CLAIMS

What is claimed is:

1. A method of fabricating a ferrite for use in a resistivity logging tool, comprising:

pressing a mixture of a ferrite powder and a binder into a mold having a geometry corresponding to a channel defined on an inner surface of a bobbin associated with the resistivity logging tool, wherein the channel is arcuate and extends at an angle offset from a central axis of the bobbin; and

adjusting at least one of a length, a width, and a thickness of the ferrite to manipulate a magnetic permeability of the ferrite in a direction of a magnetic field passing through the ferrite.

2. The method of claim 1, wherein the binder is a material selected from the group consisting of a rubber, an elastomer, an epoxy, a polymer, and a ceramic.

3. The method of claim 1, wherein mixing the ferrite powder with the binder comprises rolling the ferrite powder and the binder between adjacent rollers.

4. The method of claim 1, wherein adjusting the at least one of the length, the width, and the thickness of the ferrite comprises increasing an aspect ratio between the length and the width and thereby increasing the magnetic permeability of the ferrite in the direction of the magnetic field passing through the ferrite.

5. The method of claim 4, wherein increasing the aspect ratio between the length and the width comprises at least one of decreasing the width of the ferrite and increasing the length of the ferrite.

6. The method of claim 1, wherein adjusting the at least one of the length, the width, and the thickness of the ferrite comprises increasing an aspect ratio between the length and the thickness and thereby increasing the magnetic permeability of the ferrite in the direction of the magnetic field passing through the ferrite.

7. The method of claim 6, wherein increasing the aspect ratio between the length and the thickness comprises at least one of decreasing the thickness of the ferrite and increasing the length of the ferrite.

8. The method of claim 1, wherein adjusting the at least one of the length, the width, and the thickness of the ferrite comprises positioning at least one lamination between adjacent layers of the ferrite along the length of the ferrite, the at least one lamination being made of a non-magnetic material.

9. The method of claim 8, wherein the non-magnetic material is selected from the group consisting of a polymer, a rubber, an elastomer, an epoxy, a ceramic, and any combination thereof.

10. The method of claim 8, wherein the adjacent layers of the ferrite each exhibit a decreased thickness as compared to the thickness of the ferrite, the method further comprising constraining the magnetic field passing through the ferrite to the decreased thickness of the adjacent layers of the ferrite.

11. A resistivity logging tool, comprising:

a tool mandrel;

a bobbin positioned about the tool mandrel and having a cylindrical body that provides an inner surface and an outer surface, wherein a plurality of channels are defined on the inner surface and laterally adjacent channels are separated by a divider extending radially inward from the inner surface;

a coil winding wrapped about the outer surface of the body at an angle offset from a central axis of the body; and

a plurality of ferrites received within the plurality of channels and interposing the coil winding and the tool mandrel, wherein the dividers prevent physical contact between laterally adjacent ferrites and each ferrite conforms to a geometry of a corresponding one of the plurality of channels, and

wherein at least one of a length, a width, and a thickness of each ferrite is adjusted to manipulate a magnetic permeability of each ferrite in a direction of a magnetic field passing through the ferrite.

12. The resistivity logging tool of claim 11, wherein the bobbin and the divider each comprise a material selected from the group consisting of a plastic, a thermoplastic, an epoxy, a polymer, a ceramic, and any combination thereof.

13. The resistivity logging tool of claim 11, wherein each ferrite is a molded ferrite formed by mixing a ferrite powder with a binder to provide a mixture that is pressed into a mold that exhibits the geometry of the corresponding one of the plurality of channels.

14. The resistivity logging tool of claim 13, wherein the binder is a material selected from the group consisting of a rubber, an elastomer, an epoxy, a polymer, a ceramic, and any combination thereof.

15. The resistivity logging tool of claim 11, wherein an aspect ratio between the length and the width of at least one of the plurality of ferrites is increased to increase the magnetic permeability in the direction of the magnetic field passing through the at least one of the plurality of ferrites.

16. The resistivity logging tool of claim 11, wherein an aspect ratio between the length and the thickness of at least one of the plurality of ferrites is increased to increase the magnetic permeability in the direction of the magnetic field passing through the at least one of the plurality of ferrites.

17. The resistivity logging tool of claim 11, further comprising at least one lamination positioned between adjacent layers of at least one of the plurality of ferrites along the length of the at least one of the plurality of ferrites.

18. The resistivity logging tool of claim 17, wherein the at least one lamination comprises a non-magnetic material selected from the group consisting of a polymer, a rubber, an elastomer, an epoxy, a ceramic, and any combination thereof.

19. The resistivity logging tool of claim 11, wherein an aspect ratio between the length and the width of the laterally adjacent ferrites is decreased to reduce a difference in the magnetic permeability between each adjacent ferrite in the direction of the magnetic field passing through each adjacent ferrite.

20. A method of fabricating a ferrite for use in a resistivity logging tool comprising:

providing a block of magnetic material that exhibits an isotropic magnetic permeability;

excising the ferrite from the block of magnetic material such that the ferrite exhibits a geometry corresponding to a channel defined on an inner surface of a bobbin associated

with the resistivity logging tool, and wherein the channel is arcuate and extends at an angle offset from a central axis of the bobbin; and

wherein adjusting at least one of a length, a width, and a thickness of the ferrite comprises increasing an aspect ratio between the length and the width and thereby increasing the effective magnetic permeability of the ferrite in a direction of a magnetic field passing through the ferrite.

21. The method of claim 20, wherein providing the block of magnetic material comprises pressing a ferrite powder through a press to generate the block of magnetic material, and wherein the magnetic permeability is isotropic in a plane normal to a direction of the press.

22. The method of claim 21, wherein excising the ferrite from the block of magnetic material comprises excising the ferrite with a length of the ferrite aligned with the plane normal to the direction of the press.

23. The method of claim 20, further comprising positioning at least one lamination between adjacent layers of the ferrite along a length of the ferrite, the at least one lamination being made of a non-magnetic material selected from the group consisting of a polymer, a rubber, an elastomer, an epoxy, a ceramic, and any combination thereof.