CLAIMS

What is claimed is:

1. A method of applying a hardfacing composition to a surface of an earth-boring tool, comprising:

suspending grains of hard material in a molten cobalt-based metal alloy including at least about 5.0 wt% ruthenium on a surface of an earth-boring tool; and

cooling and solidifying the molten cobalt-based metal alloy with the grains of hard material suspended therein.

2. The method of claim 1, further comprising formulating the hardfacing composition to exhibit a fracture toughness K_{Ic} of y and a wear resistance number of x, wherein $y \geq 17.686 - 2.565*\ln(| x-2.813|)$.

3. The method of claim 1, further comprising formulating the hardfacing composition to comprise between about 5.0 wt% ruthenium and about 45.0 wt% ruthenium.

4. The method of claim 3, further comprising formulating the hardfacing composition to comprise between about 20 wt% ruthenium and about 45 wt% ruthenium.

5. The method of claim 1, further comprising formulating the hardfacing composition to exhibit a wear resistance number of at least about 6.0 and a fracture toughness K_{Ic} of at least about 15.0 ksi√in.

6. The method of claim 1, further comprising formulating the hardfacing composition to exhibit a wear resistance number of at least about 4.0 and a fracture toughness K_{Ic} of at least about 18.0 ksi√in.

7. The method of claim 1, further comprising formulating the hardfacing composition to comprise between about 10.0 wt% cobalt-based metal alloy and about 50.0 wt% cobalt-based metal alloy.

8. The method of claim 1, further comprising formulating the cobalt-based metal alloy to comprise a hexagonal crystal structure.

9. The method of claim 1, further comprising formulating the grains of hard material to comprise at least one of a transition metal carbide, a transition metal nitride, and a transition metal oxide.

10. The method of claim 1, further comprising formulating the grains of hard material to comprise tungsten carbide.

11. The method of claim 1, wherein suspending grains of hard material in the molten cobalt-based metal alloy comprises melting a welding rod, the welding rod comprising a cylindrical body of cobalt-based metal alloy and particles of hard material disposed within the cylindrical body.

12. The method of claim 11, wherein melting the welding rod comprises using one of a metal-inert gas welding process, a tungsten-inert gas welding process, or a plasma-transferred arc welding process.

13. The method of claim 1, wherein suspending grains of hard material in the molten cobalt-based metal alloy comprises melting a powder mixture comprising particles of a cobalt-based metal alloy and particles of hard material through a flame spray nozzle.