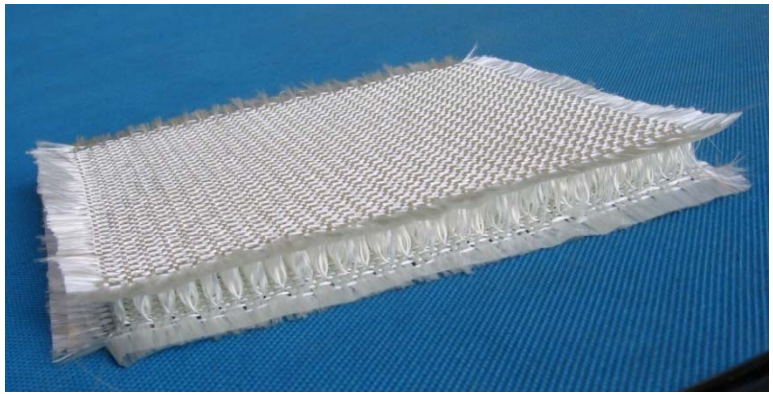
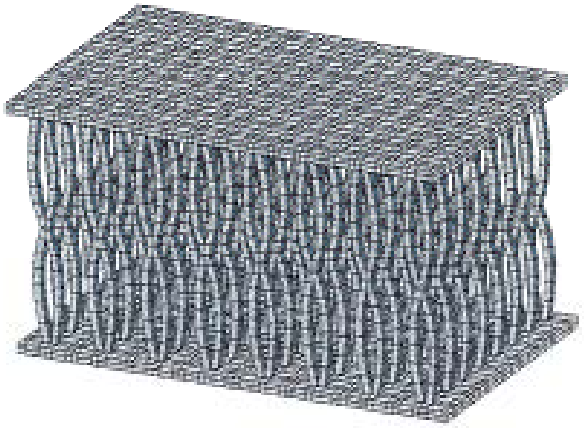
3D spacer fabric Introduction

