TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Progetto
AMHybridStructures

TekCo
Tekno Compositi s.r.l.

UNIVERSITÀ DI CASSINO E DEL LAZIO MERIDIONALE
Dipartimento di Ingegneria Civile e Meccanica

Relatore: ing. Luca Tersigni
Technical Manager di Tekno Compositi

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Referente: prof. Luca Sorrentino
Professore di Tecnologie e Sistemi di Lavorazione

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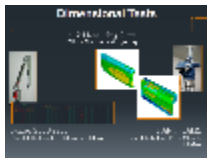
PROGETTI STRATEGICI AdS AEROSPAZIO

Tekno Compositi: Company Overview

Is a company for Advanced Composite Manufacturing, Prototyping & Training

Plant Equipment …



Aerospace & Automotive Primary & Secondary Structures Products …

Aerospace & Automotive Main OEM's Prime / Second Contractors …

LEONARDO Divisione ETN

LEONARDO Divisione Elicotteri

AERO SEKUR SAFETY FIRST

MECAER | AVIATION | GROUP

ThalesAlenia Space

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PROGETTI STRATEGICI AdS AEROSPAZIO

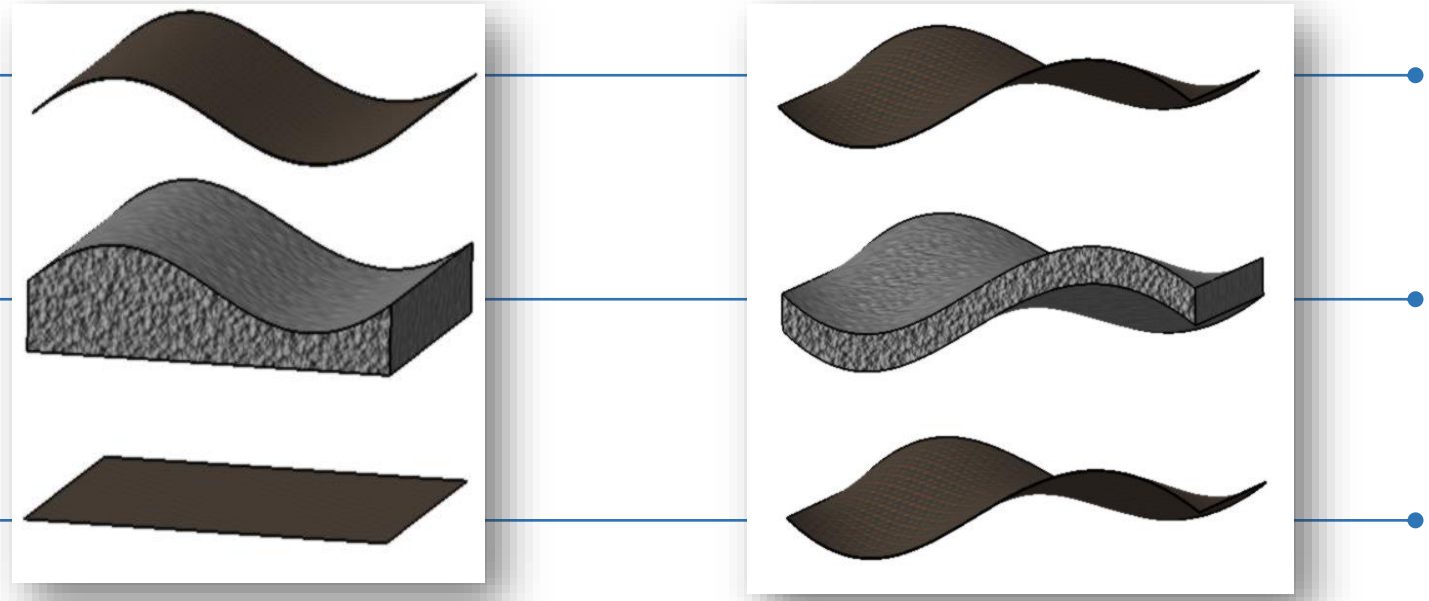
R&D: AMHybridStructures

Acronimo e durata Progetto	**AMHybridStructures – 18 Mesi**
Titolo progetto	Avanzate strutture ibride metallo/composito per componenti ad elevate prestazioni funzionali
Obiettivo del progetto	Sviluppo di strutture ibride ad elevate prestazioni funzionali costituite da un core in metallo realizzato in AM ed irrigidite in materiale composito polimerico

FRP (Skin)

Lattice Structure
Ti6Al4V (CORE)

FRP (Skin)

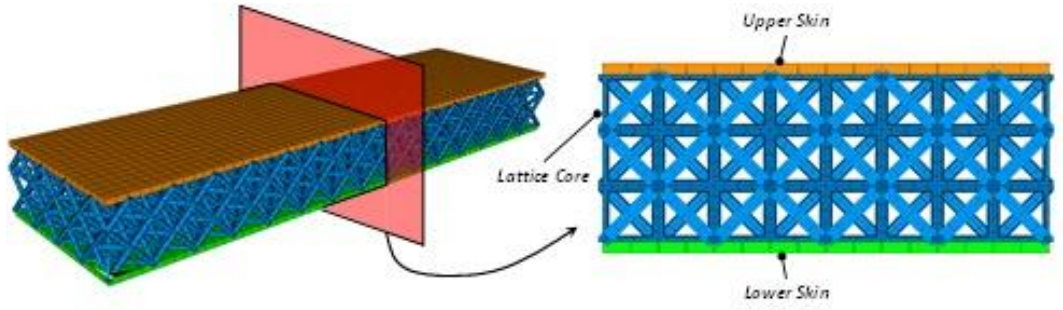


PROGETTI STRATEGICI AdS AEROSPAZIO

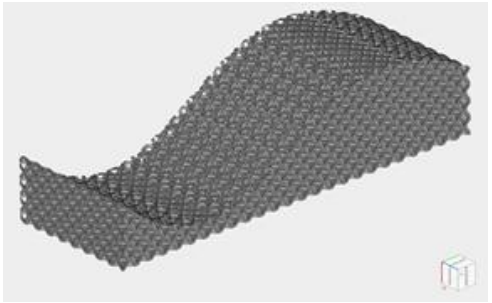
R&D: AMHybridStructures

Steps del Progetto

1. Definizione Processo
2. Sviluppo Modello FEM
3. Validazione modello FEM



geometrie piane a sez. costante 9,3x30x270mm

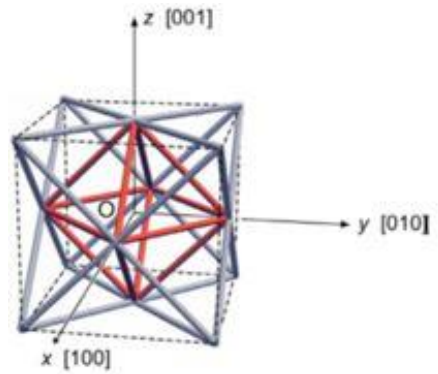


Spessore Variabile

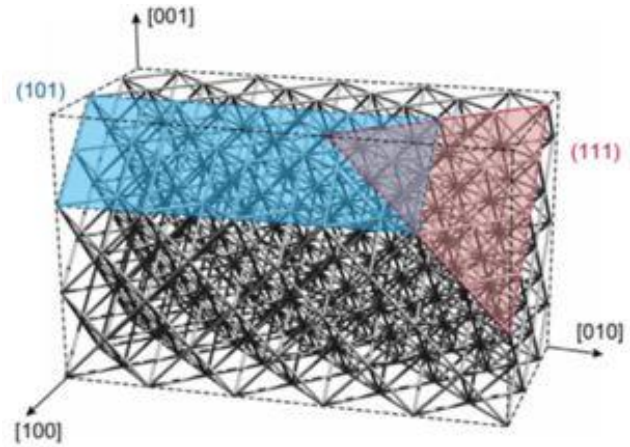
Spessore Costante

Struttura Lattice mediante stampante 3D (EBM)

