CLAIMS

What is claimed is:

1. A cutting element for an earth-boring tool, comprising:

a substrate base comprising a substantially cylindrical outer side surface and a longitudinal axis substantially parallel to the substantially cylindrical outer side surface; and

a cutting tip comprising:

an elongated surface defining a longitudinal end of the cutting tip;

a first generally conical surface extending from proximate the substrate base to the elongated surface;

a second generally conical surface extending from proximate the substrate base to the elongated surface, the second generally conical surface opposite the first generally conical surface;

a first generally flat surface extending between the first generally conical surface, the second generally conical surface, and the elongated surface;

a second generally flat surface extending between the first generally conical surface, the second generally conical surface, and the elongated surface, the second generally flat surface opposite the first generally flat surface; and

a central axis extending through the cutting tip from an interface between the substrate base and the cutting tip to a central location on the elongated surface;

wherein the longitudinal axis of the substrate base is not co-linear with the central axis of the cutting tip.

2. The cutting element of claim 1, wherein the substrate base comprises a first material and the cutting element tip comprises a second material different than the first material.

3. The cutting element of claim 2, wherein the first material comprises a cemented carbide material and the second material comprises an abrasion resistant material selected from the group consisting of a polycrystalline diamond material, a carbide material, a metal-matrix carbide composite material, and a cubic boron nitride material.

4. The cutting element of claim 3, wherein the second material comprises a polycrystalline diamond material and the cutting tip further comprises a third material formed over the polycrystalline diamond material.

5. The cutting element of claim 2, wherein substantially all of the cutting element from an interface between a longitudinal end of the substrate base and the longitudinal end of the cutting tip comprises the second material, the second material being a substantially uniform material.

6. The cutting element of claim 2, wherein the second material comprises a layer over the substrate base, the layer having a substantially uniform thickness.

7. The cutting element of claim 6, wherein the substantially uniform thickness of the second material is at least about 0.15 inches (3.81 mm).

8. The cutting element of claim 1, wherein the substrate base comprises at least one chamfer around a longitudinal end thereof opposite the cutting tip.

9. The cutting element of claim 8, wherein the at least one chamfer comprises a first chamfer extending around the substrate base between a lateral side surface of the substrate base and a second chamfer, the second chamfer extending around the substrate base between the first chamfer and the longitudinal end of the substrate base opposite the cutting tip.

10. The cutting element of any one of claims 1 through 9, wherein the elongated surface defining the longitudinal end of the cutting tip is relatively more narrow in a central region thereof than in a radially outer region thereof.

11. The cutting element of claim 10, wherein the surface defining the longitudinal end of the cutting tip is curved relative to a plane passing longitudinally through a center of the cutting element.

12. The cutting element of claim 10, further comprising one or more valleys extending into at least one of the first flank surface and the second flank surface.

13. The cutting element of claim 10, further comprising one or more ridges extending from at least one of the first flank surface and the second flank surface.

14. The cutting element of claim 10, wherein the cutting tip is configured to rotate relative to the substrate base.

15. An earth-boring tool, comprising:

a body; and

a plurality of cutting elements attached to the body, each cutting element of the plurality of cutting elements comprising:

a substantially cylindrical substrate base; and

a cutting tip comprising:

a first generally conical surface extending from proximate the substrate base to a longitudinal end of the cutting tip;

a second generally conical surface extending from proximate the substrate base to the longitudinal end of the cutting tip, the second generally conical surface opposite the first generally conical surface relative to a longitudinal axis of the cutting tip;

a first flank surface extending from proximate the substrate base to the longitudinal end of the cutting tip and extending between the first generally conical surface and the second generally conical surface; and

a second flank surface extending from proximate the substrate base to the longitudinal end of the cutting tip and extending between the first generally conical surface and the second generally conical surface, the second flank surface opposite the first flank surface relative to a longitudinal axis of the cutting tip;

wherein at least one cutting element of the plurality of cutting elements is oriented relative to the body such that the cutting tip of the at least one cutting element is back raked and configured to initially engage a formation to be bored by the earth-boring tool with one of the first generally conical surface and the second generally conical surface of the at least one cutting element.