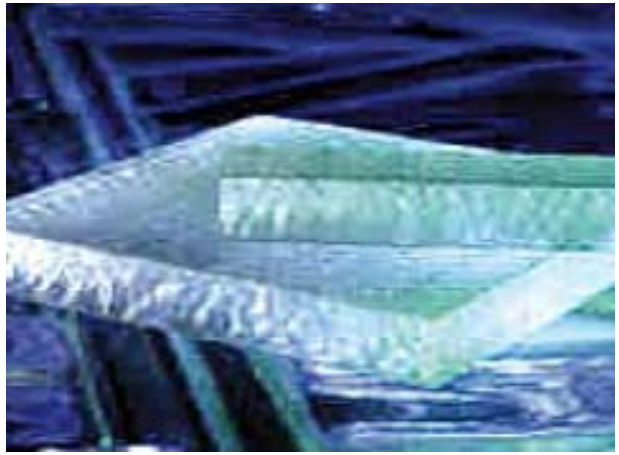


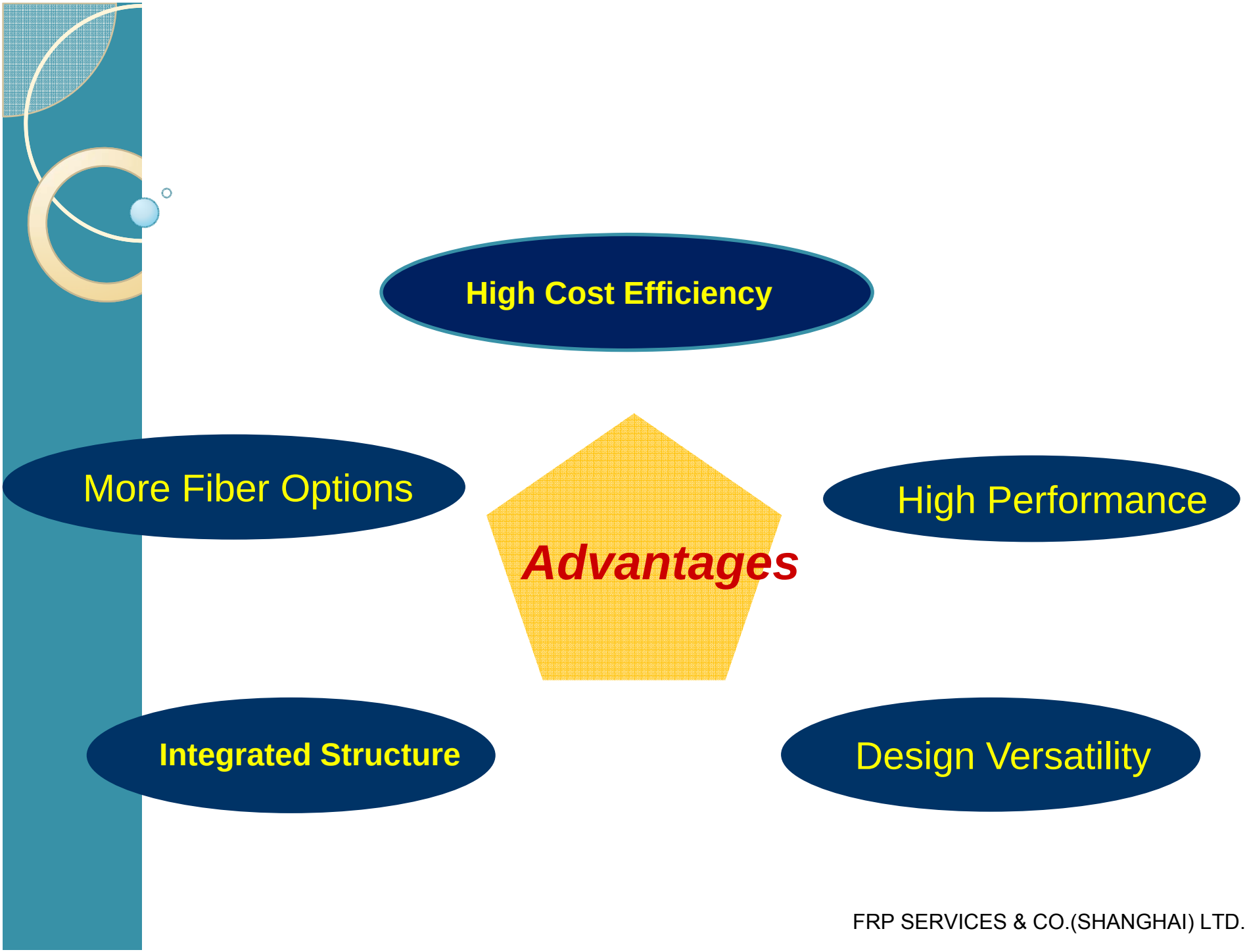
3D Sandwich Material

Sandwich Structure



Para-girder Structure




High Cost Efficiency
More Fiber Options
Advantages
High Performance
Integrated Structure
Design Versatility

Applications

1 廿 Marine Market

2 廿 Transport Market

3 廿 Building & Construction Market

4 廿 Corrosion Industry

5 廿 Wind Energy Industry

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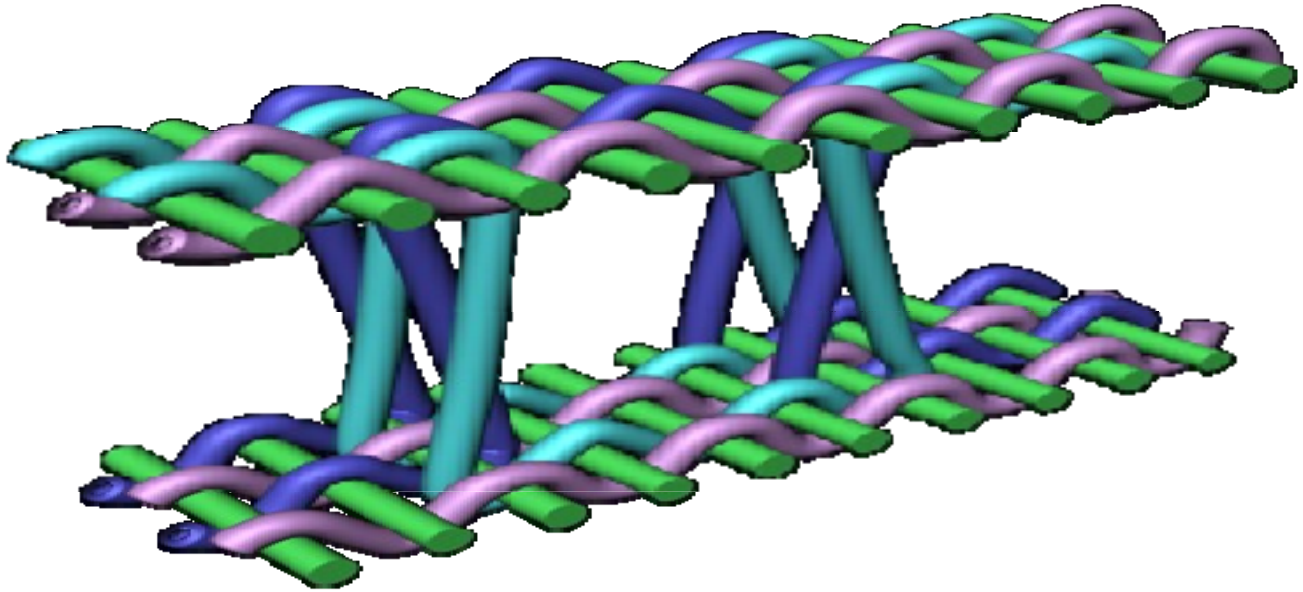
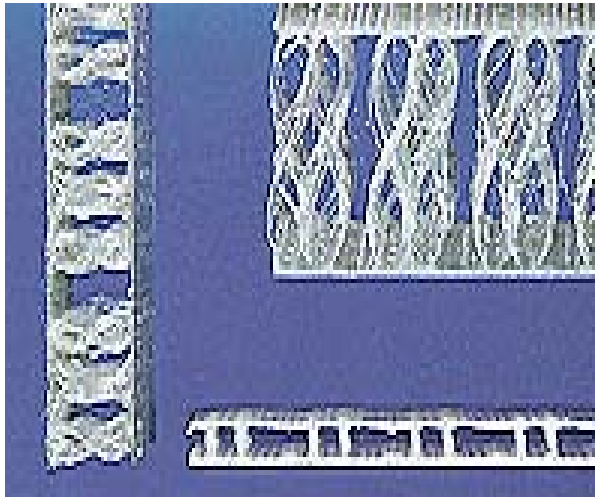
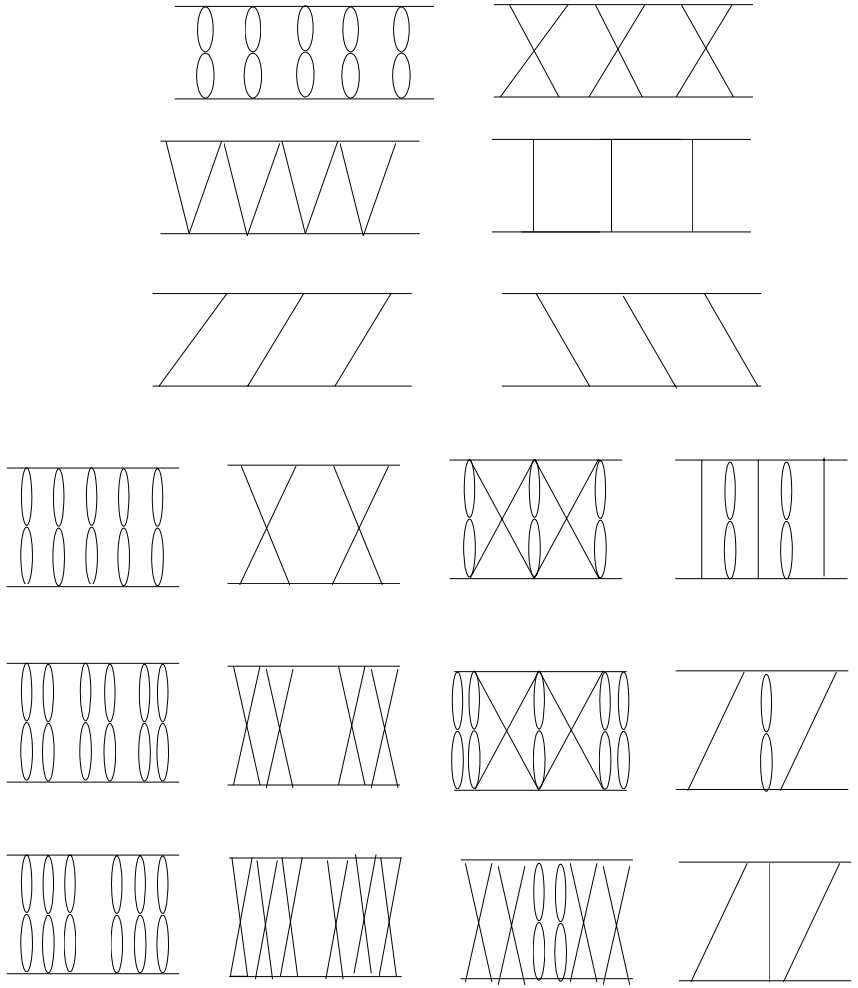
(2) Research & Development



