What is claimed:

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

forming the layup, wherein the layup 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 rigid, continuous and co-aligned;

consolidating, via compression molding with the application of heat and pressure, the layup in a mold cavity; and

cooling the consolidated layup, thereby providing a fiber-composite part.

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

3. The method of claim 2 wherein the 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 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.

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 preforms.

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-preforms.

9. The method of claim 1 wherein forming the layup comprises:

positioning a first fiber-bundle-based preform 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 fiber-bundle-based preform 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 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.

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.

12. The method of claim 1 wherein forming the layup comprises tacking together the plural fiber-bundle-based preforms prior to placement in the mold cavity for consolidation.

13. The method of claim 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.