

NCF NEW PRODUCT APPLICABLE TO PRESS MOLDING SUCH AS CONTINUOUS COMPRESSION MOLDING

SHINDO INDUSTRIAL MATERIALS DIVISION



Fig. 1 The fabric that a thermoplastic layer is inserted to NCF layers.

ABSTRACT

Our NCF fabric has been applied to various product in an Aerospace, a Marine, Civil construction repair and reinforcement fields.

We are proud to present our new product that the thermoplastic nonwoven fabric or film are inserted to NCF layers with stitch bonding. This fabric has a good drape property compared to a prepreg, and it is already included resin layers therefor it does not have to feed resin after laminated the layers. End-user can have a mold after just laminated NCF-resinply and heating / pressurization.

AUTHORS

HIDETOSHI KASAKAWA
DEVELOPMENT TEAM LEADER

YOSHINOBU TSUCHIYA
DEVELOPMENT TEAM MANAGER

ABOUT US

Headquartered in Fukui, Japan, SHINDO Industrial Materials division is a global company premised on textile manufacturing. Current products of focus include non-crimp fabrics), carbon/glass fibre-reinforced thin prepreg with thermoplastic resins and functional knitting textiles (flame-resistant or 3D fabrics).

www.shindo.com/en/material

OUR CONTACT

Tel: +81-776-73-1341

Fax: +81-776-73-3241

E-mail: im-company@shindo.com

FEATURES

There are 4 features of this NCF-Resinply.

- 1.Design flexibility
- 2.Grant drapability
- 3.Labor saving of molding process
- 4.Stability of quality for molding(Fig.2)

In terms of Design flexibility, it shows flexibility to specification with Material selection, layered structure, Stich design. Also it can be produced a continuous fabric that formed in a vertical(0°), a horizontal(90°), an oblique direction(+30°~90° / -30°~90°) which can be customized in accordance with user’s request.

Regarding the drape property, it makes material deformation much easier by a reinforcing fiber of fabric, a resin selection, an areal weight design, a layered composition and a design of stich condition, also the other way it can be adjusted to a material that can realize shape stability against the load. According to an S-S diagram shows outline figure for tensile property, the NCF-Resinply material on Fig.3 has the drape property and excellent deformation like NCF, furthermore it can be possible to adjust to difficult deformation as NCF prepreg as well.

As for the Labor-saving of molding process, it does not have to insert and laminate the resin layer into the fabric later like a general NCF, end-users can make the molding that is just laminating the NCF-Resinply on the mold after cutting the fabric and heating/pressurization. Because of this the laminated time can be shortened 40~60% than the unidirectional material and general NCF without resin films as per Fig.4.

With regards to a stable quality molding, NCF-Resinply is a material which NCF as reinforcing fibers and resin sheets are integrated by stich therefore it is possible to increase the fiber orientation accuracy by suppressing disturbance

FIGURES

Design flexibility We will adjust according to customers request, such as material selection of fiber, resin, stich yarn, and layer composition, stich design etc.

Grant drapability We propose the material adjusted for drapability by Material selection, layered composition, stich design.

Labor saving of molding process Since it is material containing resin, it is possible to save time and handle to laminate or insert a rein layer.

Stable quality of molded article Since the reinforcing fibers are integrated with the stich. It is possible to keep alignment of reinforcing fiber due to resin flow during heating / pressurization.

Fig.2 Product features

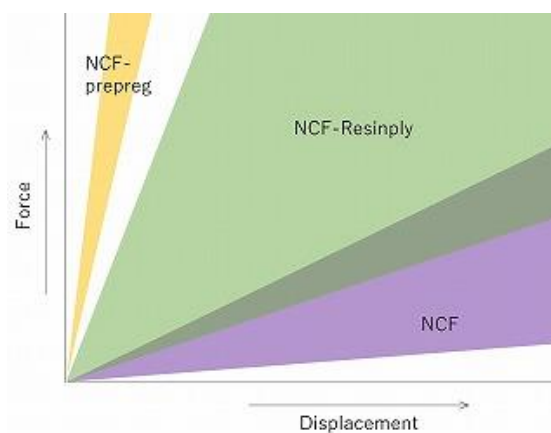


Fig. 3 s-s diagram of material.

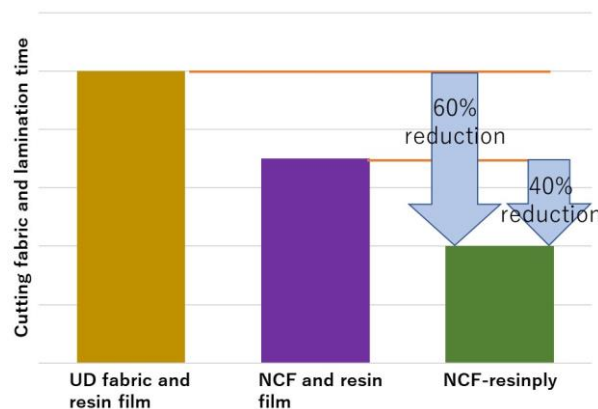


Fig. 4 Shortening effect of lamination time

of the reinforcing fiber orientation to a minimum due to the resin flow after heating/pressurization. Because of this, end-users are possible to realize a molding that has a various physical property with strength and rigidity in accordance with a designer.

