



FlexForm[®]

TECHNOLOGIES

THE LEADER IN NATURAL FIBER COMPOSITES



Leading the Way

FlexForm Technologies is the North American leader in the manufacture of natural fiber composite (NFC) materials made from sustainable resources. Our state-of-the-art facility in Elkhart, Indiana manufactures FlexForm®, a combination of natural fibers such as kenaf, hemp, flax, jute and sisal blended with thermoplastic polymers such as polypropylene and polyester.

FlexForm Technologies is answering the call for lighter weight materials that meet or surpass the performance requirements of numerous industries including *automotive, recreational vehicle, truck, modular housing, packaging, construction, marine, office interiors, agriculture and aviation*. Current applications include door panels, consoles, headliners, inserts, package trays, pillars, seat backs, trunk liners, office panels, ceiling tiles, and absorbency products.

The Time for Change is Now

Global consumption of reinforced plastics is growing at a rate of almost 20% per year. Glass fiber-reinforced plastics (GRP) represent the largest segment of this market. However GRP and wood flour reinforced plastics tend to be heavy, brittle, present environmental challenges in the workplace, and are difficult to recycle. Government regulations coupled with the rising costs of waste disposal are creating significant market demand for high performance, more Eco-friendly alternatives.

FlexForm is the alternative. It is a stronger, more versatile product providing superior performance compared to other existing materials. It is no coincidence that our year-over-year growth has been significant as manufacturers continue to take advantage of the benefits associated with NFCs.

FlexForm NFCs are economical, light-weight, and easy to process. NFCs are on average 25 percent stronger than wood fiber reinforced thermoplastics of comparable weight. They have none of the negative handling or environmental issues associated with glass fiber.



Absorbancy Products



Commercial Equipment



FlexForm is ideal for seatback applications with superior properties for knee impact and one-step processing that allow easy conformance to frame work geometry, bonding of cover materials, back side attachments, and trimming in a single operation.

FlexForm is an excellent substitute for many existing wood fiber, wood flour, and fiberglass reinforced plastics. It is available in various densities to fit many product possibilities. Performance features can be engineered into custom formulations and FlexForm can be layered and/or laminated to a broad range of products to meet many different needs.



F I B E R C O M P O S I T E S



Office Interiors



Commercial Transportation



FlexForm's composition can be modified to meet even the most demanding performance specifications such as required by Mercedes for the door panels in the new M-Class above and the R-Class.





Environmentally Friendly

Natural fibers are grown and harvested on an annual basis. Kenaf, hemp, and flax are cultivated on a number of continents including North America and they offer economic alternatives to today's farmers as the technology continues to expand.

FlexForm does not contain harmful levels of chemicals or volatile organic compounds. As a thermoplastic, NFCs offer realistic opportunities for recovery and reuse of the trim waste and end-of-life components. This will become critical if the United States enacts recycling laws similar to those in Europe for component manufacturers.

The Total Solutions Provider

FlexForm is a total solutions provider with extensive engineering capabilities in composite formulation, composite design and new product development. We provide complete tool and process support, working side-by-side with our customers from the design stage to the manufacturing stage to aid your success. Backed by complete ASTM testing and quality control equipment, our experienced technical staff can evaluate your manufacturing objective and provide assistance in meeting environmental compliance and workplace safety challenges.

We are dedicated to customer service. Our customer support includes part/process development assistance at customer sites as required. We also offer on-going technical support through production launch and throughout the program life cycle.

Our state-of-the-art laboratory has presses and contact and hot air heating capabilities that are available for development and rapid parts prototyping. Our expert team will assist customers with equipment specifications, plant design, and installation of 3D press lines.



FLEXFORM PRODUCTS

FlexForm® MT

Flexible non-woven mat used in a contact oven for 3D applications with optional forced hot air pre-heat.

FlexForm® LD

A low-density board preprocessed to allow use in forced hot air heating systems for 2D and 3D applications. FlexForm LD allows for variable geometry within a common forming tool. LD is also an ideal tack board.

FlexForm® HD

A high-density hardboard that is a fully compressed sheet to be used in infrared or hot-air heating systems for 2D and 3D applications.