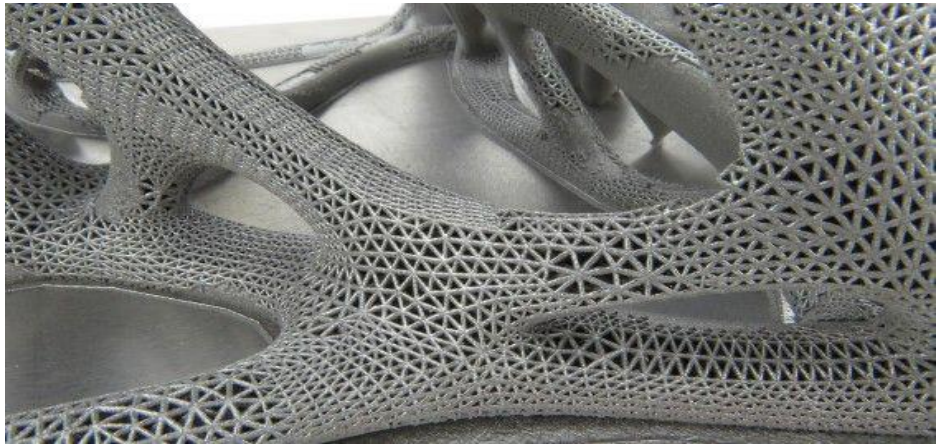
- ✓ Ripetizione di una **cella base** o **unitaria** (**unit cell**) lungo le 3 direzioni x, y e z
- ✓ Alcune tipologie di **unit cell** : tetraedrica, lattice block, piramidale e octet-truss

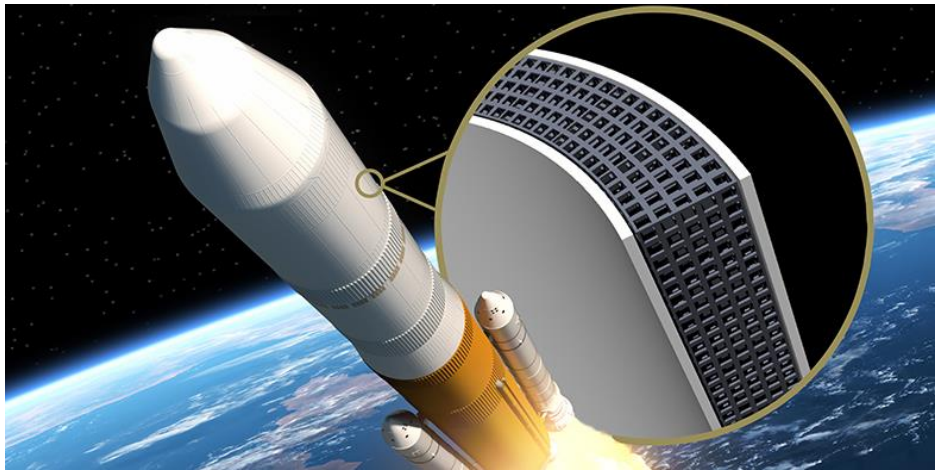


Cella octet-truss



Lattice structure





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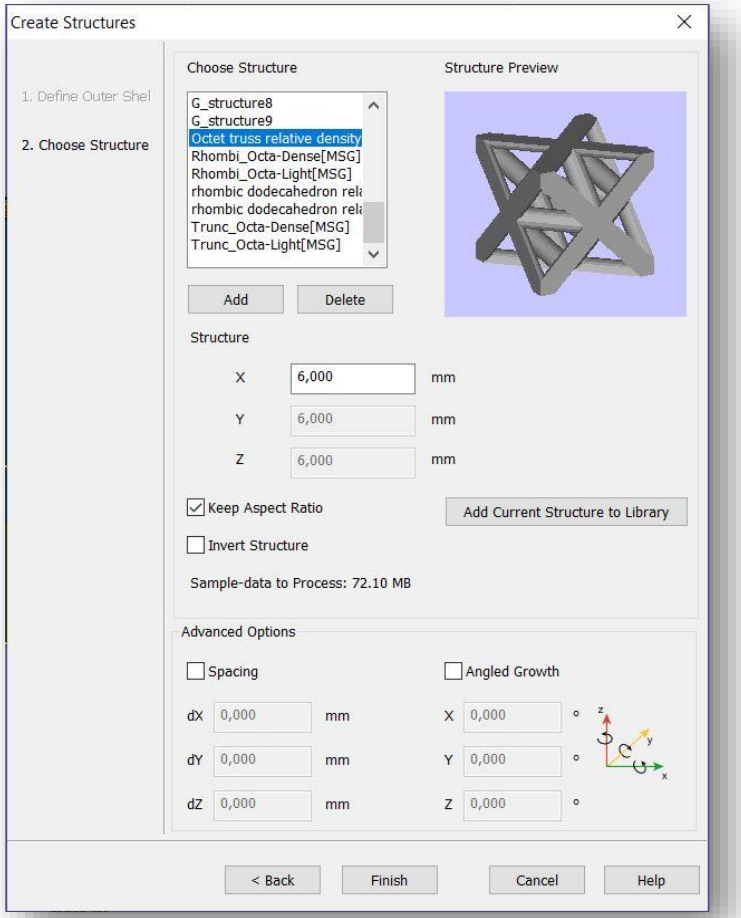
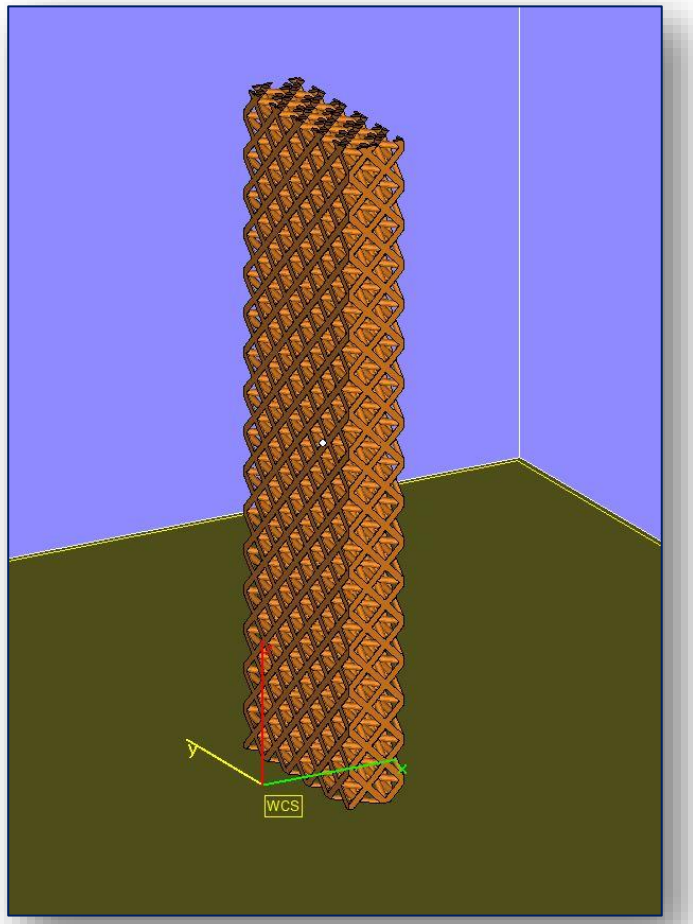
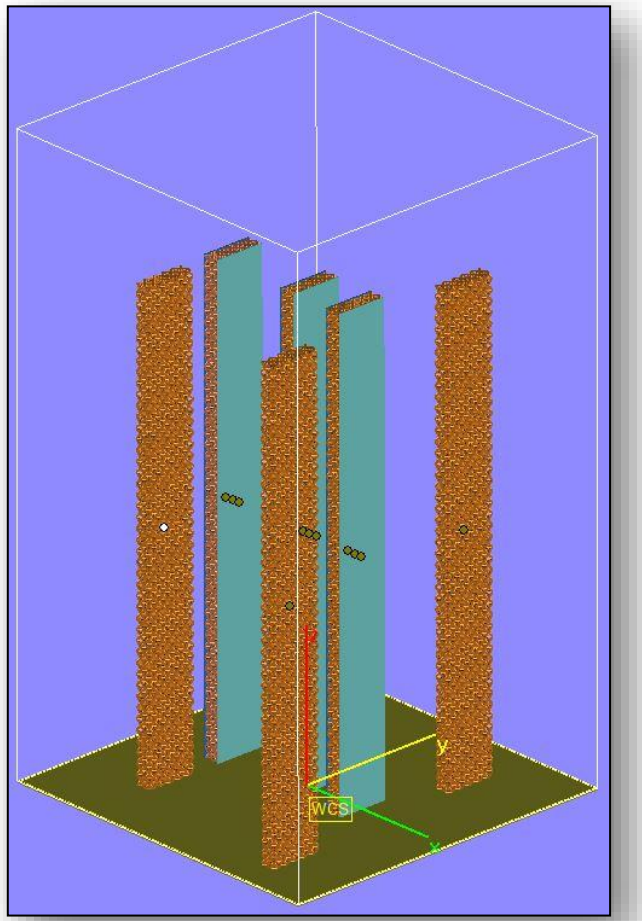
Struttura Lattice mediante stampante 3D (EBM)