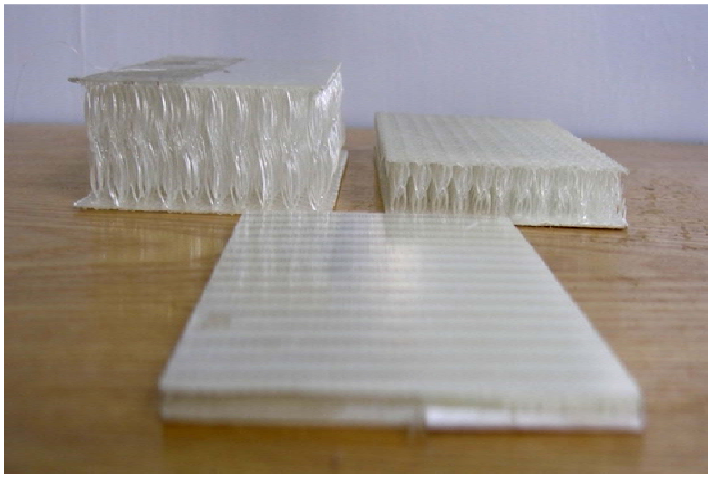
Typical Fabric Structure

Structure Design





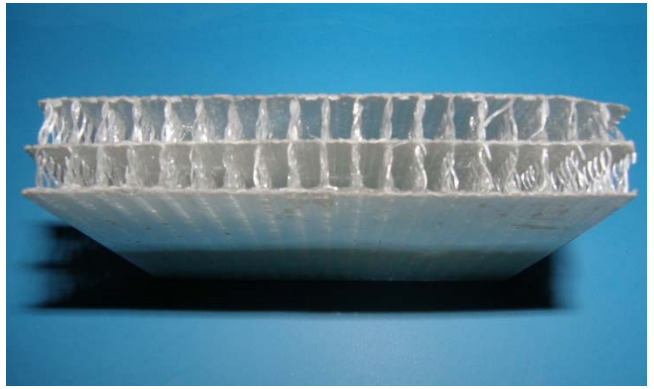
1. both deck layers bonded together by Z-piles from 2 to 25mm.



2) 3D Sandwich Fabrics made from carbon fibers，basalt fibers of other high performance fibers

3）S-glass and Basalf Sandwich Composite

4) 3D double-decker Fabric



5) Infused with PU

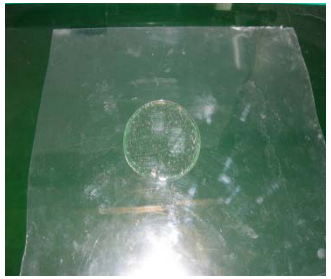
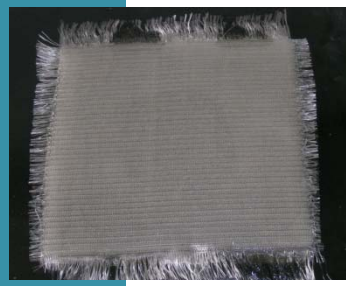
Infused with Phenolic Foam

