

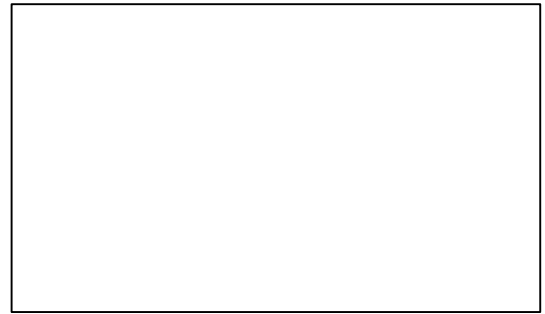
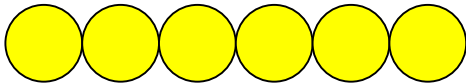
No. 4

COMPOSITE REINFORCEMENT

Many types of fabric are woven with different equipment to provide adapted reinforcement to optimize the composite structure.

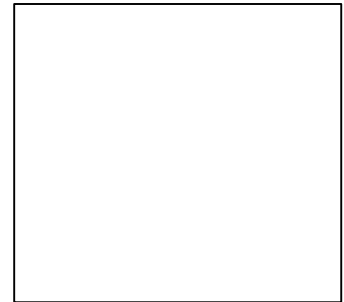
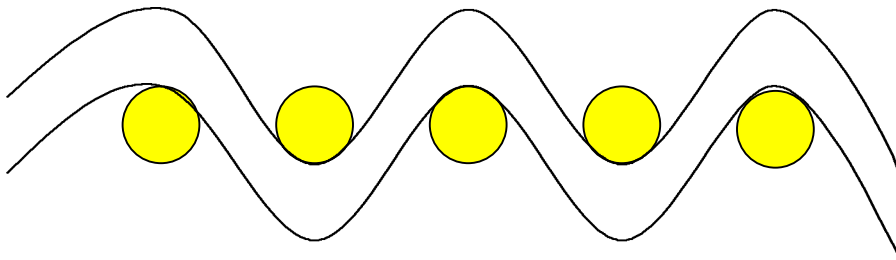
UNI-DIRECTIONAL FIBER

UD

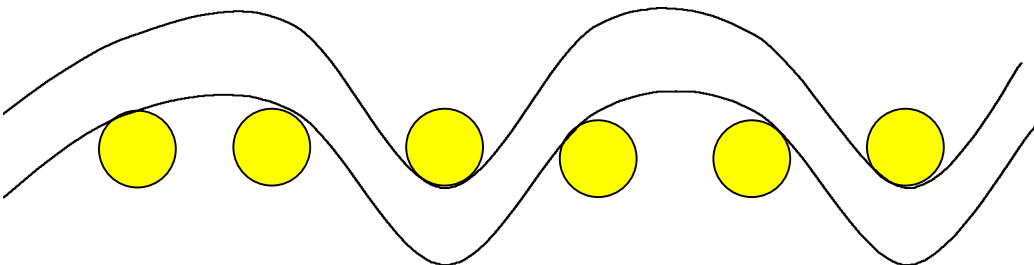


BI-DIRECTIONAL FIBER

Plain Weave (1/1)