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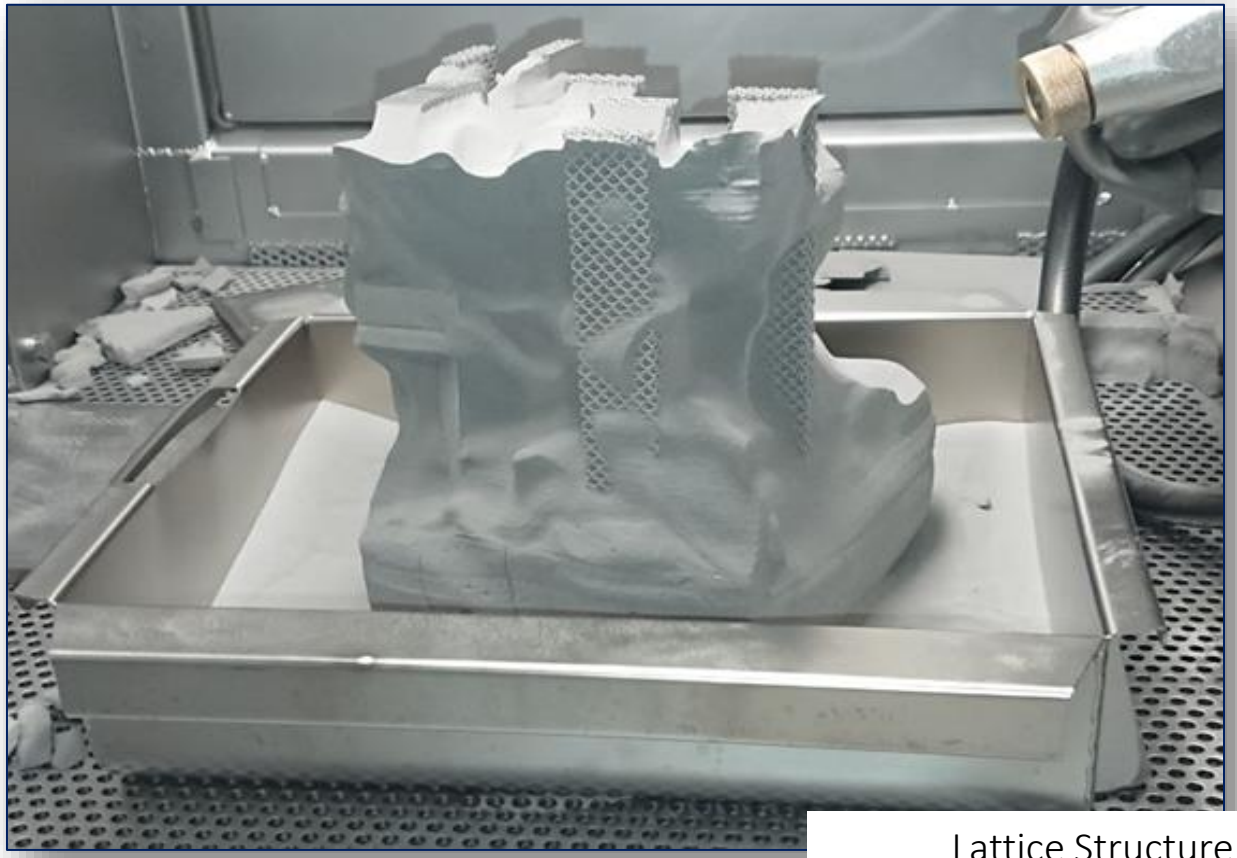
Struttura Lattice mediante stampante 3D (EBM)



Lattice Structure **Ti6Al4V** (CORE)

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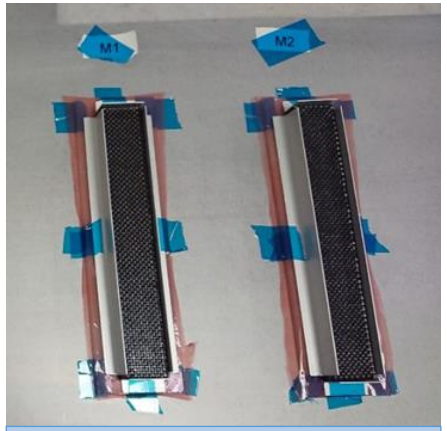
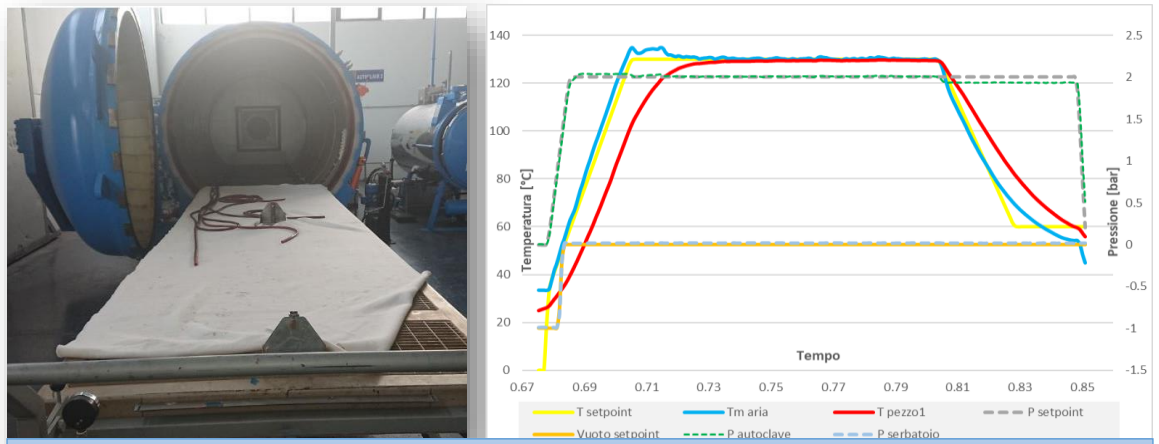
R&D: AMHybridStructures

Formatura (Prepreg + Autoclave)

