What is claimed:

1. A method for fabricating a fiber-composite part via compression molding of a layup, wherein the method comprises:

forming ~~a~~the layup, wherein the layup ~~includes~~consists of plural fiber-bundle-based preforms each consisting of one or more bundles of fibers impregnated with a polymer resin, wherein within each bundle, the fibers are continuous and co-aligned; ~~a first fiber-bundle-based preform and a second fiber-bundle based preform, and wherein:~~

~~(a) the first preform is rigid, has a first shape, and comprises a first plurality of continuous, co-aligned fibers impregnated with a first matrix material,~~

~~(b) the second preform is rigid, has a second shape, and comprises a second plurality of continuous, co-aligned fibers impregnated with a second matrix material; and~~

consolidating, via compression molding, the ~~first preform and the second preform~~ layup in a mold cavity ~~via the application of heat and pressure~~; and

cooling the consolidated layup~~first preform and second preform~~, thereby providing a fiber-composite part.

2. The method of claim 1 wherein ~~the first shape and the second~~ at least some of the plural fiber-bundle-based preforms have a shape ~~are~~ that is individually selected and defined by ~~one or more non-contradictory~~ characteristics from the group consisting of ~~linear,~~ non-linear, planar, non-planar, open form, and closed form.

3. The method of claim ~~1~~ 2 wherein the ~~first~~ shape includes a first bend and a second bend.

4. The method of claim 3 wherein the first bend and the second bend are out-of-plane with respect to one another, ~~the first~~ the at least some fiber-bundle-based preforms having the shape therefore characterized as non-planar.

5. The method of claim 4 wherein the first bend and the second bend are orthogonal to one another.

6. The method of claim 1 wherein at least some of the plural fiber-bundle-based preforms differ from one another in at least one characteristic selected from the group consisting of fiber type, fiber volume fraction, and fiber distribution~~the first matrix material and the second matrix material are different from one another~~.

7. The method of claim 1 wherein the polymer resin in some of the plural fiber-bundle-based preforms differs from the polymer resin in some other of the fiber-bundle-based preformsthe first preform and the second preform differ from one another in at least one characteristic selected from the group consisting of fiber type, fiber volume fraction, fiber distribution, matrix composition.

8. The method of claim 1 wherein some of the plural fiber-based-preforms have a shape that is different from some other of the fiber-based-preformsforming a layup further comprises positioning the first and second preforms so that at least a portion of the second preform is adjacent to at least a portion of the first preform.

9. The method of claim 1 wherein the first shape is different from the second shapeforming the layup comprises:

positioning a first one of the plural fiber-bundle-based preforms in the layup so that the fibers therefrom occupy a first volumetric region of the fiber-composite part, and

positioning a second one of the plural fiber-bundle-based preforms in the layup so that the fibers therefrom occupy a second volumetric region of the fiber-composite part, and wherein:

(a) the first volumetric region includes a first section having a first portion, wherein the first portion of the first section comprises the fibers sourced from the first fiber-bundle-based preform;

(b) the second volumetric region includes a second section having a first portion, wherein the first portion of the second section comprises the fibers sourced from the second fiber-bundle-based preform; and

(c) wherein the first section and the second section are contiguous.

10. The method of claim ~~1~~9 wherein the first fiber-bundle-based preform and the second fiber-bundle-based preform are each characterized by a fiber type, a fiber volume fraction, fiber distribution, and a polymer-resin composition, and wherein the first fiber-bundle-based preform and the second fiber-bundle-based preform differ as to at least one of the characterizations, the at least one differing characterization, and/or a fiber alignment of the first fiber-bundle-based preform and the second fiber-bundle-based preform as positioned in the layup, selected to imbue the fiber-composite part with a different property, or a different amount of the property, as between the first section and the second section

fiber-composite part comprises:

~~(a) a first section having a first portion, wherein the first portion comprises the first plurality of co-aligned fibers sourced from the first preform;~~

~~(b) a second section having a first portion, wherein the first portion of the second section comprises the second plurality of co-aligned fibers sourced from the second preform; **and**~~

~~(c) wherein the first section and the second section are contiguous;~~

~~(d) wherein the first section experiences first stresses and the second section experiences second stresses when the fiber composite is in use due to applied forces, the first section being at a first volumetric region of the fiber-composite part and the second section being at a second volumetric region of the fiber-composite part;~~

~~(e) wherein the first and second stresses differ from one another in at least one of direction and magnitude;~~

~~and wherein forming the layup further comprises positioning the first preform in the layup so that the first plurality of co-aligned fibers therefrom occupy the first volumetric region, and positioning the second preform in the layup so that the second plurality of co-aligned fibers therefrom occupy the second volumetric region~~.

11. The method of claim 10 wherein the property is selected from the group consisting of an ability to withstand stresses, stiffness, electrical conductivity, and thermal conductivity~~first plurality of fibers comprise a different material than the second plurality of fiber~~.

12. The method of claim 1~~0~~ wherein forming the layup comprises tacking together the plural fiber-bundle-based preforms prior to placement in the mold cavity for consolidation~~a fiber volume fraction of the first plurality of fibers in the first preform is different from a fiber volume fraction of the second plurality of fibers in the second preform~~.

13. The method of claim ~~10~~ 1 wherein a shape of a cross section of each of the plural fiber-bundle-based preforms is individually selected from the group consisting of circular and oval~~forming the layup further comprises positioning the first preform and the second preform so that said first and second preforms are not co-linear with respect to one another in the layup~~.