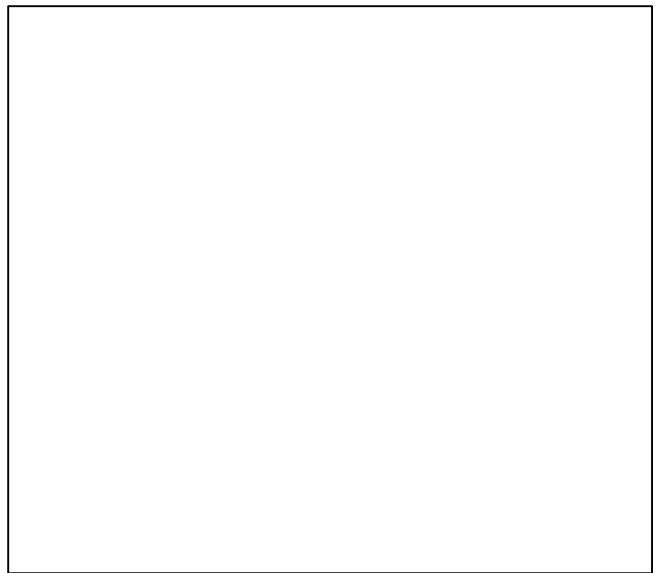
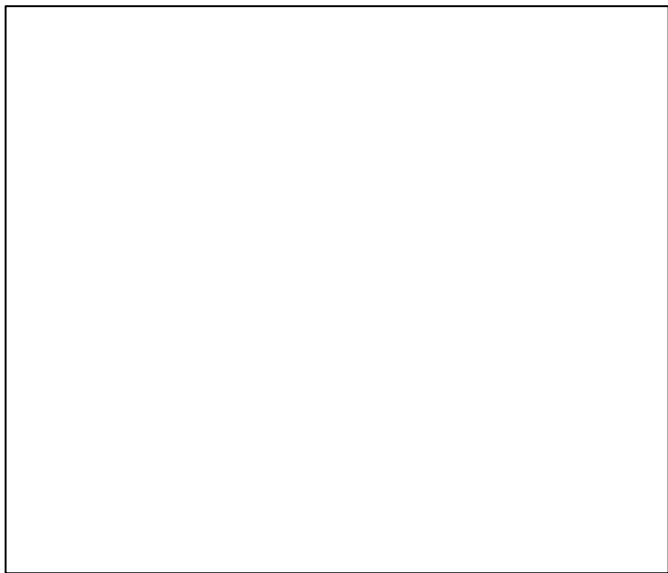
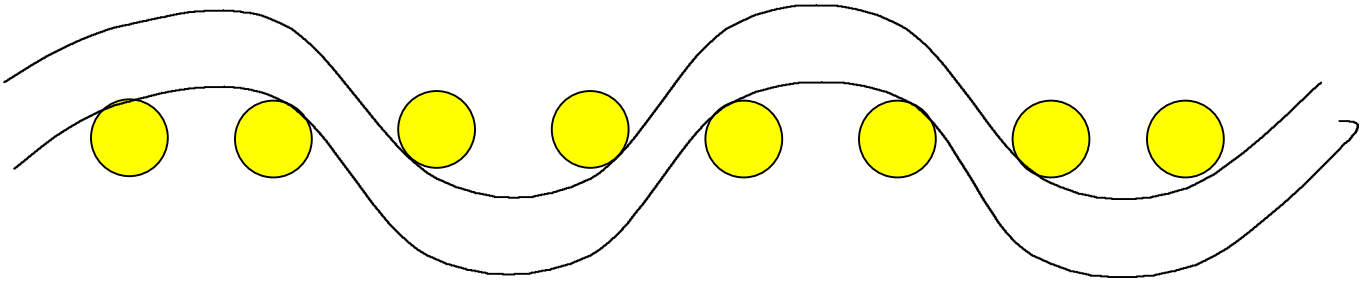