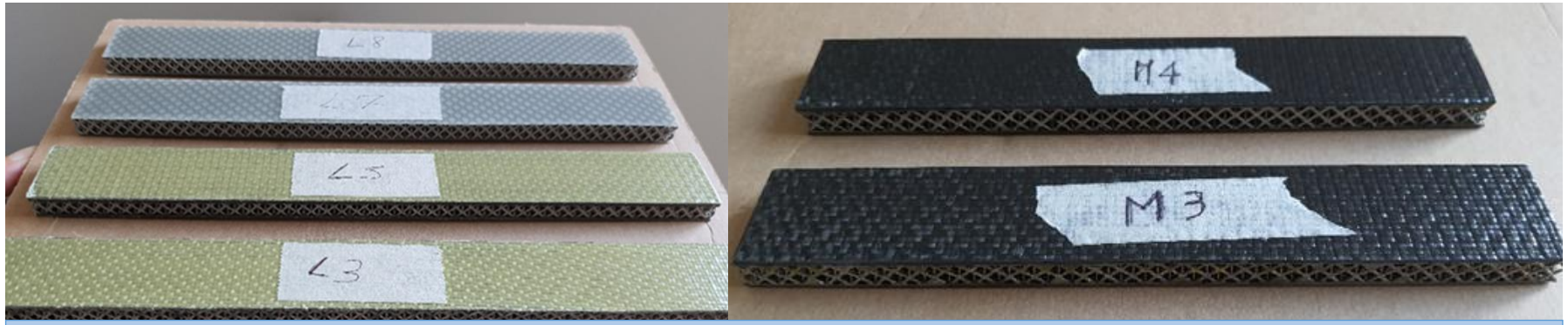


Stratificazione

Compattazione



Ciclo termico in autoclave



Provini realizzati

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R&D: AMHybridStructures

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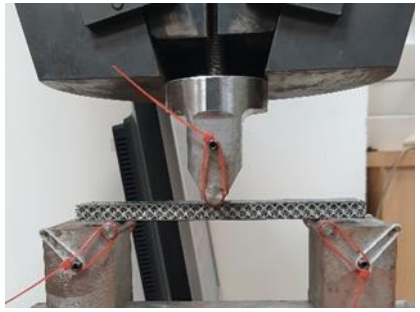
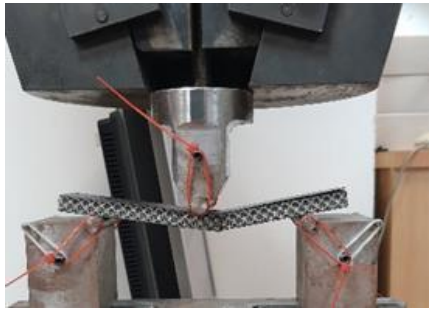
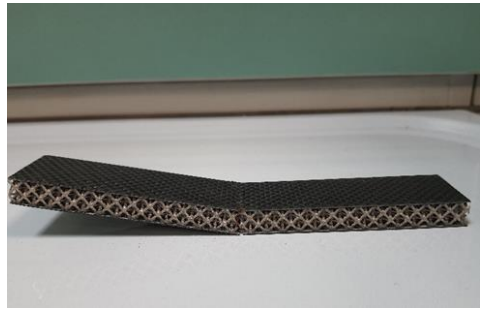
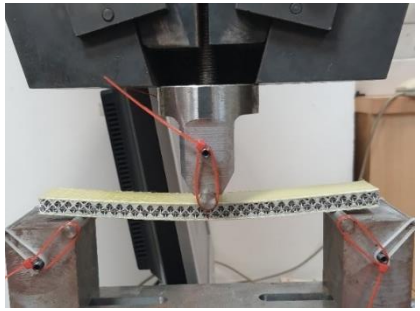
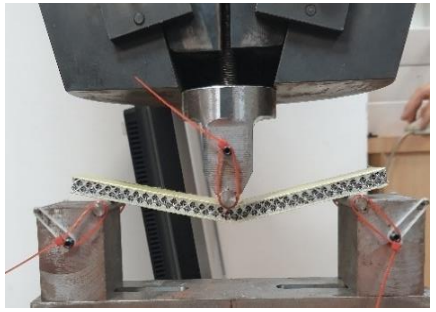
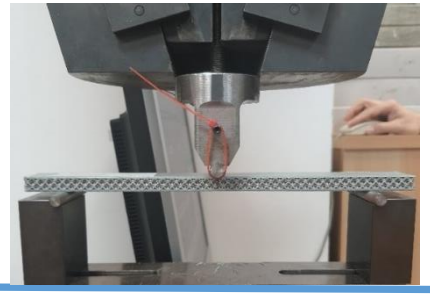
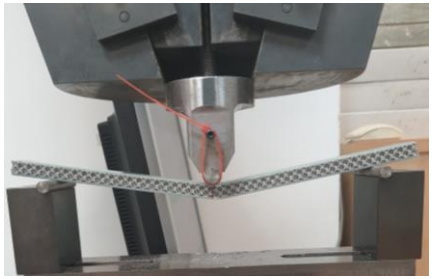
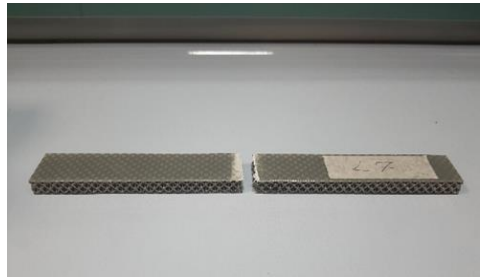
Modello FEM: Test Sperimentali

Carbonio (M18-1 43) (CC202 ER 450)			
Kevlar (AA285-DT190-50) (STYLE285 ER450)			
Vetro (EE 106 ET445 45)			

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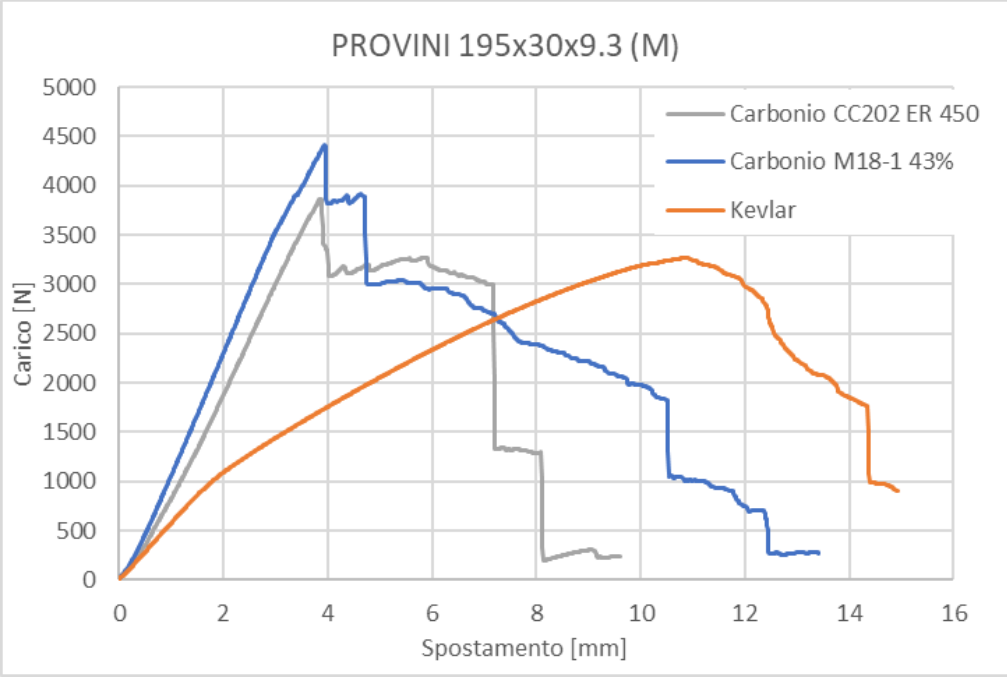
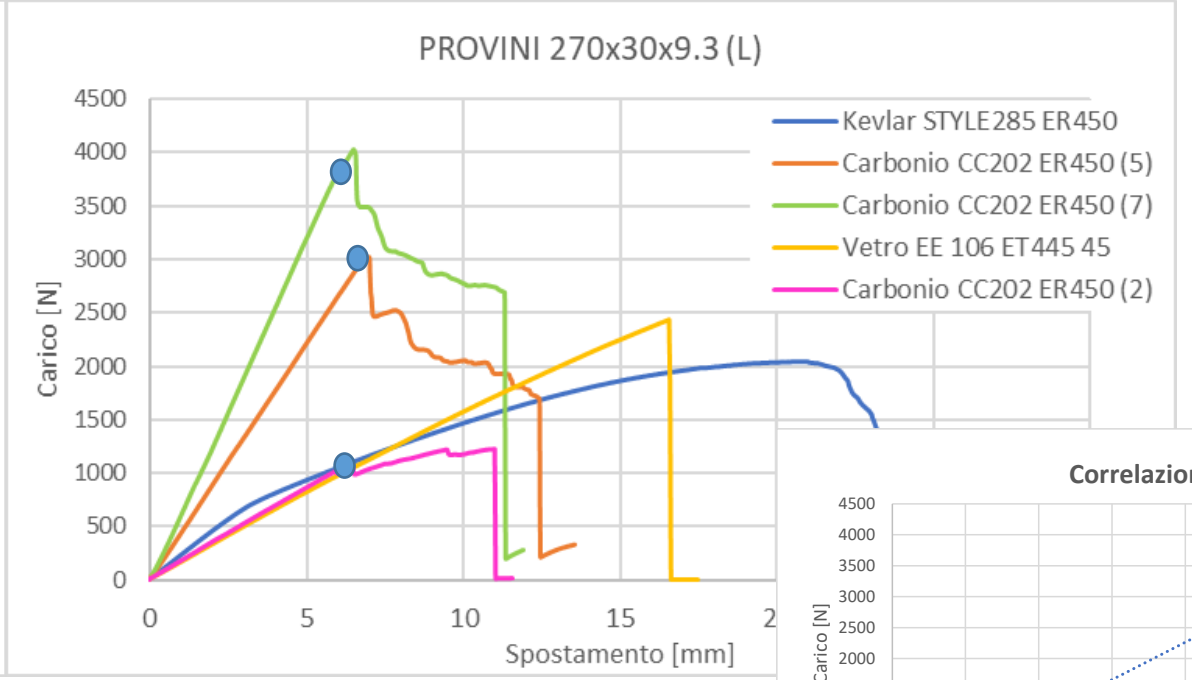
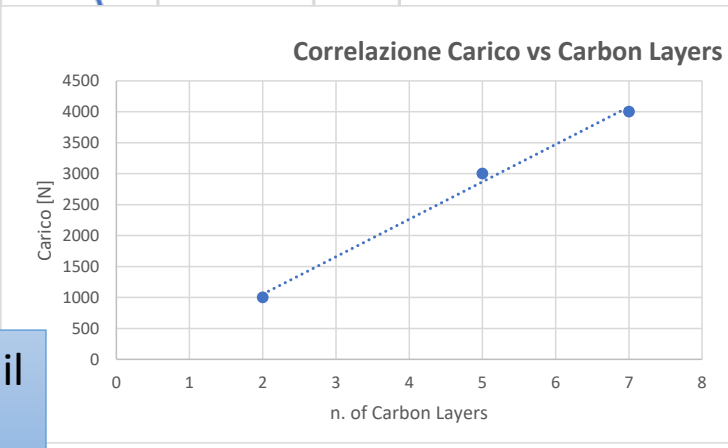
R&D: AMHybridStructures

