

CLAIMS

- 1 1. A method for manufacturing a Z-directed component for insertion into a mounting hole in a
2 printed circuit board, comprising:
 - 3 simultaneously extruding a plurality of materials according to the structure of the Z-directed
4 component to form an extruded object; and
5 forming the Z-directed component from the extruded object.
- 1 2. The method of claim 1, further comprising extruding the plurality of materials in a lengthwise
2 direction of the Z-directed component.
- 1 3. The method of claim 2, wherein the plurality of materials extend lengthwise through
2 substantially the entire extruded object.
- 1 4. The method of claim 1, further comprising forcing the plurality of materials through a
2 chamber of an extrusion die to form the extruded object, a portion of the chamber including a barrier
3 that separates different materials from each other and defines the structure of the Z-directed
4 component.
- 1 5. The method of claim 4, wherein a diameter of the chamber and a thickness of the barrier
2 narrow in a downstream direction of extrusion.
- 1 6. The method of claim 1, further comprising separating a segment from the extruded object and
2 curing the separated segment of the extruded object to form the Z-directed component.
- 1 7. The method of claim 1, wherein one of the plurality of extruded materials is a conductive
2 material that forms a conductive channel in the Z-directed component.
- 1 8. The method of claim 7, further comprising applying a conductive trace to one of a top surface
2 and a bottom surface of the Z-directed component that connects with the conductive channel to
3 provide an interconnection between the conductive channel and a trace on the printed circuit board.
- 1 9. The method of claim 7, wherein the extruded conductive material extends to a side surface of
2 the Z-directed component to provide an interconnection between the conductive channel and a trace
3 on the printed circuit board.

- 1 10. The method of claim 7, further comprising applying a layer of insulator on one of a top
2 surface and a bottom surface of the Z-directed component to protect a portion of the extruded
3 conductive material that is exposed at the respective top or bottom surface of the Z-directed
4 component.
- 1 11. The method of claim 7, further comprising twisting the extruded object as it advances to cause
2 the conductive channel to spiral in the Z-directed component.
- 1 12. The method of claim 1, further comprising compressing the Z-directed component with a plug
2 that includes a recess formed in an end thereof having a tapered rim around a periphery of the recess
3 to form a corresponding taper in one of a top surface and a bottom surface of the Z-directed
4 component.
- 1 13. A method for manufacturing a Z-directed component for insertion into a mounting hole in a
2 printed circuit board, comprising:
3 simultaneously extruding a plurality of materials according to the structure of the Z-directed
4 component to form an extruded object;
5 varying the timing of extrusion between predetermined sections of one of the materials to
6 stagger the sections in the extruded object; and
7 forming the Z-directed component from the extruded object.
- 1 14. The method of claim 13, wherein a first set of the staggered sections extends to a top surface
2 of the Z-directed component and is spaced from a bottom surface thereof and a second set of the
3 staggered sections is spaced from the top surface of the Z-directed component and extends to the
4 bottom surface thereof.
- 1 15. The method of claim 13, further comprising dispensing the material making up the staggered
2 sections from a plurality of slats in the path of extrusion and imposing a predetermined delay between
3 a first set of the slats and a second set of the slats to vary the timing of extrusion of said material,
4 wherein the delay is imposed by varying (1) the position of the first set of slats relative to the second
5 set of slats, (2) the length of a material path feeding the first set of slats relative to the length of a
6 material path feeding the second set of slats, (3) the timing of material flow to the first set of slats
7 relative to the second set of slats, or (4) a combination thereof.

CLAIMS:

1. A method for manufacturing a Z-directed component for insertion into a mounting hole in a printed circuit board, comprising:

simultaneously extruding a plurality of materials in the cross-sectional shape of the Z-directed component to form an extruded object with the plurality of materials arranged relative to each other in their operative positions for the Z-directed component;

staggering said extrusion of a first portion of at least one of the materials in the extruded object relative to said extrusion of a second portion of said at least one of the materials in the extruded object; and

firing at least a segment of the extruded object, the fired segment forming the Z-directed component insertable into a mounting hole in a printed circuit board.

2. The method of claim 1, wherein the first portion of said at least one of the materials extends to a top surface of the Z-directed component and is spaced from a bottom surface thereof and the second portion of said at least one of the materials is spaced from the top surface of the Z-directed component and extends to the bottom surface thereof.

3. The method of claim 1, wherein said staggering includes dispensing said at least one of the materials from a plurality of slats in the path of extrusion and imposing a predetermined delay between a first set of the slats and a second set of the slats to vary the timing of extrusion of said material.

4. The method of claim 3, wherein the delay is imposed by varying (1) the position of the first set of slats relative to the second set of slats, (2) the length of a material path feeding the first set of slats relative to the length of a material path feeding the second set of slats, (3) the timing of material flow to the first set of slats relative to the second set of slats, or (4) a combination thereof.