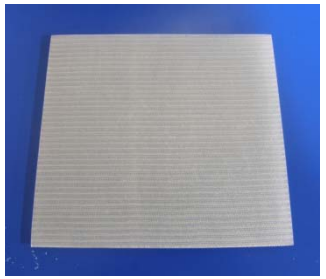
Composites and Tests

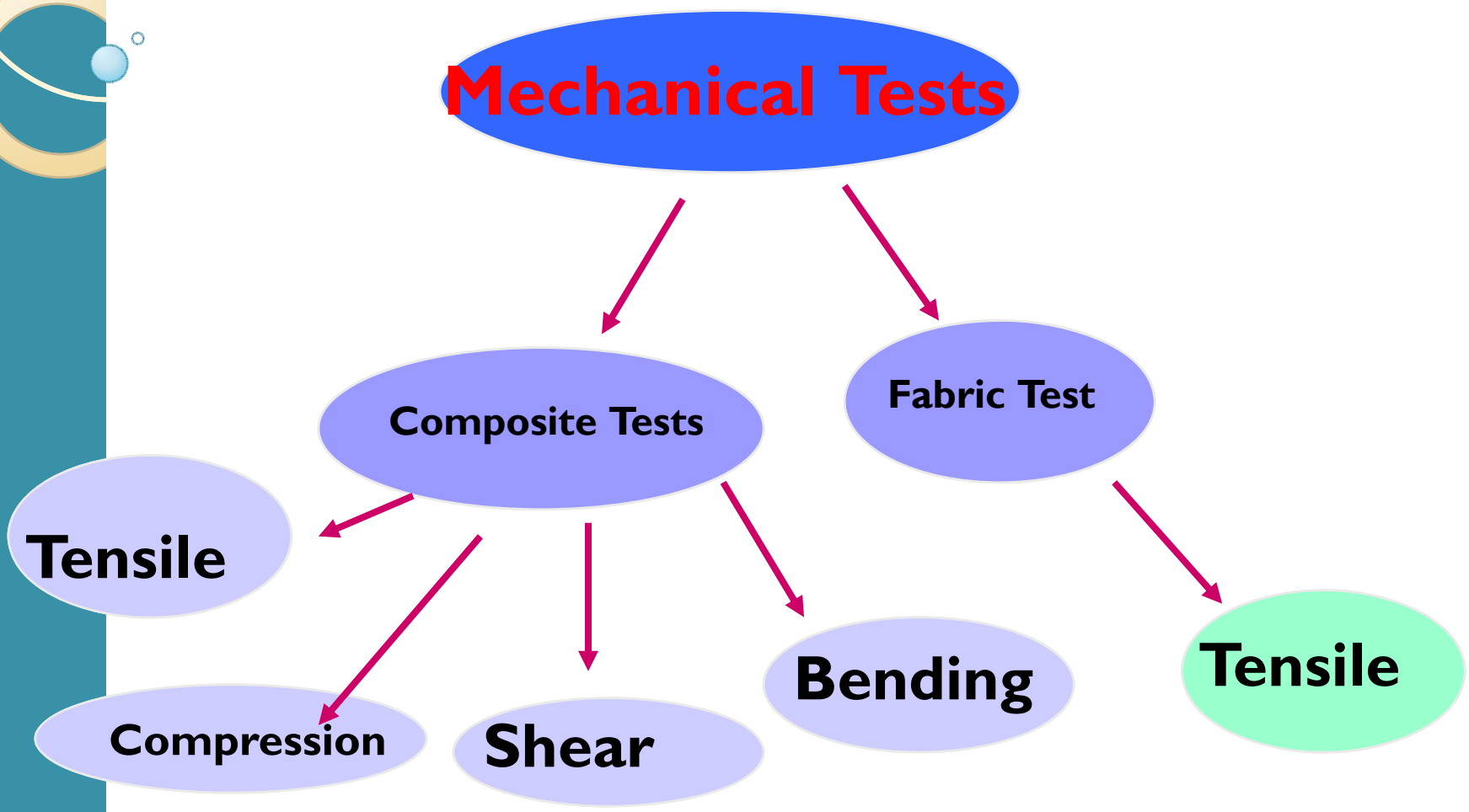
Hand lay-up



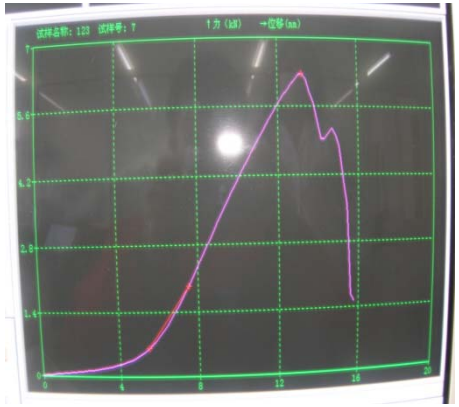


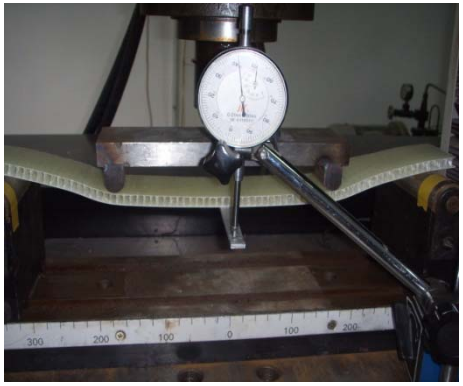




Mechanical Tests
Composite Tests
Fabric Test
Tensile
Compression
Shear
Bending
Tensile

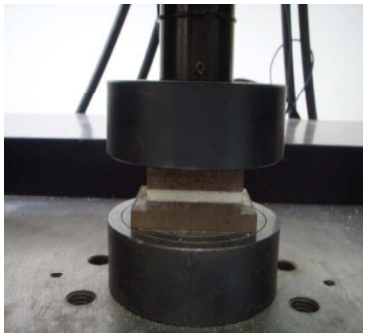
Tensile Test

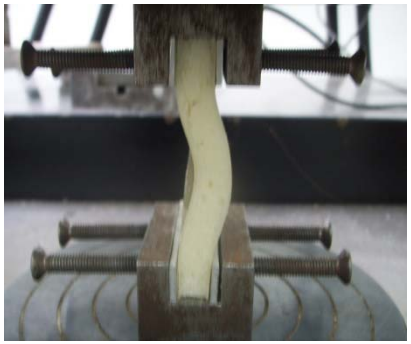


Composite Tests （ASTM)



PU Test





Performance

Items	Stats
Material	E-glass(epoxy)
Fabric Hight(mm)	2～25
Tensile Strength (Mpa)	232～238/295～331
Tensile Modulus (Gpa)	12.1～14.8/18.2～19.7
Flatwise Compression (Mpa)	0.5～8.7
Flatwise Modulus(Mpa)	45.1～72.1
Shear Strength (Mpa)	1.1～1.5/2.8～3.5
Shear Modulus (Mpa)	21～33/51～75
Bending Strength (Mpa)	44～51/90～117
Bending Modulus(Gpa)	8～12/13～16

Findings of the Tests

1. Compared with traditional aluminum honeycomb material, composites made of 3D sandwich woven fabric performed better at tensile and shear strength.
2. Two materials performed almost the same in the flat wise compression and bending tests.
3. 3D sandwich composites can be the ideal substitute for traditional honeycombs.

Conclusions

1. The integrated structure of the fabric guarantees good physical properties of the composite. The cells between 2 deck layers can be filled with wires, bolts, foam and even sensors.

2. There are different ways to lay-up. The size of a single laminate can be made according to the customers' needs.

Conclusions

3. The fabric has good design-versatility. The thickness of deck layers, roll width, density and height of vertical piles can be adjusted to meet certain requirements.

4. Composites made of 3D sandwich woven fabric boast excellent mechanical properties and resistance against delamination, which can be the ideal substitute for traditional honeycomb materials.