**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 ~~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 fiber-bundle-based preform ~~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 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.