16. The earth-boring tool of claim 15, wherein the cutting tip of the at least one cutting element comprises a longitudinal axis extending centrally through the cutting tip from proximate the substrate base to the longitudinal end of the cutting tip that is not co-linear with a longitudinal axis extending centrally through the substrate base.

17. The earth-boring tool of claim 15, wherein each cutting element of the plurality of cutting elements is oriented relative to the body such that the cutting tip of each cutting element is back raked and configured to initially engage the formation to be bored by the earth-boring tool with one of the first generally conical surface and the second generally conical surface of each cutting element.

18. The earth-boring tool of claim 15, further comprising at least one alignment feature in or on the body with which the first flank surface and the second flank surface of the at least one cutting element of the plurality of cutting elements are aligned.

19. The earth-boring tool of claim 15, wherein each of the first flank surface and the second flank surface is substantially flat.

20. The earth-boring tool of any one of claims 15 through 19, wherein the earth-boring tool is a fixed cutter rotary drill bit.

What is claimed is:

1. A fixed-cutter earth-boring rotary drill bit, comprising:

a bit body bearing fixed blades; and

cutting elements secured to the fixed blades of the bit body, at least some of the cutting elements comprising:

a substrate base comprising a substantially cylindrical outer side surface and a longitudinal axis substantially parallel to the substantially cylindrical outer side surface; and

a cutting tip comprising:

an elongated surface defining a longitudinal end of the cutting tip;

a first generally conical surface extending from proximate the substrate base to the elongated surface;

a second generally conical surface extending from proximate the substrate base to the elongated surface, the second generally conical surface opposite the first generally conical surface;

a first generally flat surface extending between the first generally conical surface, the second generally conical surface, and the elongated surface;

a second generally flat surface extending between the first generally conical surface, the second generally conical surface, and the elongated surface, the second generally flat surface opposite the first generally flat surface; and

a central axis extending through the cutting tip from an interface between the substrate base and the cutting tip to a central location on the elongated surface;

wherein a width of the longitudinal end of the cutting tip varies along a length of the elongated surface; and

wherein at least some of the cutting elements are positioned such that at least one of the first generally conical surface or the second generally conical surface initially engages a formation to be bored with the fixed-cutter earth-boring rotary drill bit by being oriented in a back raked position and each of the first generally flat surface

and the second generally flat surface of the cutting tip is configured to stabilize the respective cutting element within at least one groove cut in the formation.

2. The fixed-cutter earth-boring rotary drill bit of claim 1, wherein the substrate base of the cutting element comprises a first material and the cutting tip of the cutting element comprises a second material different than the first material.

3. The fixed-cutter earth-boring rotary drill bit of claim 2, wherein the first material comprises a cemented carbide material and the second material comprises an abrasion resistant polycrystalline diamond material.

4. The fixed-cutter earth-boring rotary drill bit of claim 1, wherein the substrate base of the cutting element comprises at least one chamfer around a longitudinal end thereof opposite the cutting tip.

5. The fixed-cutter earth-boring rotary drill bit of claim 4, wherein the at least one chamfer comprises a first chamfer extending around the substrate base between a lateral side surface of the substrate base and a second chamfer, the second chamfer extending around the substrate base between the first chamfer and the longitudinal end of the substrate base opposite the cutting tip.

6. The fixed-cutter earth-boring rotary drill bit of claim 1, wherein the first generally conical surface of the cutting tip and the second generally conical surface of the cutting tip are oriented generally symmetrically with respect to each other about the central axis of the cutting tip.

7. The fixed-cutter earth-boring rotary drill bit of claim 1, wherein the elongated surface defining the longitudinal end of the cutting tip is generally arcuate having a point of origin of a radius centered along the longitudinal axis of the substrate base of the cutting element.

8. The fixed-cutter earth-boring rotary drill bit of claim 1, wherein the width of the longitudinal end of the cutting tip is narrower in a central region than in a radially outer region.