Modello FEM: Validazione







Ogni Layer aumenta il carico di circa 605N

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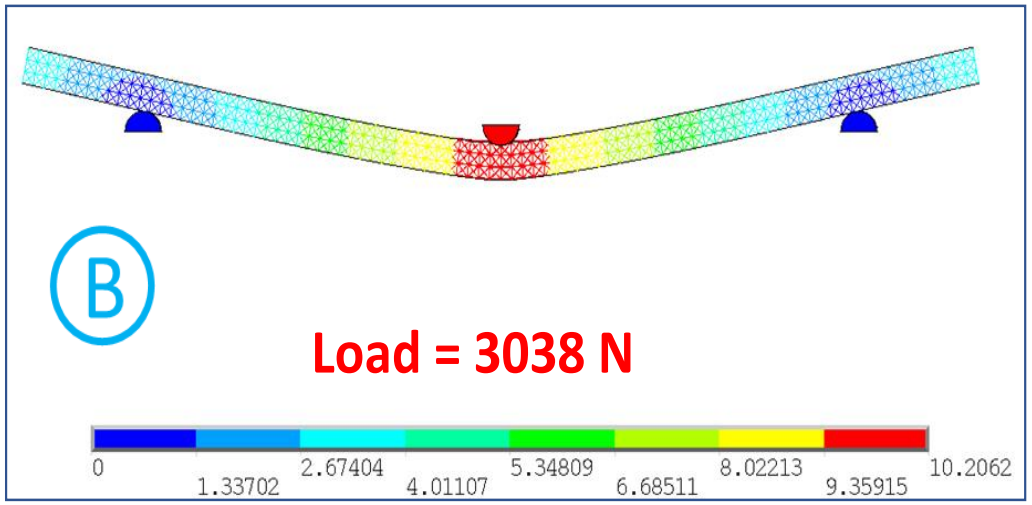
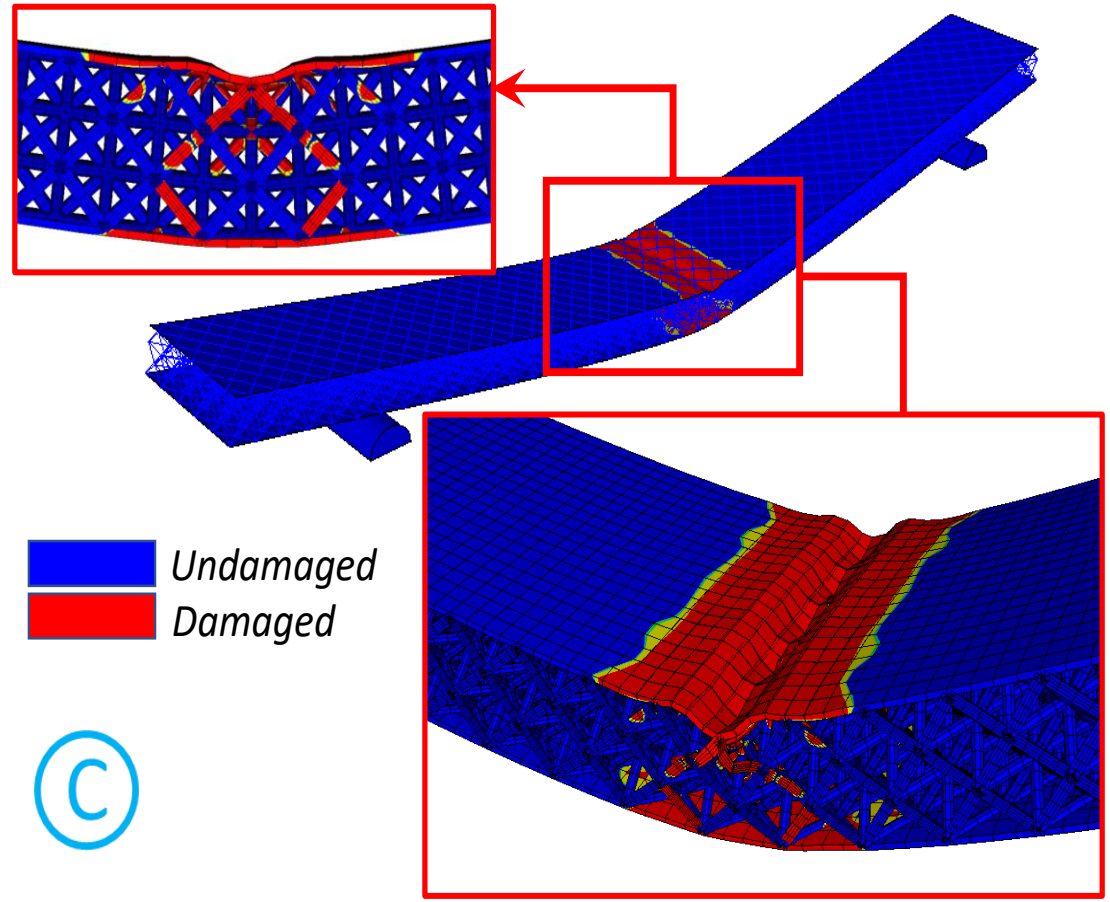
R&D: AMHybridStructures