3 HARNESS
(1/2)



No. 4

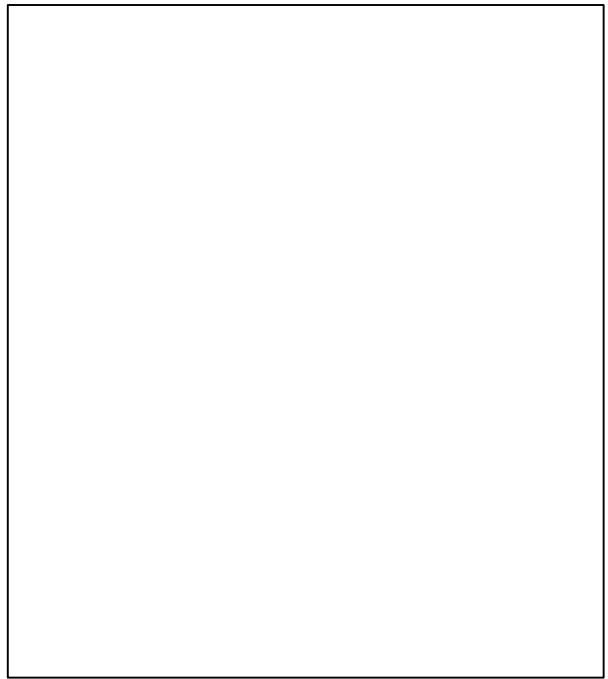
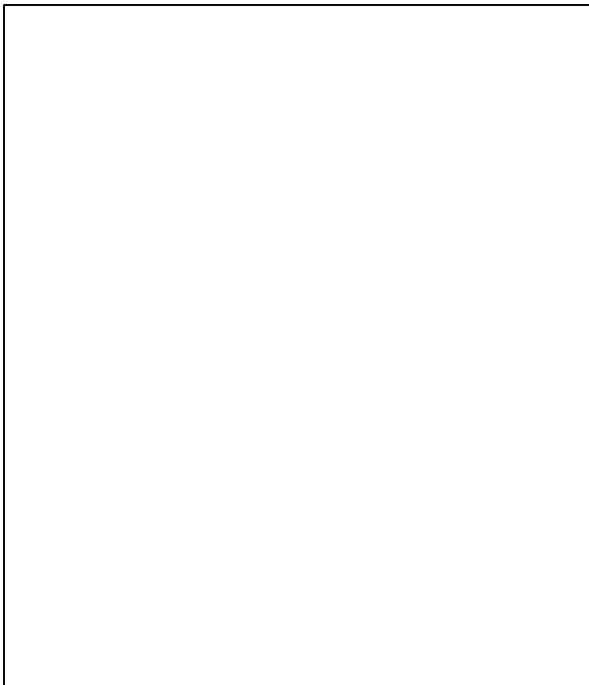
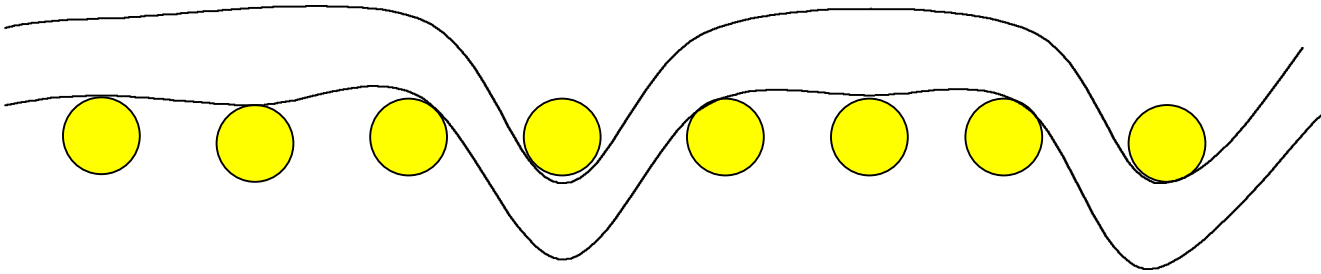
**4 HARNESS
(2/2)**



