MULTISCALE SYSTEMS

MetaCORE-LD

Lighter paneling with increased strength

Technical datasheet

Description

MetaCORE-LD is MetaCORE engineered into a sandwich panel. This composite structure offers substantial weight reduction with a maximum bonding surface area. As a result, delamination of panels from the core material is a problem of the past.

Table 1: Characteristics of MetaCORE-LD with corresponding advantages

Characteristic	→	Advantage
Low Mass Density (Lightweight)	→	Reduces total vehicle weight
High Strength	→	Mitigates catastrophic failure
Low Thermal Conductivity	→	Better temperature control
Pro-Isotropy	→	Multi-directional performance
Corrosion Resistance	→	Increased durability
Cost Savings	→	Widely available raw materials
Customer-Preferred Manufacturing Methods	→	On-demand customization

Geometric Motifs

The MetaCORE product line was conceived as a lightweight impact-absorbing structural material. These geometric motifs (below) have made their way into MetaCORE-LD, which offers our customers a greater access to bespoke solutions.

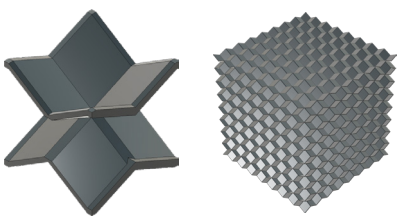

Fig. 1: *MetaCORE [EB] motif as single unit cell and tessellation (right).*

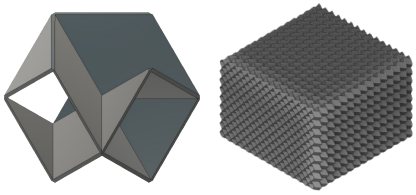

Fig. 2: *MetaCORE [MO] motif as single unit cell and tessellation (right).*

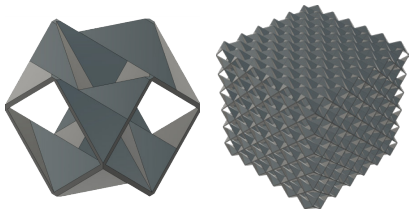

Fig. 3: *MetaCORE [WB] motif as single unit cell and tessellation (right).*

Loading Types and Panel Geometry