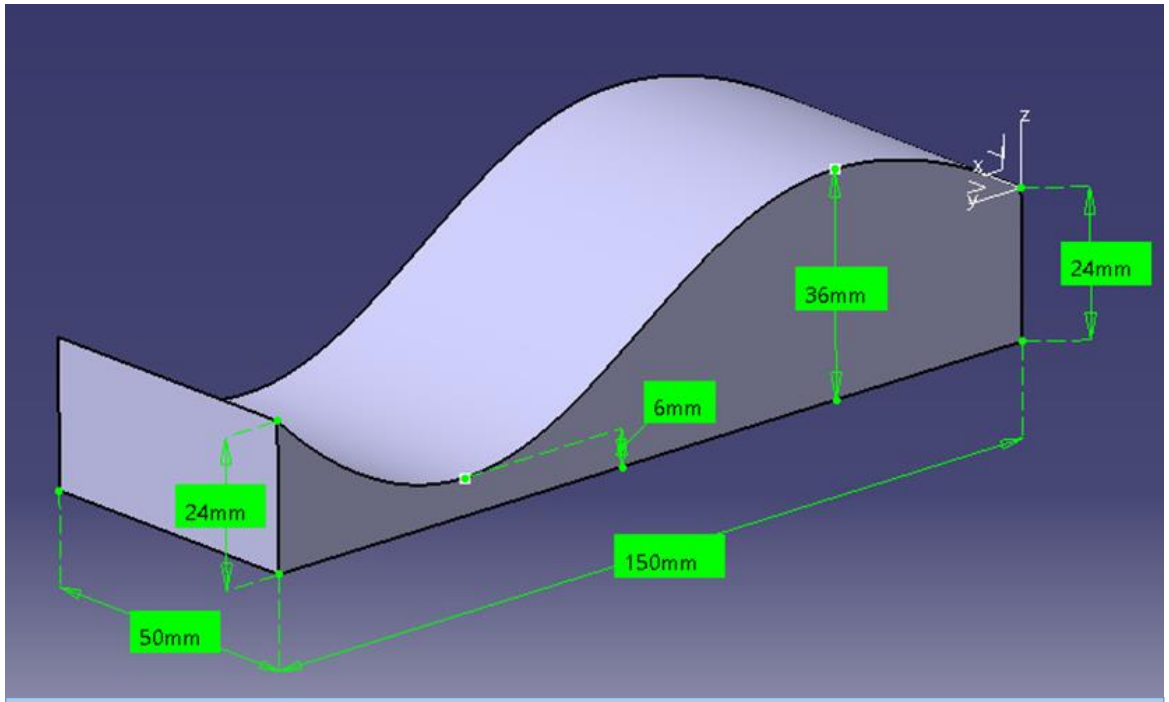
Modello FEM



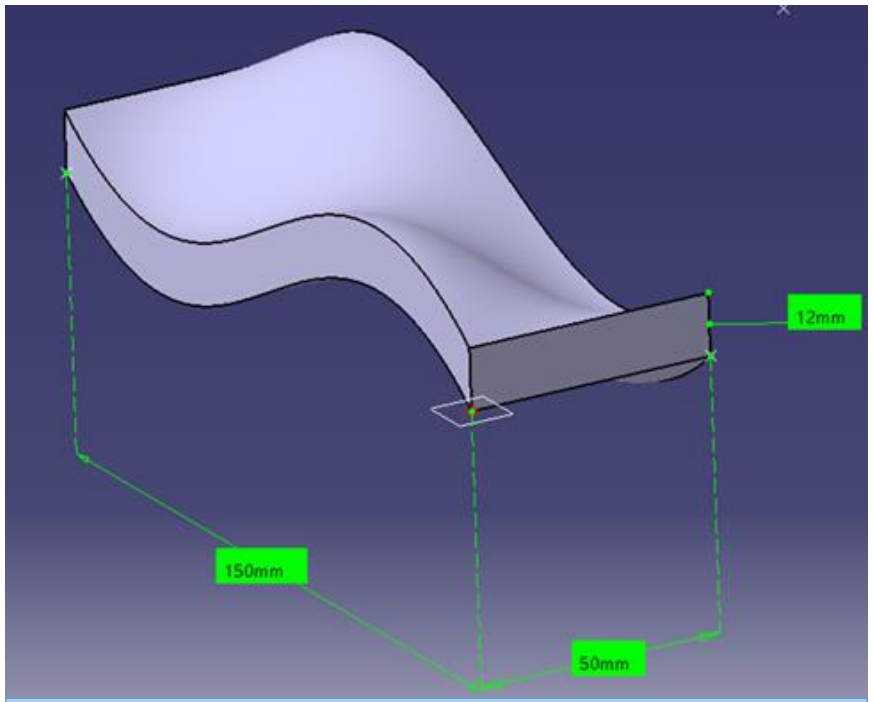


R&D: AMHybridStructures

Geometrie complesse di Riferimento



Geometria a sezione non costante

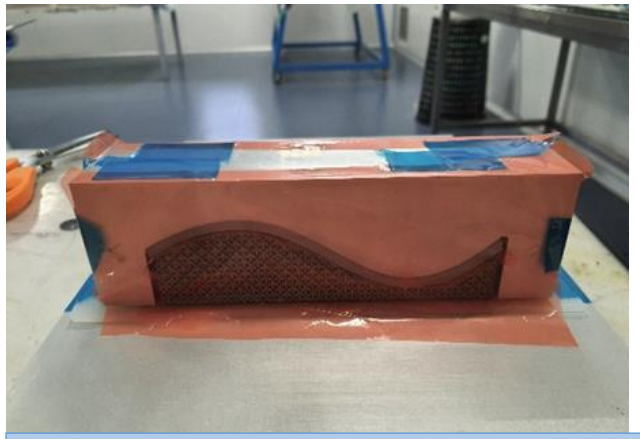


Geometria a sezione costante

R&D: AMHybridStructures

Definizione Processo

Core



Stratificazione

Compattazione + Cura

Provini finali

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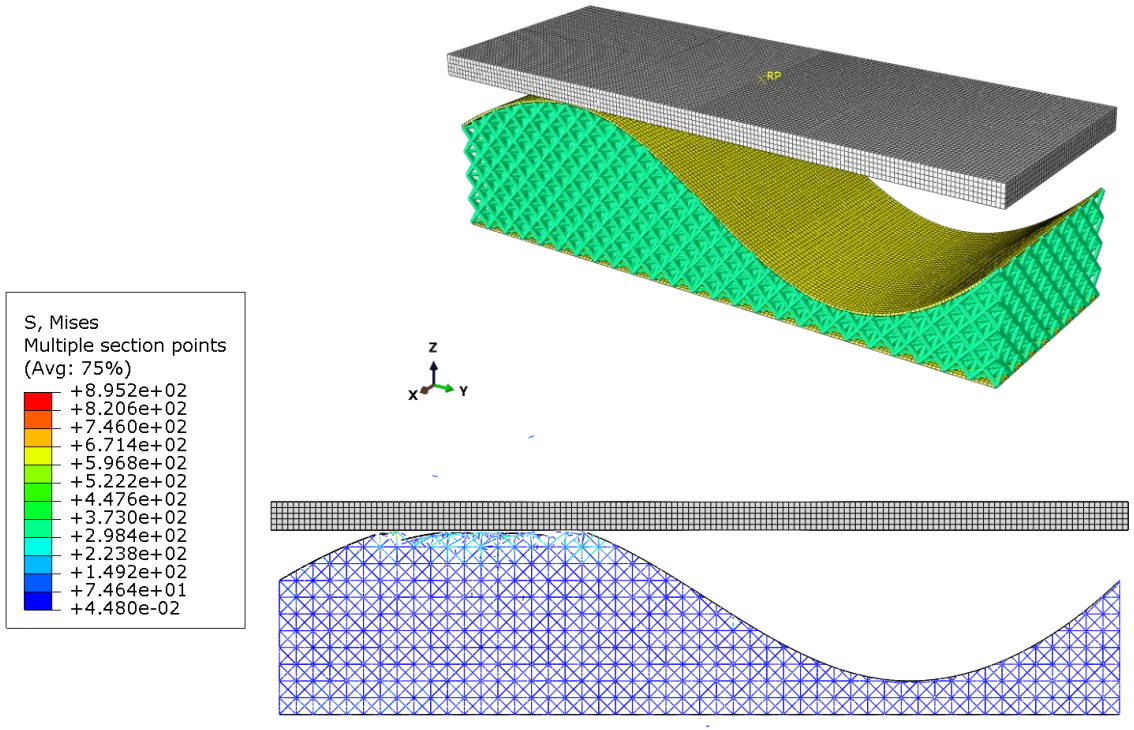
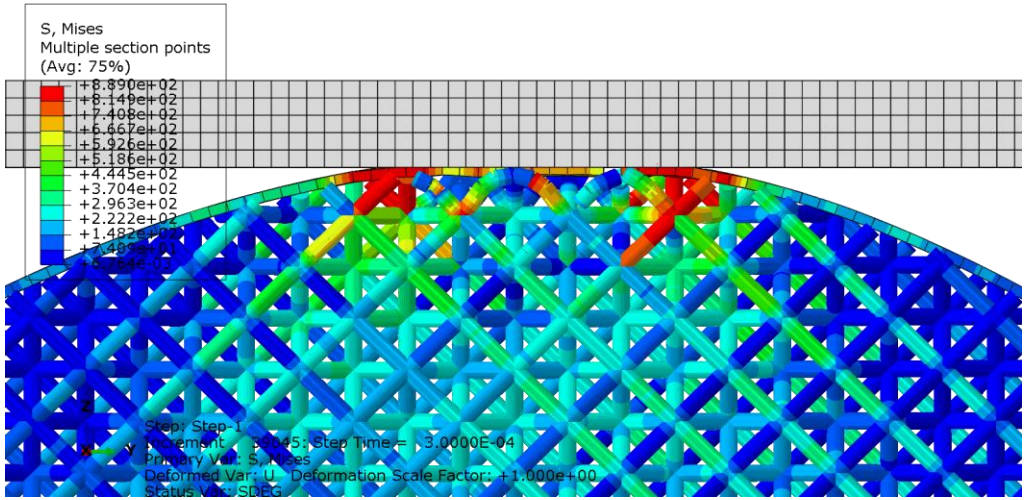
Modello FEM





