CLAIMS

What is claimed is:

1. An oilfield downhole cutting tool, comprising:

a tool body comprising a non-cutting stabilizing section;

a plurality of first cutters coupled to the tool body forward of the non-cutting stabilizing section, wherein a maximum cutting diameter defined by the first cutters is less than 1.1 times a diameter defined by the non-cutting stabilizing section; and

a cutting rate limiting component coupled to the tool body.

2. The oilfield downhole cutting tool of claim 1, wherein the maximum cutting diameter defined by the first cutters is less than 1.02 times the diameter defined by the non-cutting stabilizing section.

3. The oilfield downhole cutting tool of claim 1, wherein the first cutters are removeably coupled to the tool body.

4. The oilfield downhole cutting tool of claim 1, further comprising a plurality of second cutters located aft of the non-cutting stabilizing section.

5. The oilfield downhole cutting tool of claim 1, wherein the first cutters comprise a spade cutter removeably coupled to the tool body surmounting a forward end of the tool body.

6. The oilfield downhole cutting tool of claim 1, wherein the first cutters are comprised of tungsten carbide.

7. The oilfield downhole cutting tool of claim 1, wherein the first cutters are coupled to the tool body in machined recesses.

8. The oilfield downhole cutting tool of claim 1, further comprising a plurality of bearing pads removeably coupled to the non-cutting stabilizing section of the tool body.

9. An oilfield downhole cutting tool system, comprising:

a cutting tool comprising a tool body comprising a non-cutting stabilizing section and a plurality of cutters coupled to the tool body; and

a bushing defining a cavity into which at least a portion of the cutting tool is received in a run-in state of the system and defining a cutting trajectory of the cutting tool.

10. The oilfield downhole cutting tool system of claim 9, wherein the bushing radially stabilizes the cutting tool in 360 degrees during initial cutting operation.

11. The oilfield downhole cutting tool system of claim 10, wherein the bushing radially stabilizes the cutting tool via contact with the non-cutting stabilizing section of the cutting tool.

12. The oilfield downhole cutting tool system of claim 9, wherein the cutting tool partially cuts out the bushing during cutting operation.

13. The oilfield downhole cutting tool system of claim 9, wherein the bushing serves to guide tools through a window cut by the cutting tool in a casing of a wellbore, after removal of the cutting tool from the wellbore.

14. A method of cutting a hole in a wellbore casing, comprising:

running a cutting tool system into a wellbore, the cutting tool system comprising a cutting tool coupled to a bushing, the cutting tool received by a cavity defined by the bushing; and

rotating the cutting tool to cut through the bushing and to cut the hole through the casing, the cutting following a trajectory determined by the cavity.

15. The method of cutting a hole in a wellbore casing of claim 14, further comprising detaching a cutter of the cutting tool, one of rotating and flipping the cutter, and reattaching the cutter to the cutting tool.

16. The method of cutting a hole in a wellbore casing of claim 14, further comprising the bushing radially stabilizing the cutting tool in 360 degrees during at least an initial portion of the cutting.

17. The method of claim 14, wherein the clearance between the bushing and a non-cutting stabilizing portion of the cutting tool is less than about 20 thousandths of an inch (0.020 inches) in a run-in state of the cutting tool system.

18. The method of claim 14, further comprising the cutting tool automatically limiting the rate of cutting through the bushing.

19. The method of claim 14, further comprising:

removing the cutting tool from the wellbore while leaving the bushing in the wellbore; and

the bushing guiding a completion tool through the hole in the wellbore casing.