DESIGN FLEXIBILITY

Our NCF-resinply has a design possibility that meets customer needs as follows.

◆Fiber selection

Carbon fiber, Glass fiber, Aramid fiber etc

◆Thermoplastic resin selection

The type of resin: PA, PE, PP, PET etc

Form of the resin: Non-woven fabric or Film

◆Areal weight

NCF layer Areal weight: 75~300g/m²

Thermoplastic resin Areal weight: Total 20~400g/m²

◆Layered structure

NCF orientation angle: +30° ~90° 、 -30° ~90° 、 0°

Insertion of the thermoplastic resin layer:
Insertable to any layer (but, in case the reinforcing fiber 0° is inserted to NCF, the thermoplastic resin layer does not insert to the upper layer of the 0° sheet)

◆Stich selection

PET, PA, PEI, GF etc

◆Stich design

Stich pattern, Stich length, Stich pitch

These can be customized in accordance with

FIGURES

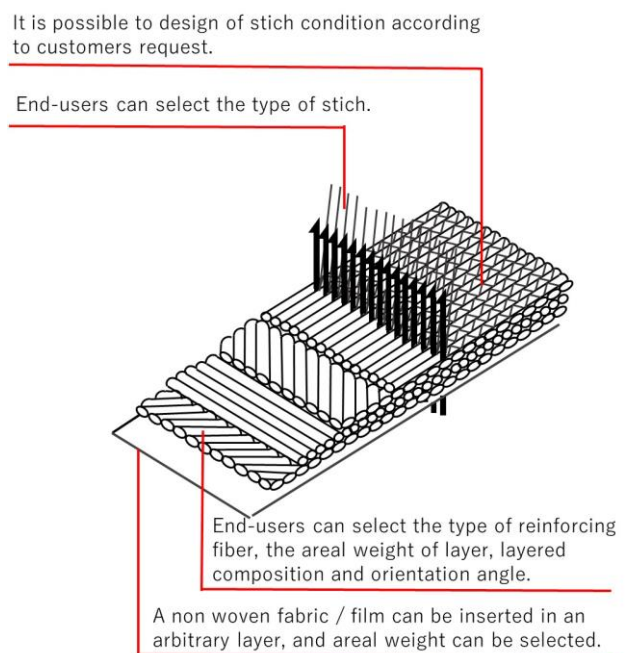


Fig.5 Material design

customer request and application.

APPLICATIONS

From the viewpoint of a continuous molding process, it has been studied as a material for continuously producing a molding with same cross-sectional shape. On the other hand, it is also possible to apply the material that is molding 3-dimensional curved surface shape.

And it is noticed from various fields because this material can be used in various fields because it has several desirable mechanical properties like strength and physical properties such as impact resistance, low water absorption and heat resistance in accordance with the material design.

NCF-resinply is possible to configure the reinforcing fibers in a state of continuous fibers, therefore it is possible to achieve high strength development, also to speed up the molded product cycle and to increase the toughness of the molded product by using a thermoplastic resin such as the resin layer is a matrix. For that reason, it is expected in the future to apply to especially an Aerospace field and an Automotive field those who needs the physical properties like strength and rigidity and an Impact resistance including the parts for which cost balance is required as well. In addition to this, applying high corrosion resistance of NCF, it has also been studied as an Alternate material instead the materials made of metal and concrete those who has corrosion occurs and there is concern about durability, or strength and rigidity is missing due to it composed only of resin in the fields of tubular structure is embed in the ground such as a drain pipe.

In order to make NCF-resinply use it to solve a wide variety of customers' problem, we propose

FIGURES

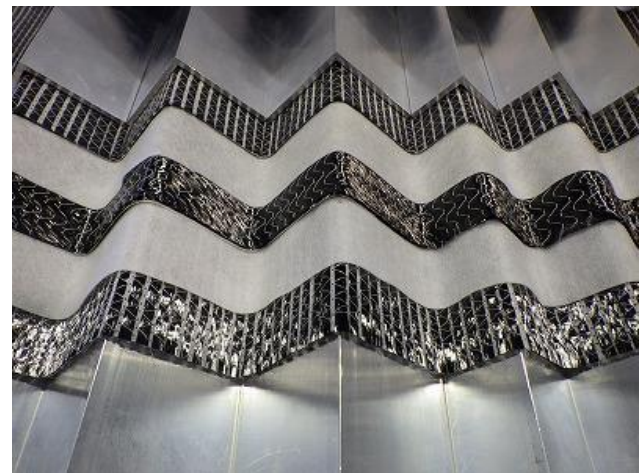


Fig.6 Draping example of same cross-sectional shape

Reinforcing fiber	Layered composition	Areal weight [g/m ²]
Carbon	(CF0° /PA6-NWF/CF90°)	(150/200/150)
	(CF+45° /PA6-NWF/CF-45°)	(150/200/150)
Glass	(GF0° /PP-NWF/GF90°)	(230/140/200)
	(GF+45° /PP-NWF/GF-45°)	(220/140/220)

※ NWF : Non Woven Fabric

Fig.7 Specification example for representative materials

products according to customers` request. Please contact us if you have any questions or requests.

FIGURES