Pictures soon

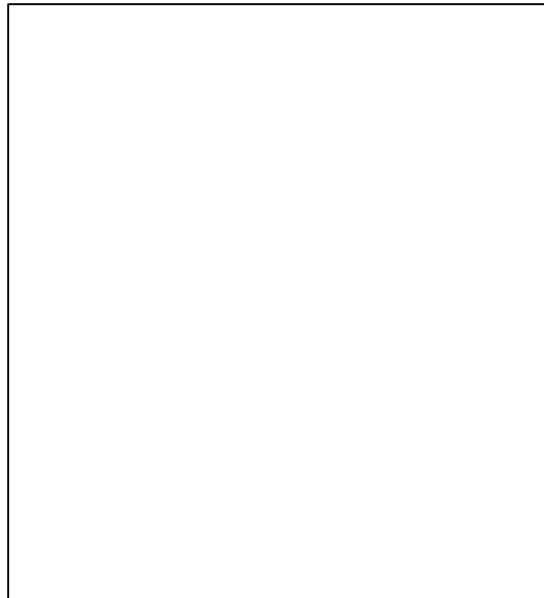
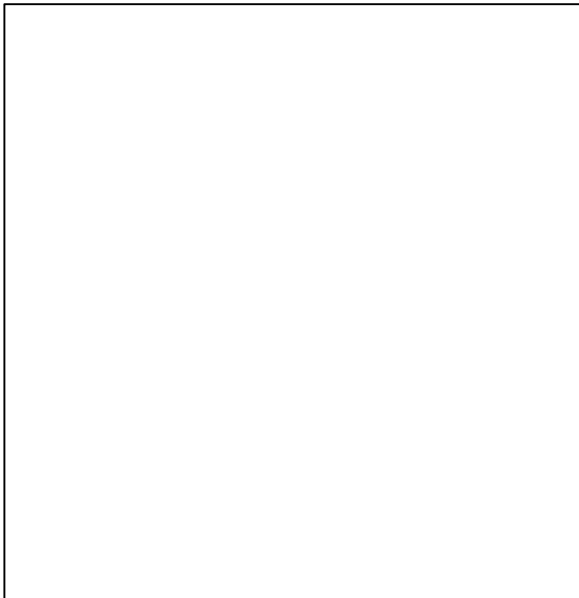
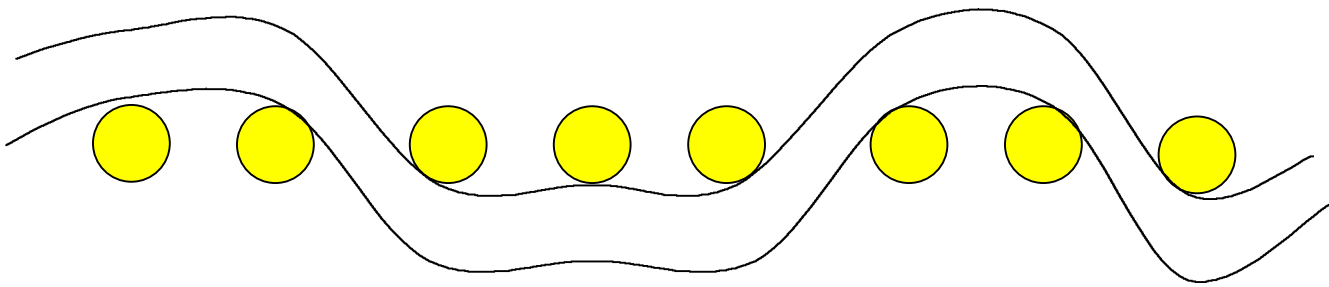
No. 4

