WHAT IS CLAIMED IS:

1. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

2. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s, at a maximum power of not greater than about 10 Hp, and at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

3. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s, at a depth of cut of at least about 0.003 inches (0.076 mm), and at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

4. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s, and having a corner holding factor of not greater than about 0.07 inches (1.78 mm) at a depth of cut of 1.8.

5. The abrasive article as recited in claim 4, wherein the bonded abrasive body is capable of a material removal rate of 0.4 in^3/min/in (258 mm^3/min/mm).

6. The abrasive article as recited in any one of claims 1 to 3 and 5, wherein the material removal rate is at least about 0.45 in^3/min/in (290 mm^3/min/mm).

7. The abrasive article as recited in any one of claims 1 to 3, 5, and 6, wherein the material removal rate is at least about 0.5 in^3/min/in (323 mm^3/min/mm).

8. The abrasive article as recited in any one of claims 1 to 3, and 5 to 7, wherein the material removal rate is at least about 0.55 in^3/min/in (355 mm^3/min/mm).

9. The abrasive article as recited in any one of claims 1 to 3, and 5 to 8, wherein the material removal rate is at least about 0.6 in^3/min/in (387 mm^3/min/mm).

10. The abrasive article as recited in any of the preceding claims, wherein the bond material is formed from not greater than about 20 wt% boron oxide (B_2O_3) for the total weight of the bond material.

11. The abrasive article as recited in any of the preceding claims, wherein the bond material comprises a ratio of weight percent silicon oxide (SiO_2): weight percent aluminum oxide (Al_2O_3) of not greater than about 3.2.

12. The abrasive article as recited in any of the preceding claims, wherein the bond material is formed from not greater than about 3.0 wt% phosphorous oxide (P_2O_5).

13. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) and not greater than about 3.0 wt% phosphorous oxide (P_2O_5), wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s.

14. The abrasive article as recited in claim 12 or 13, wherein the bond material is essentially free of phosphorus oxide (P_2O_5).

15. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a single phase vitreous bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s.

16. The abrasive article as recited in any one of claims 1 and 3 to 15, wherein the bonded abrasive body is capable of grinding the workpiece at a maximum power of not greater than about 10 Hp.

17. The abrasive article as recited in claim 2 or 16, wherein the maximum power is not greater than about 9 Hp.

18. The abrasive article as recited in any one of claims 2, 16, and 17, wherein the maximum power is not greater than about 8 Hp.

19. The abrasive article as recited in any one of claims 1, 2, and 4 to 18, wherein the bonded abrasive body is capable of grinding at a depth of cut of at least about 0.003 inches (0.076 mm).

20. The abrasive article as recited in claim 3 or 19, wherein the depth of cut is at least about 0.004 inches (0.101 mm).

21. The abrasive article as recited in any one of claims 3, 19, and 20, wherein the depth of cut is at least about 0.0045 inches (0.114 mm).

22. The abrasive article as recited in any one of claims 1 to 3, and 5 to 21, wherein the bonded abrasive body comprises a corner holding factor of not greater than about 0.07 inches at a depth of cut of 1.8.

23. The abrasive article as recited in claim 4 or 22, wherein the bonded abrasive body comprises a corner holding factor of not greater than about 0.06 inches (1.52 mm) at a depth of cut of 1.8.

24. The abrasive article as recited in any one of claims 4, 22, and 23, wherein the bonded abrasive body comprises a corner holding factor of not greater than about 0.05 inches (1.27 mm) at a depth of cut of 1.8.

25. The abrasive article as recited in any one of the preceding claims, wherein the workpiece exhibits no visible evidence of burn at the material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

26. The abrasive article as recited in any one of the preceding claims, wherein the workpiece comprises a metal selected from the group of metals consisting of metal, metal alloys, plastic, natural materials, and a combination thereof.

27. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body is capable of grinding the workpiece at a speed of at least about 65 m/s.

28. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body is capable of grinding the workpiece at a speed of at least about 70 m/s.

29. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body is capable of grinding the workpiece at a speed of at least about 80 m/s.

30. The abrasive article as recited in any one of the preceding claims, wherein the abrasive particles consist essentially of microcrystalline alumina.

31. The abrasive article as recited in any one of the preceding claims, wherein the abrasive particles have an average particle size of not greater than about 250 microns.

32. The abrasive article as recited in any one of the preceding claims, wherein the microcrystalline alumina comprises grains having an average grain size of not greater than about 1 micron.

33. The abrasive article as recited in any one of claims 1 to 14 and 16 to 31, wherein the bond material comprises a single phase vitreous material.

34. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body comprises a porosity of at least about 43 vol% of the total volume of the bonded abrasive body.

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35. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body comprises a porosity of not greater than about 70 vol%.

36. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body comprises at least about 35 vol% abrasive particles of the total volume of the bonded abrasive body.

37. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body comprises not greater than about 15 vol% bond material of the total volume of the bonded abrasive body.

38. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from an alkaline earth oxide compound (RO).

39. The abrasive article as recited in any one of the preceding claims, wherein a total amount of alkaline earth oxide compound (RO) present in the bond material is not greater than about 3.0 wt%.

40. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from not greater than about 3 different alkaline earth oxide compounds (RO) selected from the group of calcium oxide (CaO), magnesium oxide (MgO), barium oxide (BaO), strontium oxide (SrO).

41. The abrasive article as recited in any one of the preceding claims, wherein the bond material comprises an alkali oxide compound (R_2O) selected from the group of compounds consisting of lithium oxide (Li_2O), sodium oxide (Na_2O), potassium oxide (K_2O), and cesium oxide (Cs_2O) and a combination thereof.

42. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from a total amount of alkali oxide compound (R_2O) not greater than about 20 wt%.

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43. The abrasive article as recited in any one of the preceding claims, wherein the bond material comprises not greater than about 3 alkali oxide compounds (R_2O).

44. The abrasive article of claim 42, wherein a content (wt%) of any alkali oxide compound present within the bond material is not greater than half of a total content (wt%) of alkali oxides.

45. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from not greater than about 55 wt% silicon oxide (SiO_2).

46. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from at least about 12 wt% aluminum oxide (Al_2O_3).

47. The abrasive article as recited in any one of the preceding claims, wherein the bond material is formed from at least one alkali oxide compound (R_2O) and at least one alkaline earth oxide compound (RO), wherein the total content of the alkali oxide compound and the alkaline earth oxide compound is not greater than about 20 wt%.

48. The abrasive article as recited in any one of the preceding claims, wherein the bond is formed from boron oxide (B_2O_3) and silicon oxide (SiO_2), and wherein the total content of boron oxide and silicon oxide is not greater than about 70 wt%.

49. The abrasive article of claim 47, wherein the content of silicon oxide (SiO_2) is greater than the content of boron oxide.

50. The abrasive article as recited in any one of the preceding claims, wherein the bond is formed from a composition comprising not greater than about 1 wt% of oxide compounds selected from the group consisting of MnO_2, $ZrSiO_2$, $CoAl_2O_4$, and MgO.

51. The abrasive article of claim 49, wherein the bond is formed from a composition essentially free of oxide compounds selected from the group consisting of MnO_2, $ZrSiO_2$, $CoAl_2O_4$, and MgO.

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52. The abrasive article as recited in any one of the preceding claims, wherein the bonded abrasive body is sintered at a temperature of not greater than about 1000°C.

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WHAT IS CLAIMED IS:

1. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

2. The abrasive article of claim 1 in which the bonded abrasive body has a corner holding factor of not greater than about 0.07 inches (1.78 mm) at a depth of cut of 1.8.

3. The abrasive article as recited in any of claims 1 and 2, wherein the bond material is formed from not greater than about 20 wt% boron oxide (B_2O_3) for the total weight of the bond material.

4. The abrasive article as recited in any of claims 1, 2 and 3, wherein the bond material comprises a ratio of weight percent silicon oxide (SiO_2): weight percent aluminum oxide (Al_2O_3) of not greater than about 3.2.

5. The abrasive article as recited in any of claims 1, 2, 3 and 4, wherein the bond material is formed from not greater than about 3.0 wt% phosphorous oxide (P_2O_5).

6. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm).

7. The abrasive article as recited in any one of claims 1 and 6, wherein the bonded abrasive body is capable of grinding the workpiece at a maximum power of not greater than about 10 Hp.

8. The abrasive article as recited in any one of claims 1, 6 and 7, wherein the abrasive particles consist essentially of microcrystalline alumina.

9. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bond material comprises a single phase vitreous material.

10. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bonded abrasive body comprises a porosity of at least about 43 vol% and not greater than about 70 vol% of the total volume of the bonded abrasive body.

11. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bonded abrasive body comprises at least about 35 vol% abrasive particles of the total volume of the bonded abrasive body.

12. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond material comprises an alkali oxide compound (R_2O) selected from the group of compounds consisting of lithium oxide (Li_2O), sodium oxide (Na_2O), potassium oxide (K_2O), and cesium oxide (Cs_2O) and a combination thereof.

13. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond material is formed from at least one alkali oxide compound (R_2O) and at least one alkaline earth oxide compound (RO), wherein the total content of the alkali oxide compound and the alkaline earth oxide compound is not greater than about 20 wt%.

14. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond is formed from a composition comprising not greater than about 1 wt% of oxide compounds selected from the group consisting of MnO_2, $ZrSiO_2$, $CoAl_2O_4$, and MgO.

15. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight

percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm).