wrapped around a polyurethane mold. Next, a sheet of PP that has been pre-heated in an oven to about 120 °C and softened to a pliable state will be wrapped around the foam layer and formed as quickly as possible before the sheet becomes too cold and rigid. The assembly is then vacuum bagged to complete the forming process. This process involves many steps and requires skillful craftsmen to be able to form the brace accurately and effectively. Thus, the productivity in the manufacturing of such molded articles is not high.

Therefore, there is a need for a material that allows for an easier way of making such molded articles which additionally shows an improved adhesion of the foam to the article.

As such, there is a need to provide materials to make molded articles that overcome, or at least ameliorate, one or more of the disadvantages described above.

Summary

According to the present disclosure, there is provided a laminate for making a molded article comprising at least one fiber reinforcement impregnated with a resin matrix as a first layer and a foam as a second layer.

In a first aspect, there is provided a laminate for making a molded article comprising at least one fiber reinforcement selected from a woven or knitted fabric made from carbon, glass, para-aramid synthetic or polymer fibers as a first layer which is (a) pre-impregnated with a partially cured epoxy matrix that can be cured at elevated temperatures during molding and (b) laminated to a foam as a second layer.

The laminate is a pre-impregnated reinforced fiber layer laminated to a foam. Advantageously, the laminate is drapable and can be used easily to form a molded article with fewer process steps and without the need of special skills. For the manufacture of the molded article, the laminate can be

fastened to the mold at room temperature, vacuum bagged and then left to cure at elevated temperature to yield the appropriate shape. The resulting molded article is thinner, lighter and much stronger than the PP-based articles due to the presence of the reinforcement in the laminate.

The laminate may optionally comprise an adhesive layer between the foam layer and the first layer. In this case

Claims

1. A laminate for making a molded article comprising at least one fiber reinforcement selected from a woven or knitted fabric made from carbon, glass, para-aramid synthetic or polymer fibers as a first layer which is
(a) pre-impregnated with a partially cured epoxy matrix that can be cured at elevated temperatures during molding and
(b) laminated to a foam as a second layer.

2. A laminate according to claim 1 wherein the first layer consists of multiple layers of fiber reinforcement impregnated with the resin matrix.

3. A laminate according to claim 1, wherein the foam layer is laminated to the first layer using an adhesive layer.

4. A laminate according to claim 3 wherein the adhesive layer is made from a nano-silica based nanocomposite.

5. A laminate according to claim 1 wherein the resin matrix additionally comprises a filler.

6. A laminate according to claim 1 wherein the laminate has holes.

7. A laminate according to claim 6 wherein the holes have a size of about 0.1 to 10 mm.

8. A process for making a laminate according to claim 1 which comprises the following steps:

(a) immersing the fiber reinforcement into the resin matrix,

(b) impregnating the reinforcement,

(c) optionally applying an adhesive to a foam or the impregnated reinforcement, and

(d) attaching the impregnated reinforcement to the foam.

9. A process for making a molded article which comprises the following steps:

(a) exposing the laminate according to claim 1 to a mold of well-defined shape,

(b) applying a pressure to the laminate,

(c) curing the laminate.

10. A process according to claim 9 wherein the pressure is achieved by a vacuum.

11. A process according to claim 10 wherein the vacuum is induced inside a bagging film.

12. A process according to claim 11 wherein a breather material linked to the vacuum port is used between the bagging film and the laminate.

13. A process according to claim 12 wherein a release film is inserted between the breather material and the laminate.

14. A process according to claim 9 further comprising a step of drilling or punching holes into the molded article after the curing step.

15. A molded article obtainable by molding a laminate according to claim 1.

16. A molded article obtainable by molding a laminate according to claim 4.

17. A method of using the molded article according to claim 15 or 16 as a brace for scoliosis, a prosthetic, a sport protector or a safety device.