**4 HARNESS
(1/3)**



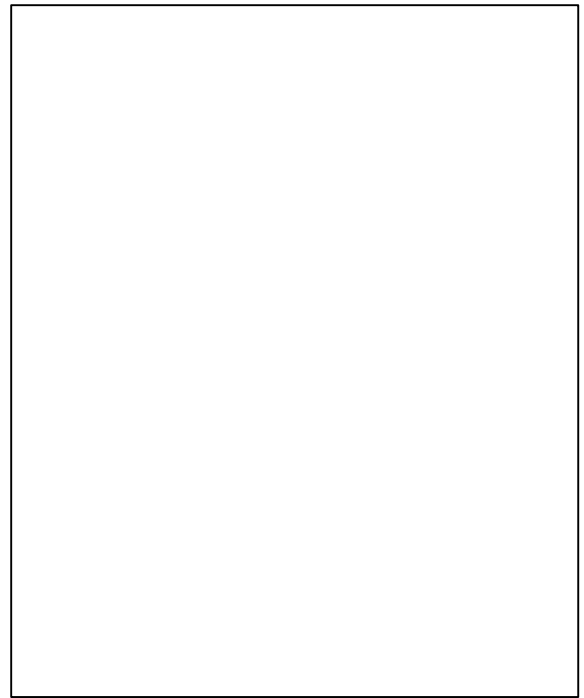
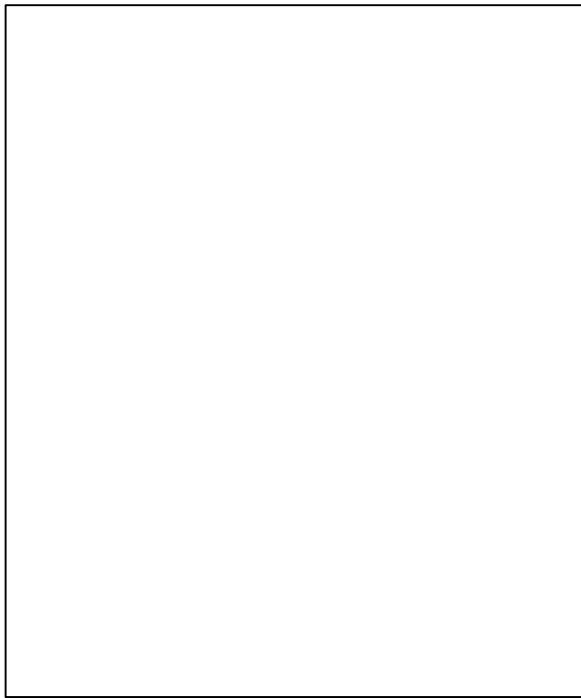
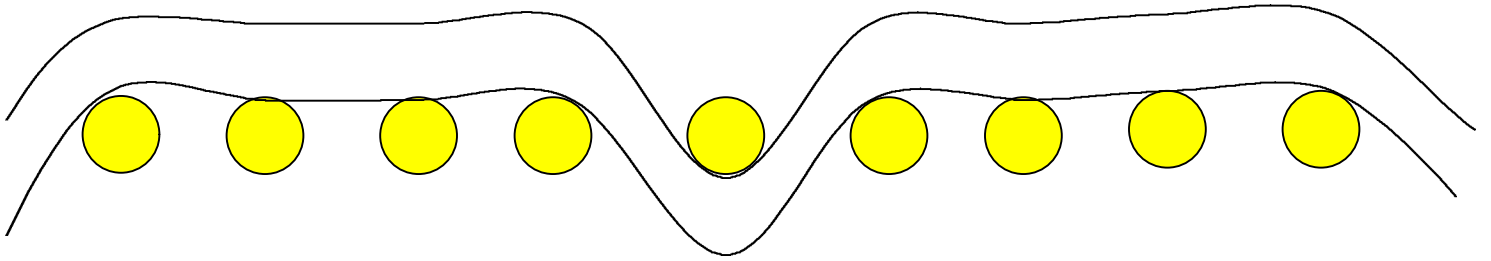
No. 4

5 HARNESS
(2/3)



No. 4

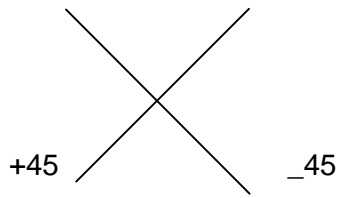
5 HARNESS
(1/4)