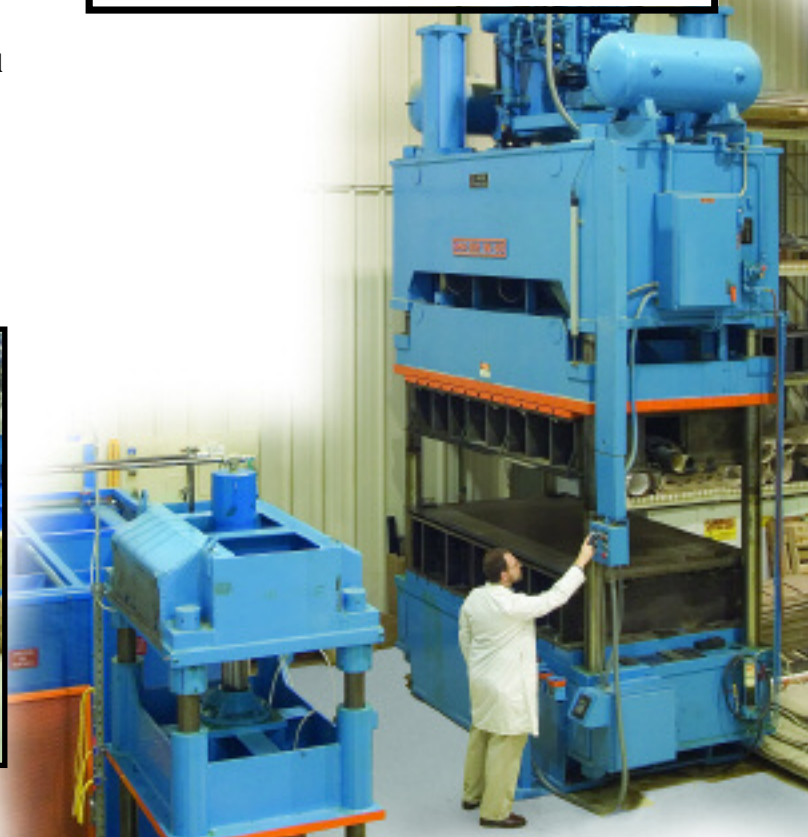
Standard Sizes:

Weight: 170 to 2400 grams/m²
Widths: Up to 3.5 m (11.25 feet)
Packaging: Sheets or rolls

FlexForm® FR

NEW

FlexForm FR is a natural fiber based alternative to fiber glass commonly used in office panels, ceiling tiles, and wall systems. FlexForm FR is tackable, offers structural benefits, is produced from sustainable materials, and has no harmful off gassing.



