CLAIMS

1. A manufacturing process of an orthogonal structural member in a multi-chamber fiber composite material, including the steps of preparing preformed core bodies, wherein a thin film material is used for making a foam material chamber containing a foaming material, and the foaming material chamber is filled with an appropriate amount of foaming material to prepare the preformed core bodies~~;~~, wherein the foaming material is of a microcapsule structure, wherein the microcapsule structure includes a capsule shell made of plastic material, and the foaming material is encapsulated in the capsule shell, performing die-filling on the preformed core bodies, wherein several preformed core bodies made in the step of preparing the preformed core bodies are placed into a mold according to a predetermined spatial layout, and each preformed core body is encapsulated with a layer of fiber material; integrally forming the fiber shell and the core structure, wherein the temperature of a die cavity is increased, and under the expansion pressure of the foam material, the chamber walls (130) and the structural panels (110) are formed synchronously to form a structural member shell (10) including at least two chambers (120); and meanwhile, the foaming material in the preformed core bodies expands and fills each chamber (120), so as to form a multi-chamber space structure, orthogonal to the structural panels (110), in the chamber walls (130)~~.~~,

~~2. The manufacturing process of the orthogonal structural member in the multi-chamber fiber composite material according to claim 1, characterized in that the monomer particles of the foaming material are of a microcapsule structure, wherein the microcapsule structure includes a capsule shell made of plastic material, and the foaming material is encapsulated in the capsule shell.~~

~~3. The manufacturing process of the orthogonal structural member in the multi-chamber fiber composite material according to claim 1, characterized in that~~ wherein the thin film material includes a wax film~~-~~ resin layer (1), an adhesive resin layer (2) and a foam material polymer resin mixture layer (3), wherein the foaming material polymer resin mixture layer (3) is

formed by being coated with a foaming material polymer resin mixture and comprises a foaming material with the volume fraction not less than ~~30%.~~65%,

~~4. The manufacturing process of the orthogonal structural member in the multi-chamber fiber composite material according to claim 1, characterized in that~~ wherein the layer material includes a viscous adhesive layer (A^*) and a water-insoluble wax film~~-~~ layer with polymer adhesive (B), wherein the viscous adhesive layer (A^*) includes a solvent carrier, a foam material, a water insoluble expandable viscous polymer adhesive and a thermosensitive molding resin, the foaming material is evenly distributed in the solvent carrier, and the volume fraction of the foaming material to the solvent carrier is not less than ~~30%~~50%.

~~5. An orthogonal structural member in a multi-chamber fiber composite material, including the shell (10), wherein the orthogonal structural member is characterized in that the shell (10) comprises several structural panels (110) and at least two chambers (120) arranged between the structural panels (110), the chamber walls (130) are arranged between every two adjacent chambers (120) and are orthogonal to the structural panels (110), and the shell (10) and the chamber walls (130) are made of carbon fiber material or composite material; the chambers (120) are internally provided with cores (20) made of foam plastic; and the structural panels (110), the chambers (120), the chamber walls (130) and the cores (20) are integrally formed by a thermal forming process of fiber material and foam plastic.~~

~~6~~2. An orthogonal structural member in a multi-chamber fiber composite material, including the shell (10), wherein the orthogonal structural member is characterized in that the shell (10) comprises several structural panels (110) and at least two chambers (120) arranged between the structural panels (110), the chamber walls (130) are arranged between every two adjacent chambers (120) and are orthogonal to the structural panels (110), and the shell (10) and the chamber walls (130) are made of carbon fiber material or glass fiber~~composite~~ material; the chambers (120) are internally provided with the cores (20) made of foam plastic; and the structural panels (110), the chambers (120), the chamber walls (130) and the cores (20) are

integrally formed through the manufacturing process of the orthogonal structural member in the multi-chamber fiber composite material in ~~any of~~ claim~~s~~ 1~~-4~~.

3~~7~~. The orthogonal structural member in the multi-chamber fiber composite material according to claim 2~~5 or claim 6~~, characterized by being of a blade-shaped structure, wherein the structural panels (110) are blade-shaped panels; or, the orthogonal structural member in the multi-chamber fiber composite material is of a sheet-shaped structure, the structural panels (110) are sheet-shaped panels, and the chambers (120) are distributed in a honeycomb shape or an orthogonal or heterotrophic grid shape or a strip shape.

4~~8~~. The orthogonal structural member in the multi-chamber fiber composite material according to claim 2~~5 or claim 6~~, characterized in that the shell (10) is in a fan shape, wherein the chambers (120) extend in the radial direction of the shell (10) and are evenly distributed in the circumferential direction of the shell (10); or, the chambers (120) extend in the circumferential direction of the shell (10) and are evenly distributed in the radial direction of the shell (10).

5~~9~~. The orthogonal structural member in the multi-chamber fiber composite material according to claim 2~~5 or claim 6~~, characterized in that the chambers (120) are filled with the cores (120).

6~~10~~. The orthogonal structural member in the multi-chamber fiber composite material according to claim 2~~5 or claim 6~~, characterized in that the shell (10) is a closed shell.

~~11. A film material, characterized by including a wax film resin layer (1), an adhesive resin layer (2) and a foaming material polymer resin mixture layer (3), wherein the foaming material polymer resin mixture layer (3) is formed by being coated with a foaming material polymer resin mixture, and the foaming material polymer resin mixture comprises a foaming material with the volume fraction not less than 30%.~~

~~12. A film material, characterized by comprising a viscous adhesive layer (A*) and a water insoluble wax film layer with polymer adhesive (B), wherein the viscous adhesive layer (A*)~~

includes a solvent carrier, a foaming material, a water-insoluble expandable viscous polymer adhesive and a thermosensitive molding resin, the foaming material is evenly distributed in the solvent carrier, and the volume fraction of the foaming material to the solvent carrier is not less than 30%.

13. A film material, characterized by including a wax film resin layer (1), an adhesive resin layer (2) and a foaming gel-type polymer resin mixture comprising microcapsules (3), wherein said foaming gel-type polymer resin mixture layer does not cause the foaming material to degrade and shrink in the process of heating and curing the layer of fiber material comprises a hydrocarbon (3), and is formed by being coated with a foaming gel-type polymer resin mixture, and the foaming gel-type polymer resin mixture comprises a foaming material with the volume fraction not less than 30%.

14. The manufacturing process of claim 1 wherein said film material comprises a gel-type polymer resin.

15. A gel-type polymer resin in the form of a resin gel, comprising: a wax film resin (1), an adhesive resin (2), microcapsules (3), a hydrocarbon (3), and a foaming material with the volume fraction not less than 30%.