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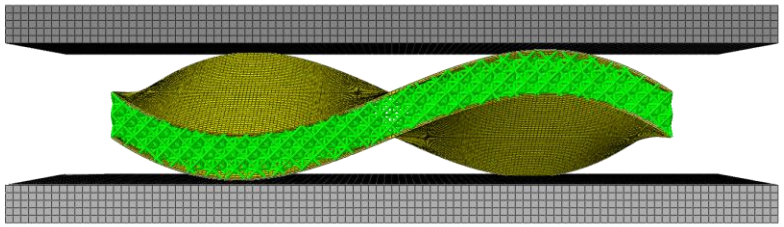
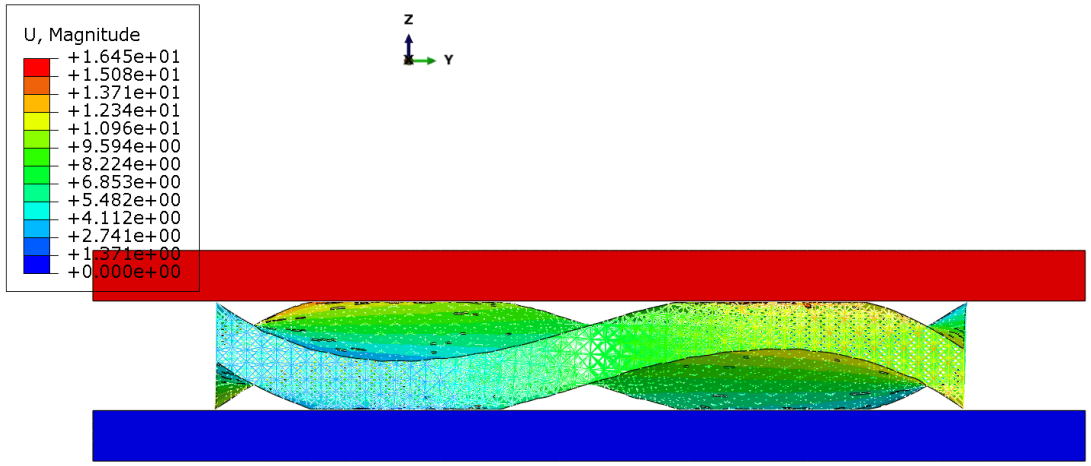
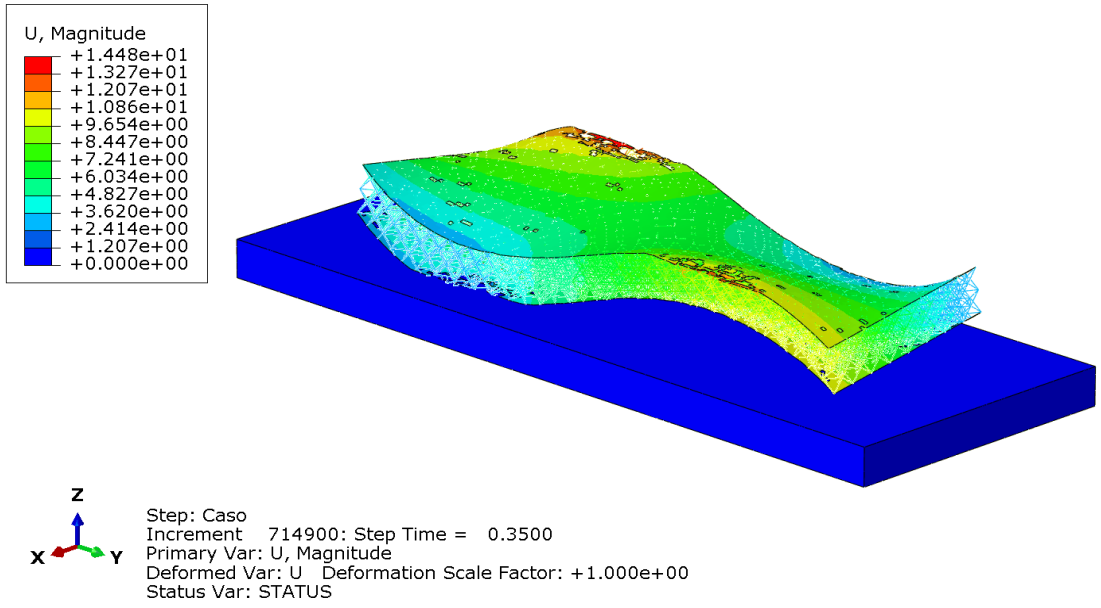
Modello FEM







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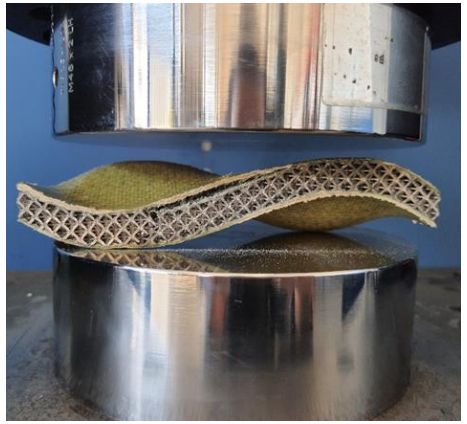
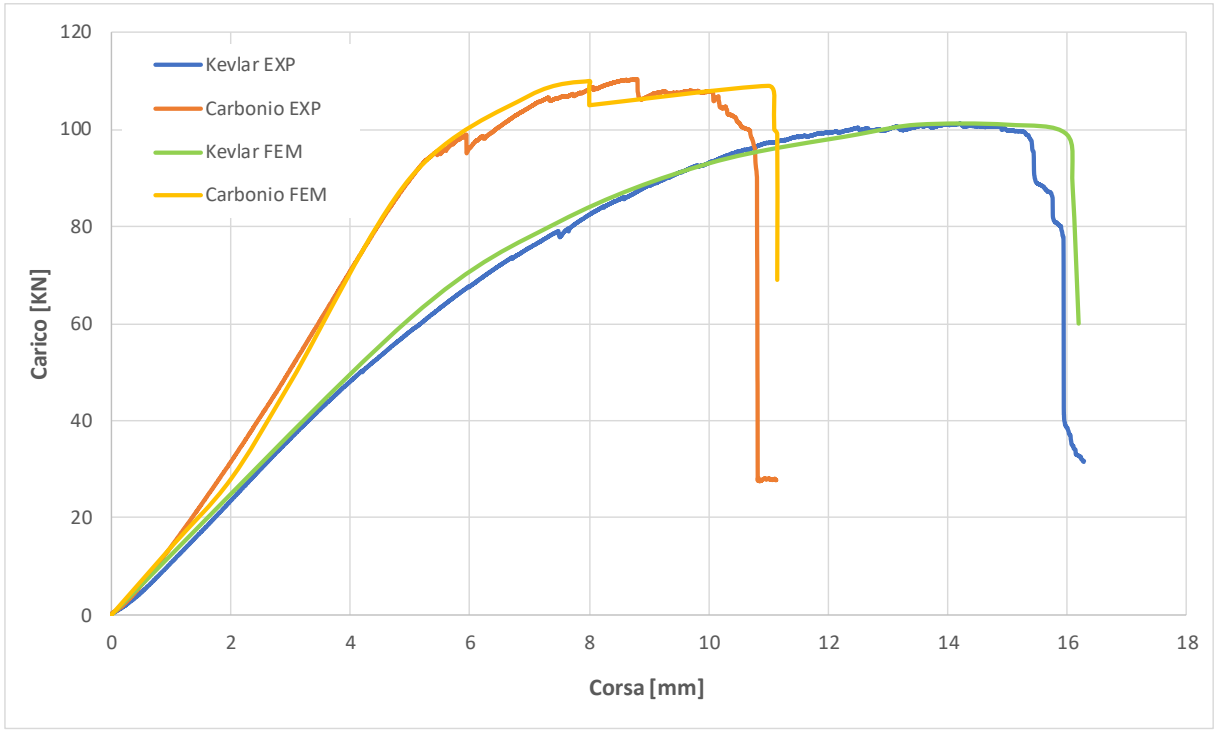
Validazione modello FEM