9. A fixed-cutter earth-boring rotary drill bit, comprising:

a bit body comprising fixed blades; and

cutting elements secured to the fixed blades of the bit body, at least some of the cutting elements comprising:

a substantially cylindrical substrate base; and

a cutting tip secured to the substrate base, the cutting tip comprising:

an elongated surface defining a longitudinal end of the cutting tip;

a first generally conical surface extending from proximate the substrate base toward the longitudinal end of the cutting tip;

an opposing second generally conical surface extending from proximate the substrate base toward the longitudinal end of the cutting tip;

a first flank surface extending between the first generally conical surface and the opposing second generally conical surface and extending from proximate the substrate base toward the longitudinal end of the cutting tip; and

an opposing second flank surface extending between the first generally conical surface and the opposing second generally conical surface and extending from proximate the substrate base toward the longitudinal end of the cutting tip;

wherein the elongated surface defining the longitudinal end of the cutting tip is relatively more narrow in a central region thereof than in a radially outer region thereof; and

wherein at least some of the cutting elements are back raked to provide initial engagement with one of the first generally conical surface and the opposing second gen-

erally conical surface with a formation to be bored by the bit body and each of the first flank surface and the opposing second flank surface of the cutting tip is configured to stabilize the respective cutting element within at least one groove cut in the formation.

10. The fixed-cutter earth-boring rotary drill bit of claim **9**, wherein each of the first flank surface and the opposing second flank surface is substantially flat.

11. The fixed-cutter earth-boring rotary drill bit of claim **9**, wherein the first generally conical surface of the cutting tip and the opposing second generally conical surface of the cutting tip are coextensive.

12. The fixed-cutter earth-boring rotary drill bit of claim **9**, wherein the elongated surface defining the longitudinal end of the cutting tip has a convex arcuate shape.

13. A fixed-cutter earth-boring tool, comprising:

a fixed-cutter tool body; and

cutting elements attached to the fixed-cutter tool body, at least some of the cutting elements comprising:

a substantially cylindrical substrate base; and

a cutting tip comprising:

a first generally conical surface extending from proximate the substrate base to a longitudinal end of the cutting tip;

a second generally conical surface extending from proximate the substrate base to the longitudinal end of the cutting tip, the second generally conical surface opposite the first generally conical surface relative to a longitudinal axis of the cutting tip;

a first flank surface extending from proximate the substrate base to the longitudinal end of the cutting tip and extending between the first generally conical surface and the second generally conical surface; and

a second flank surface extending from proximate the substrate base to the longitudinal end of the cutting tip and extending between the first generally conical surface and the second generally conical surface, the second flank surface opposite the first flank surface relative to the longitudinal axis of the cutting tip;

wherein an elongated surface defining the longitudinal end of the cutting tip is relatively more narrow in a central region thereof than in a radially outer region thereof; and

wherein at least one cutting element is oriented relative to the fixed-cutter tool body such that the cutting tip of the at least one cutting element is back raked and configured to initially engage a formation to be bored by the fixed-cutter earth-boring tool with one of the first generally conical surface and the second generally conical surface of the at least one cutting element and each of the first flank surface and the second flank surface of the cutting tip is configured to stabilize the respective cutting element within at least one groove cut in the formation.

14. The fixed-cutter earth-boring tool of claim **13**, wherein the cutting tip of the at least one cutting element comprises a longitudinal axis extending centrally through the cutting tip from proximate the substrate base to the longitudinal end of the cutting tip that is co-linear with a longitudinal axis extending centrally through the substrate base.

15. The fixed-cutter earth-boring tool of claim **13**, wherein at least some of the cutting elements are oriented relative to the fixed-cutter tool body such that the cutting tip of each cutting element is back raked and configured to initially engage the formation to be bored by the fixed-cutter earth-boring tool with one of the first generally conical surface and the second generally conical surface of each cutting element.

16. The fixed-cutter earth-boring tool of claim 13, wherein the fixed-cutter earth-boring tool is a fixed-cutter rotary drill bit.

17. The fixed-cutter earth-boring tool of claim 13, wherein the first generally conical surface of the cutting tip and the second generally conical surface of the cutting tip are oriented generally symmetrically with respect to each other about the longitudinal axis of the cutting tip.

18. The fixed-cutter earth-boring tool of claim 13, wherein the substantially cylindrical substrate base of the cutting elements comprises a first substantially uniform material and the cutting tip of the cutting elements comprises a second abrasion resistant material different than the first substantially uniform material.

19. The fixed-cutter earth-boring tool of claim 18, wherein each of the first flank surface and the second flank surface of the cutting tip is larger in area relative to a leading cutting edge of the cutting tip.