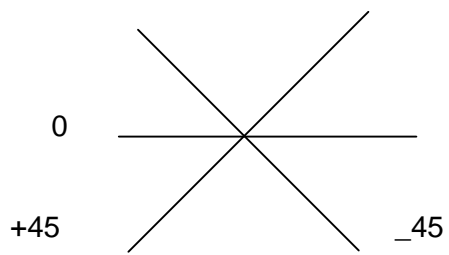
No. 4

FIBER BRAIDING

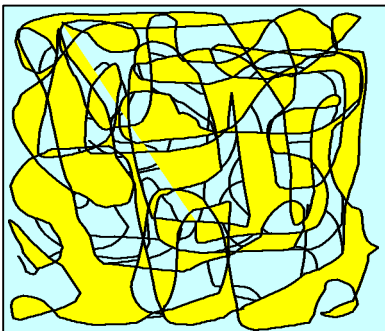
Braided $2D \pm 45^\circ$



Braided $3D \pm 45^\circ + 0^\circ$



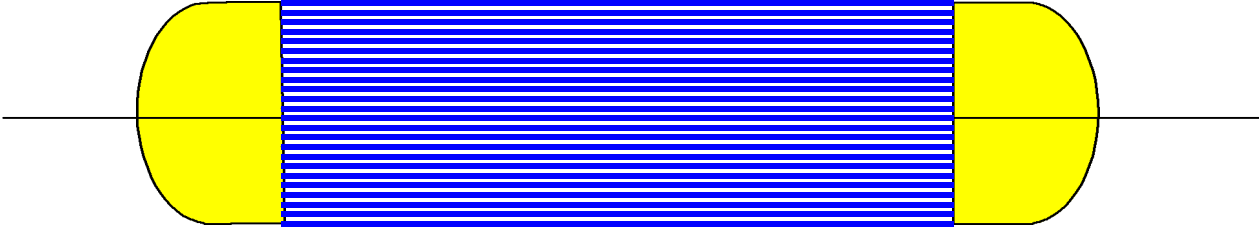
Mat Fiber



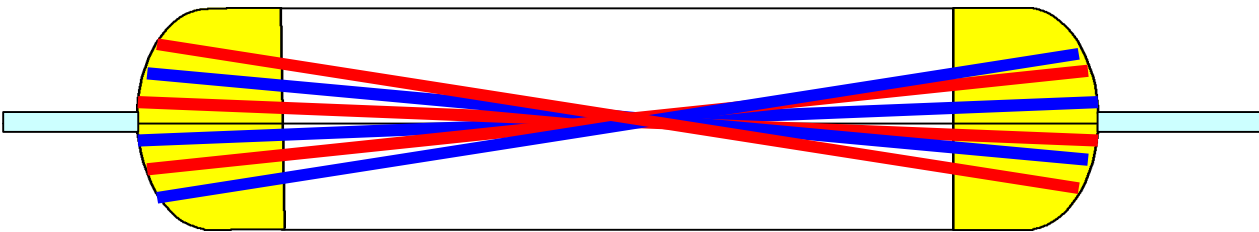
No. 4

FIBER – FILAMENT WINDING FROM 0° TO 90°

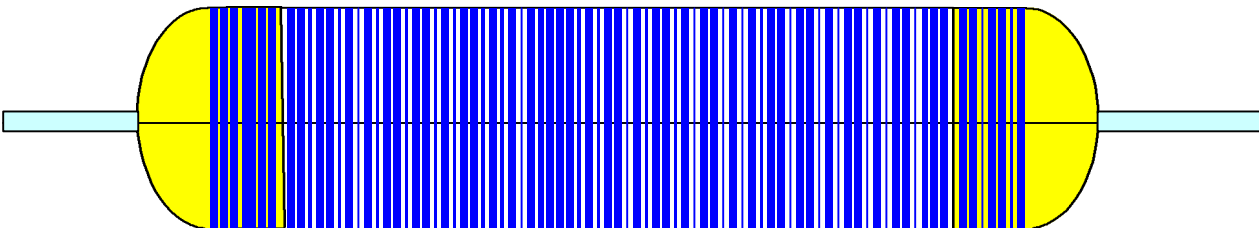
Roving – Uni-Directional 0° Filament Winding



Roving – Helical 10° to 40° (+ -)



Roving Circumferential 90°

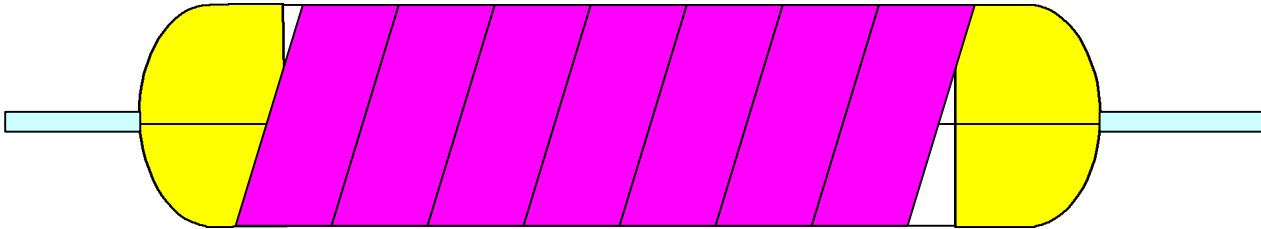


No. 4

No. 4

FIBER TAPE PLACEMENT

Tape placement



Same as above but a UD tape is used instead of a roving from 1m/m to 100 m/m. Specific machine are used to perform this work .other then filament winding.

THE CORE

The core is a component which can be made of different materials. This material is shaped to an accurate geometry and used internally with the part to produce a finished product.

The following materials are used as a core component of the structure:

WOOD CORE

- Balsa
- Gabon Wood
- Pine
- Ash
- Hickory
- And many other types

HONEYCOMB CORE

- Aluminum (honeycomb)
- Aramide
- Polyamide
- Fiberglass
- Titanium
- Ceramic

FOAM CORE

- Polyurethane
- Acrylic
- Urea
- Styrene
- Silicone
- Phenolic
- Ceramic

HOLLOW CORE

The following materials are used as a core to provide the geometry of the part and are dissolved after or removed. They are called hollow core because when the part is finished, the core no longer exists.

- plaster
- sodium silicate (salt)
- foam
- silicone bladder
- bladder (+ air)
- bladder (+ vacuum)
- ceramic
- melting metal
- casting sand

No. 4

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TECHNOLOGIES TO PRODUCE ADVANCED COMPOSITE STRUCTURES

THERMOSET MATRIX & FIBER	Pallet	Wet Impregnation	Long Dry Fiber	Preg with Thermoset Resin	Sheet Transformation
Hand Lay Up		Yes	Yes	Yes	
Resin and Fiber by Projection		Yes	No	No	
Molding with Press		Yes	No	Yes	
Molding with Autoclave		Yes	No	Yes	
Compression Molding BMC		No	No	Yes	
Compression Molding SMC		No	No	Yes	
Filament Winding		Yes	Yes	Yes	
RTM (Resin Transfer Molding)		Yes	Yes	No	
Pultrusion		Yes	No	Yes	
Rotomolding		Yes	No	No	
Braiding		-	Yes	Yes	
Continuous Lamination		Yes	-	Yes	Yes

TECHNOLOGIES TO PRODUCE ADVANCED COMPOSITE STRUCTURES

THERMOPLASTIC MATRIX & FIBER	Pallet	Wet Impregnation	Long Dry Fiber	Preg with Thermoplasti c Resin	Sheet Transformation
Thermoplastic Injection	Yes				
Filament Winding				Yes	
Pultrusion				Yes	
Compression Molding	Yes			Yes	
Vacuum Forming					Yes
Braiding				Yes	
Continuous Lamination				Yes	

TECHNOLOGIES TO PRODUCE ADVANCED COMPOSITE STRUCTURES

ELASTOMER MATRIX	Pallet	Wet Impregnation	Short Dry Fiber	Preg	Casti ng
Polyurethane	No	Yes	Yes	No	Yes
Rubber Matrix		Yes	Yes	No	Yes
FOAM MATRIX					
Polyurethane		Yes	Yes	No	Yes
Phenolic		Yes	Yes	No	Yes
Acrylic		-	No	No	Yes
PVC		Yes	No	No	Yes
Silicone		Yes	No	No	Yes

No. 4