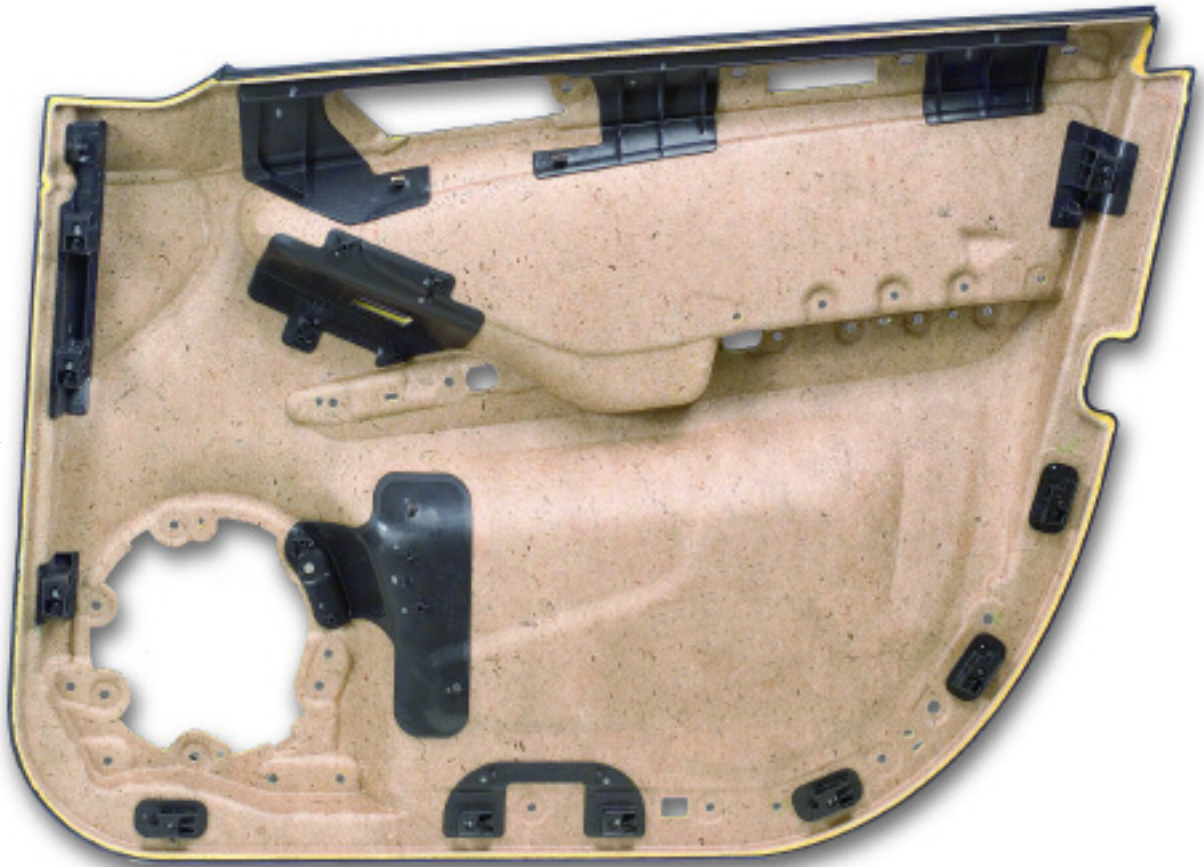
O N E S T E P 3 - D M O L D I N G

FlexForm provides the opportunity for manufacturers to produce complex 3D parts and components using low-pressure compression molding technology. Typical forming pressures do not exceed 55 psi. Our products dramatically reduce cycle times, while increasing the structural performance of the finished product.

Parts can be simultaneously surfaced with cover stock and bonded to internal fasteners without the use of additional adhesives or production steps. Parts can also be trimmed in the press during molding.

Lower Finished Component Costs

Reduced capital investment in tooling and equipment and a reduction in raw materials and labor are direct benefits from working with FlexForm.



P R O D U C T B E N E F I T S

FlexForm® natural fiber composites have significant advantages over competitive products for compression molded 3D components.

Features	Benefits
Higher tensile strength	<i>Provides greater longevity. Less likely to dent or bow. Reduces liability exposure.</i>
Higher impact strength	<i>Produces safer products. Less likely to shatter on impact. Meets all SAE side force impact standards</i>
Lower weight	<i>Increases fuel efficiency. Reduces shipping and handling costs.</i>
Greater durability	<i>Eliminates rust and corrosion.</i>
Dimensional stability	<i>Produces parts that are less likely to warp or creep under extreme temperature conditions.</i>
Cost competitive	<i>In-mold bonding of cover stocks and fasteners, without the use of secondary adhesives, results in short one step cycle times while delivering high performance specifications.</i>
Rapid part times	<i>Increases throughput. Lowers manufacturing costs.</i>
Acoustic benefits	<i>Is an acoustic absorber and/or barrier. Reduces vibration. Decreases noise level.</i>
Superior 3D molding	<i>Increases design flexibility.</i>
Greater versatility	<i>Provides the ability to engineer products to customer specifications in a wide range of applications.</i>
Lower VOC emissions	<i>Will not off-gas formaldehyde, benzene or styrene. Provides safer work places and living environments.</i>
Recyclable	<i>Factory trim can be recovered and reused. Parts can be recycled at the end of the product's useful life. Reduces landfill.</i>
First in Class, Look, and Feel	<i>FlexForm panels have a luxurious look and feel despite being less expensive to produce, especially when bonded with a high grade cover stock in the one-step process.</i>

FlexForm Typical Properties*

Product Composition (%PP / % Natural Fiber)	Weight (grams/m ²)	Press Density (mm)	Tensile Strength psi (ASTM D638)	Flexural Modulus psi (ASTM D790)	Heat Deflection 66 psi / C (ASTM D648)	Izod Impact in / ft-lb (ASTM D256)	Water Absorption % after 24 hrs (SAE J-315)	FMVSS 302 (Burn rate / mm)
50/50 (w/performance additive)	1800	2.2	6,200	550,000	162	1.8	20	20
50/50 (w/performance additive)	1600	1.95	5,200	450,000	160	1.75	20	20
50/50	1800	2.2	3,900	370,000	155	2.5	25	20
50/50	1600	1.95	3,500	300,000	150	2.4	25	20
50/50	1400	1.8	3,000	270,000	150	2	25	20
50/50	1200	1.5	2,900	260,000	150	2	25	20

*Note: These figures represent averages for molded composite formulations using the same percentage of natural fiber types and the same percentage of base polymer resin. Performance additive figures are based on changes made only to the common base polymer resin used in all test specimens. Changes made to fiber types, percentages of fiber blend, process temperatures and press densities will provide different results.

FlexForm® Technologies is ISO/TS 16949 registered.



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