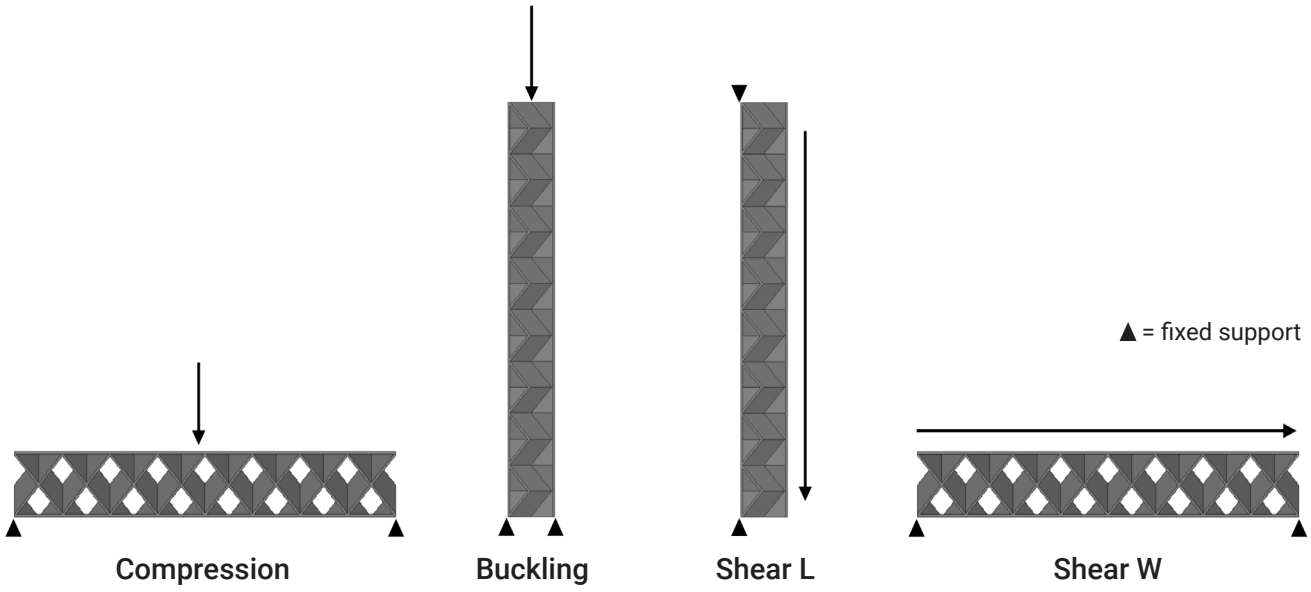

Fig. 4: *Definition of loading types of MetaCORE-LD*

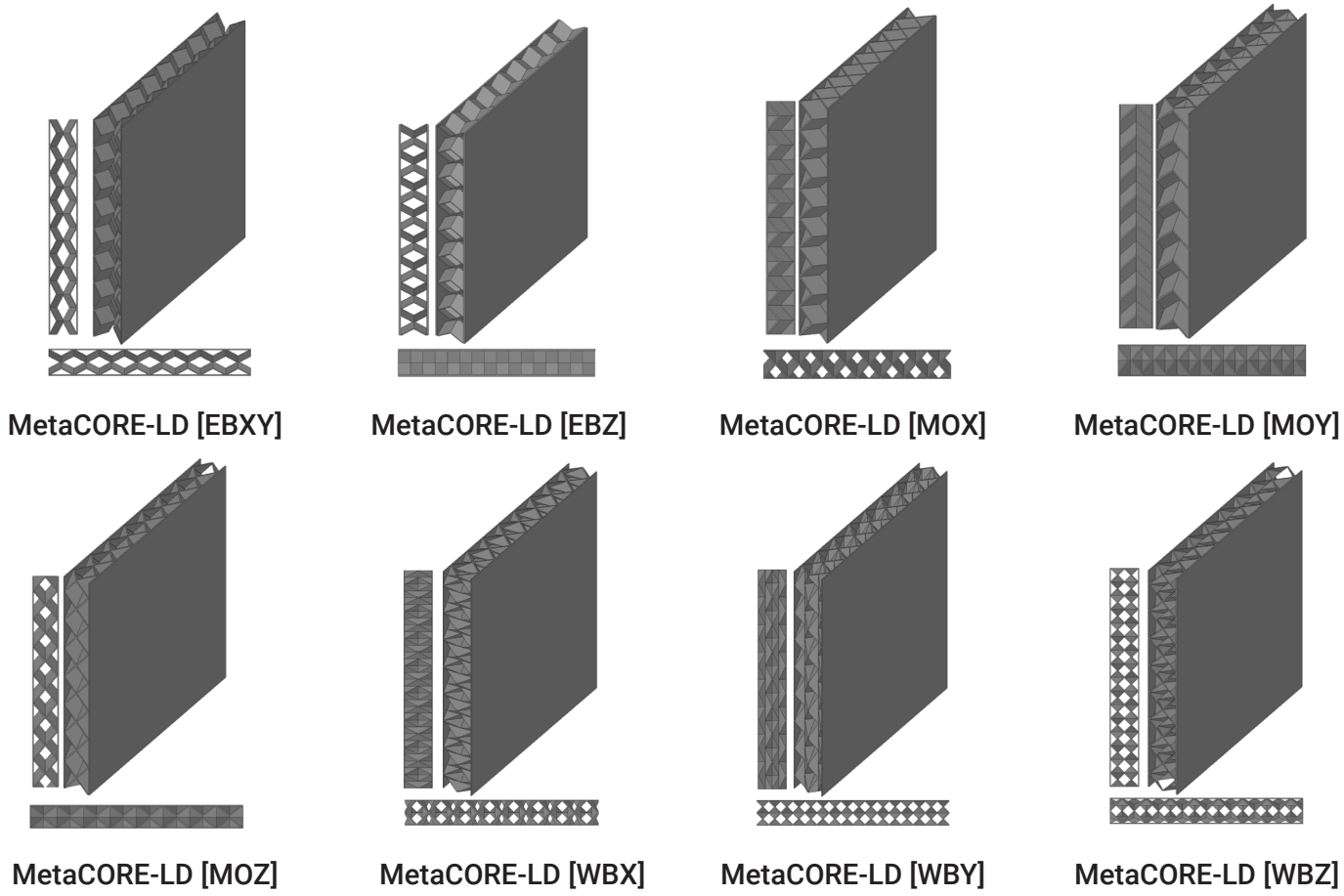

Fig. 5: *MetaCORE-LD motifs relating to Table 3.2*

Specification of MetaCORE-LD metamaterials

Product - Motif & Orientation - Core Material - Skin Material

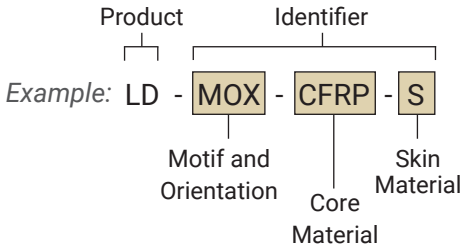

Table 2: Density, Typical Compressive Strength, Typical Buckling Strength, and Typical Shear Strengths

Metamaterial	Base Material	Density		Typical Compressive Strength		Typical Buckling Strength		Typical Shear Strength L		Typical Shear Strength W	
	core/skin*	pcf	kg/m³	kpsi	MPa	kpsi	MPa	kpsi	MPa	kpsi	kMPa
EBXY-CFRP-S	CFRP/Steel	50	795	0.25	2	2	14	1.3	9	1.3	9
EBZ-CFRP-S	CFRP/Steel	50	795	0.25	2	4	28	2.3	16	2.3	16
MOX-CFRP-S	CFRP/Steel	57	910	0.4	3	2.7	19	1.5	10	1.5	10
MOY-CFRP-S	CFRP/Steel	57	910	0.3	2	2.1	14	1.7	12	1.3	9
MOZ-CFRP-S	CFRP/Steel	57	910	0.3	2	2.9	20	1.5	10	1.7	12
WBX-CFRP-S	CFRP/Steel	51	825	0.4	3	1.9	13	1.1	8	1.1	8
WBY-CFRP-S	CFRP/Steel	51	825	0.4	3	1.8	12	1	7	1	7
WBZ-CFRP-S	CFRP/Steel	51	825	0.4	3	2.6	18	1.5	10	1.5	10

* Steel thickness ~1mm. Core thickness ~1 unit cell (~10-20mm).

Aluminum skins and skinless panels also available.

See Fig. 4 for definition of loading types and Fig. 5 for renders of panel geometry.

Material abbreviations:

- AL - Aluminum
- CFRP - Carbon Fiber Reinforced Plastic
- GS - Galvanized Steel
- S - Steel

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