Geometria a sezione costante





Test Sperimentali / FEM results

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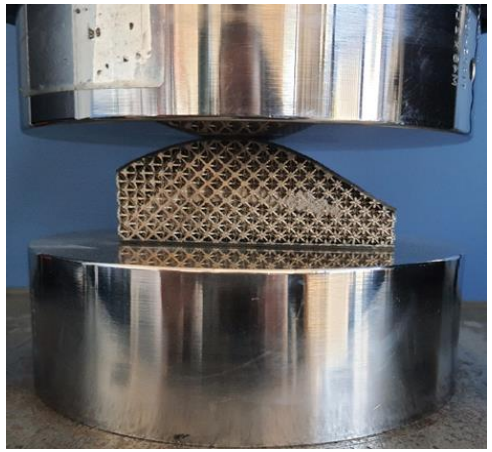
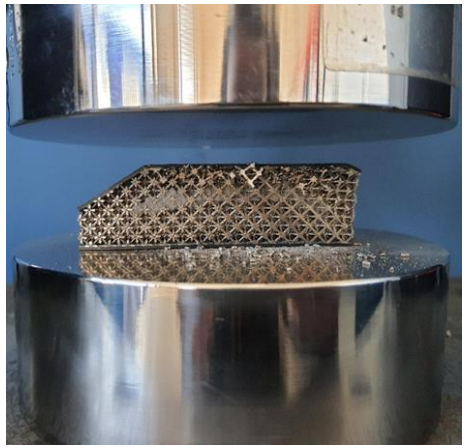
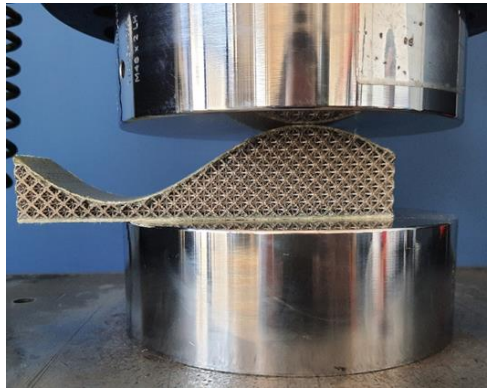
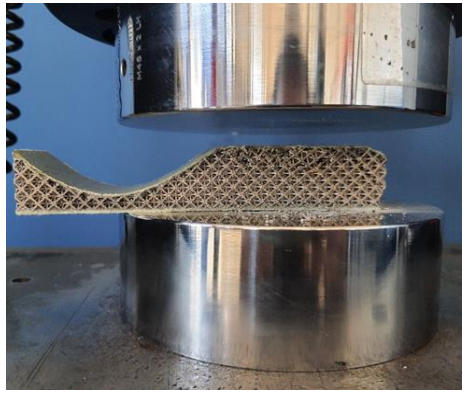
Validazione modello FEM

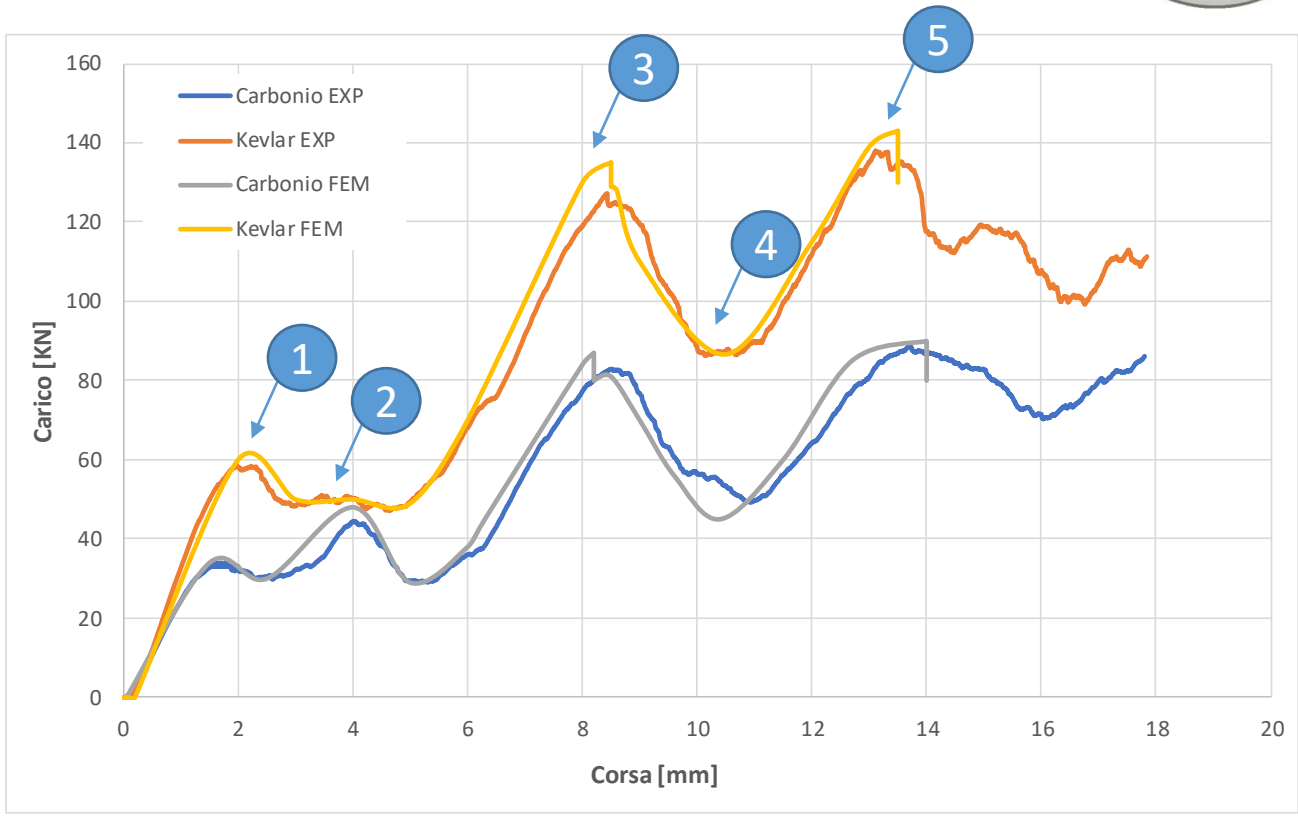




Geometria a sezione non costante







Test Sperimentali / FEM results

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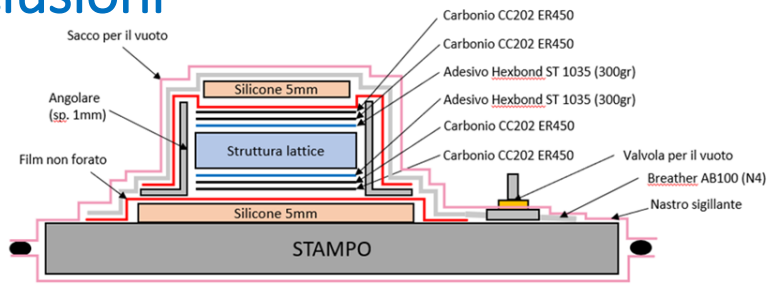
R&D: AMHybridStructures

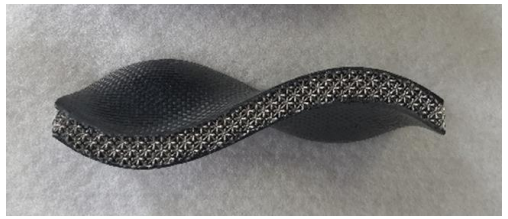
Conclusioni

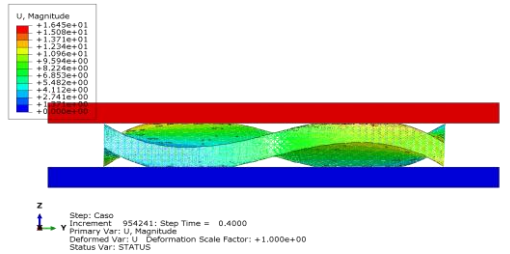
- ✓ E’ stato sviluppato un processo di formatura idoneo alla realizzazione di strutture ibride metalloAM/Composito



- ✓ E’ stata valutata la realizzabilità di strutture ibride a geometria complessa

- ✓ E’ stato sviluppato un modello previsionale per la progettazione di strutture ibride metalloAM/Composito





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Thank You

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