~~**14.** The method of claim 10 wherein forming the layup further comprises positioning the first preform and the second preform so that said first and second preforms are not parallel with respect to one another in the layup.~~

15. The method of claim 10 wherein forming the layup further comprises positioning the first preform and the second preform so that said first and second preforms are orthogonal with respect to one another in the layup.

16. The method of claim 1 wherein the fiber-composite part comprises:

(a) a first section having a first portion, wherein the first portion comprises the first plurality of co-aligned fibers sourced from the first preform;

(b) a second section having a first portion, wherein the first portion of the second section comprises the second plurality of co-aligned fibers sourced from the second preform;

(c) wherein the first section and the second section are contiguous; and

(d) wherein by virtue of a difference in at least one characteristic between the first preform and second preform, the first section of the part is relatively more stiff than the second section of the part, the first section being at a first volumetric region of the fiber-composite part and the second section being at a second volumetric region of the fiber-composite part;

and wherein forming the layup further comprises positioning the first preform in the layup so that the first plurality of co-aligned fibers therefrom occupy the first volumetric region, and positioning the second preform in the layup so that the second plurality of co-aligned fibers therefrom occupy the second volumetric region.

17. The method of claim 1 wherein the fiber-composite part comprises:

(a) a first section having a first portion, wherein the first portion comprises the first plurality of co-aligned fibers sourced from the first preform;

(b) a second section having a first portion, wherein the first portion of the second section comprises the second plurality of co-aligned fibers sourced from the second preform;

(c) wherein the first section and the second section are contiguous; and

(d) wherein by virtue of a difference in at least one characteristic between the first preform and second preform, the first section of the part is relatively more electrically conductive than the second section of the part, the first section being at a first volumetric region of the fiber-composite part and the second section being at a second volumetric region of the fiber-composite part;

and wherein forming the layup further comprises positioning the first preform in the layup so that the first plurality of co-aligned fibers therefrom occupy the first volumetric region, and positioning the second preform in the layup so that the second plurality of co-aligned fibers therefrom occupy the second volumetric region.

18. The method of claim 1 wherein the fiber-composite part comprises:

(a) a first section having a first portion, wherein the first portion comprises the first plurality of co-aligned fibers sourced from the first preform;

(b) a second section having a first portion, wherein the first portion of the second section comprises the second plurality of co-aligned fibers sourced from the second preform;

(c) wherein the first section and the second section are contiguous; and

(d) wherein by virtue of a difference in at least one characteristic between the first preform and second preform, the first section of the part is relatively more thermally conductive than the second section of the part, the first section being at a first volumetric region of the fiber-composite part and the second section being at a second volumetric region of the fiber-composite part;

and wherein forming the layup further comprises positioning the first preform in the layup so that the first plurality of co-aligned fibers therefrom occupy the first volumetric region, and positioning the second preform in the layup so that the second plurality of co-aligned fibers therefrom occupy the second volumetric region.

19. A method for fabricating a fiber-composite part, wherein the method comprises:

forming a layup, wherein the layup includes a first fiber-bundle-based preform and a second fiber-bundle based preform, and wherein:

(a) the first preform is rigid, has a first shape that is non-planar wherein the first shape includes two bends that are out-of-plane with respect to one another, and comprises a first plurality of continuous fibers impregnated with a thermoplastic resin matrix,

(b) the second preform is rigid, has a second shape, and comprises a second plurality of continuous fibers impregnated with the thermoplastic resin matrix; and

consolidating the first preform and the second preform in a mold cavity via the application of heat and pressure; and

cooling the consolidated first preform and second preform, thereby providing a fiber-composite part.

20. The method of claim 19 wherein forming a layup further comprises placing the first and second preforms in a mold cavity.

21. The method of claim 19 wherein forming a layup further comprises positioning the first preform in the layup such that the first plurality of continuous fibers from the first preform occupies a first volumetric region of the fiber-composite part, and wherein the first volumetric region experiences first stresses when the fiber-composite part is in use, and wherein the method further comprises:

fabricating the first preform to include an appropriate fiber type, fiber volume fraction, and/or fiber distribution to enable the first volumetric region to withstand the first stresses.

22. The method of claim 21 wherein forming a layup further comprises positioning the second preform in the layup such that the second plurality of continuous fibers from the second preform occupies a second volumetric region of the fiber-composite part, and wherein the second volumetric region experiences second stresses when the fiber-composite part is in use and which differ from the first stresses, and wherein the method further comprises:

fabricating the second preform to include an appropriate fiber type, fiber volume fraction, and/or fiber distribution to enable the second volumetric region to withstand the second stresses, and wherein at least one of the fiber type, fiber volume fraction, or fiber distribution of the second preform differs from that of the first preform.

23. The method of claim 19 wherein the second shape is different than the first shape.

24. A fiber-composite part comprising:

a first section at a first volumetric region of the fiber-composite part, the first section having:

(a) a first portion, wherein the first portion comprises a first plurality of co-aligned fiber;

(b) a second portion, wherein the second portion comprises a second plurality of co-aligned fiber;

a second section at a second volumetric region of the fiber-composite part, wherein the first second and the second section are contiguous with one another, the second section having:

(a) a first portion, wherein the first portion of the second section comprises the first plurality of co-aligned fiber;

(b) a second portion, wherein the second portion of the second section comprises a third plurality of co-aligned fiber, wherein the second plurality of co-aligned fiber and the third

~~plurality of co-aligned fiber differ from one another in a characteristic selected from the group consisting of fiber type, fiber volume fraction, and fiber distribution.~~