



High Structural Integrity

Solid ligaments make Duocel® superior to sintered or printed structures



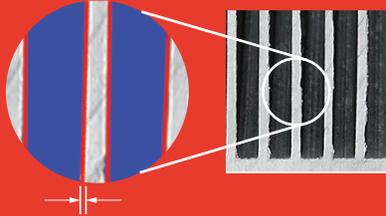
Open Celled

Fluids can easily flow through the entire structure of Duocel®



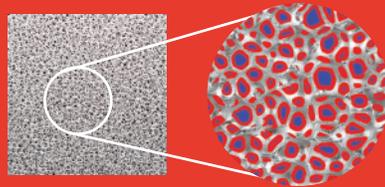
Lightweight

The low density of Duocel® makes it a lighter substitute for established applications



Initial penetration of heat into PCM is shallow due to PCM wax's poor thermal conductivity

Metal foam's high surface area allows for greater transfer of heat into the PCM



Phase Change Material (PCM)

Typical waxes used in PCMs have low thermal conductivity, and rely on extended surfaces to distribute heat throughout the wax matrix.

Metal foam is an extended surface with a much smaller gap between ligaments than machined fins, allowing more complete transfer of heat from the source to the PCM wax.

Two-Phase Cooling

Metal foam's high surface area creates increased nucleation sites. These enhance boiling and reduce thermal resistance.

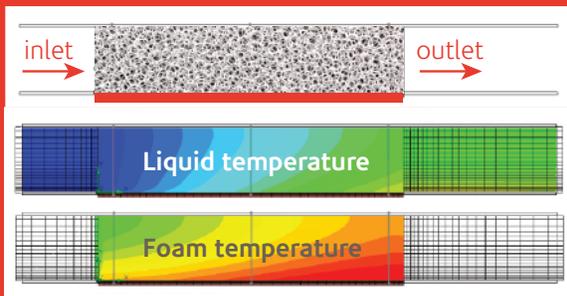
Metal foam enhances mixing, which delays dryout and extends the critical heat flux limit, allowing for much higher heat fluxes than microchannel designs.



Saturated liquid in

Heat in

Liquid + vapor mixture out



Liquid Cooling

Metal foam increases the heat transfer coefficient by enhancing mixing and restarting the boundary layer.

Manufacturing Advantage

Duocel® is great for compact, low-weight systems and conformal form factors.

Duocel® foam can be machined, plated, anodized, brazed, and soldered.



More About Duocel®

Duocel® is an open-celled rigid foam with solid ligaments and optimized properties for your design.

Base material



Aluminum



Copper



Carbon



Silicon Carbide

Pore Size

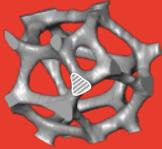


100 PPI
(~0.01")



5 PPI
(~0.20")

Ligament cross-section



3%



6-8%



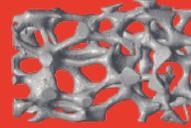
10-12%



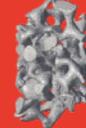
15%

Relative Density

Compression



Uncompressed



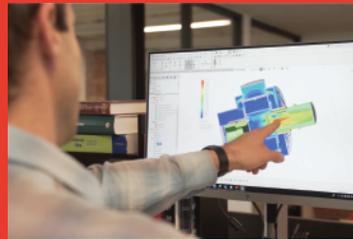
Compressed

ERG Engineering

With over 50 years of expertise designing and manufacturing foam components, we tailor Duocel® to your design for maximum performance.

Design Optimization

- Thermal conductivity
- Crush strength
- Pressure drop
- Surface area
- Operating temperature
- Electrical conductivity
- Reactivity

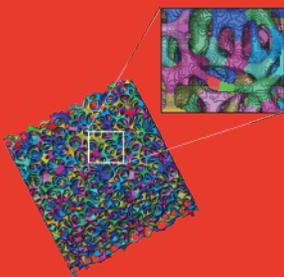


Testing

- Compressive and tensile testing
- Shock and random vibration
- Proof and burst pressure
- Thermal cycling
- microCT scanning
- Single and two-phase heat transfer

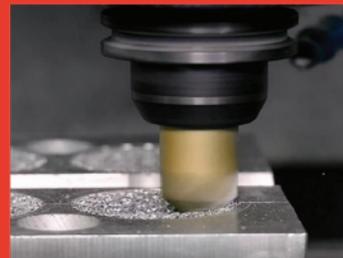


Manufacturing Advantage



Better strength and conductivity

Unlike metal foam produced through other methods, Duocel® has solid ligaments with fully developed grain boundaries.



Flexible fabrication

Duocel® metal foam can be machined, formed, brazed, soldered, anodized, and coated.

Flight Proven

ERG Aerospace has produced TRL-9 Duocel® components for various applications, including Mars landers, satellites, and commercial and military aircraft.

- UTC Supplier Gold
- 2019 Pratt & Whitney Most Innovative Supplier
- 2018 IHI Supplier of the Year
- 2017 Pratt & Whitney Service-Disabled Veteran Owned Supplier of the Year