20. The method of claim 14, wherein the cutting tool cuts with both a drilling action and a milling action.

CLAIMS

What is claimed is:

1. An oilfield downhole cutting tool, comprising: a tool body comprising a non-cutting stabilizing section; a plurality of first cutters coupled to the tool body forward of the non-cutting stabilizing section, wherein a maximum cutting diameter defined by the first cutters is less than 1.1 times a diameter defined by the non-cutting stabilizing section; a plurality of second cutters located aft of the non-cutting stabilizing section; and a cutting rate limiting component coupled to the tool body, wherein the cutting rate limiting component comprises one of a rate limiting cutter, a shoulder, a bead, or a protrusion that is set back longitudinally with respect to the tool body from the second cutters by a distance that limits the maximum cutting rate of the cutting tool to a maximum longitudinal distance per revolution of the cutting tool.

2. The oilfield downhole cutting tool of claim 1, wherein the maximum cutting diameter defined by the first cutters is less than 1.02 times the diameter defined by the non-cutting stabilizing section.

3. The oilfield downhole cutting tool of claim 1, wherein the first cutters are removeably coupled to the tool body.

4. The oilfield downhole cutting tool of claim 1, wherein the first cutters comprise a spade cutter removeably coupled to the tool body surmounting a forward end of the tool body.

5. The oilfield downhole cutting tool of claim 4, wherein the spade cutter has a groove inwards from the cutting edge of the spade cutter.

6. The oilfield downhole cutting tool of claim 1, wherein the first cutters are comprised of tungsten carbide.

7. The oilfield downhole cutting tool of claim 1, wherein the first cutters are coupled to the tool body in machined recesses.

8. The oilfield downhole cutting tool of claim 1, further comprising a plurality of bearing pads removeably coupled to the non-cutting stabilizing section of the tool body.

9. The oilfield downhole cutting tool of claim 1, wherein the tool body further comprises a helical flute.

10. An oilfield downhole cutting tool system, comprising: a cutting tool comprising a tool body comprising a non-cutting stabilizing section, a plurality of machined recesses, and a plurality of cutters removably coupled to the tool body with attachment hardware in the machined recesses; and a bushing defining a closed cavity and the bushing defining a cutting trajectory of the cutting tool, wherein in a run-in state of the system the closed cavity receives at least a portion of the cutting tool, and wherein in a cutting state of the system the non-cutting stabilizing section is configured to turn in the same direction and at substantially the same rate as the cutters.

11. The oilfield downhole cutting tool system of claim 10, wherein the bushing radially stabilizes the cutting tool in 360 degrees during initial cutting operation.

12. The oilfield downhole cutting tool system of claim 11, wherein the bushing radially stabilizes the cutting tool via contact with the non-cutting stabilizing section of the cutting tool.

13. The oilfield downhole cutting tool system of claim 10, wherein the cutting tool partially cuts out the bushing during cutting operation.

14. The oilfield downhole cutting tool system of claim 10, wherein the bushing serves to guide tools through a window cut by the cutting tool in a casing of a wellbore, after removal of the cutting tool from the wellbore.

15. A method of cutting a hole in a wellbore casing, comprising: running a cutting tool system into a wellbore, the cutting tool system comprising a cutting tool coupled to a bushing, the cutting tool received by a closed cavity defined by the bushing; rotating the cutting tool to cut through the bushing and to cut the hole through the casing, the cutting following a trajectory determined by the closed cavity; removing attachment hardware attaching a cutter to the cutting tool; detaching the cutter of the cutting tool; one of rotating or flipping the cutter; and reattaching the same cutter to the cutting tool with the attachment hardware to engage a different cutting edge of the cutter.

16. The method of cutting a hole in a wellbore casing of claim 15, further comprising the bushing radially stabilizing the cutting tool in 360 degrees during at least an initial portion of the cutting.

17. The method of claim 15, wherein the clearance between the bushing and a non-cutting stabilizing portion of the cutting tool is less than about 20 thousandths of an inch (0.020 inches) in a run-in state of the cutting tool system.

18. The method of claim 15, further comprising the cutting tool automatically limiting the rate of cutting through the bushing.

19. The method of claim 15, further comprising: removing the cutting tool from the wellbore while leaving the bushing in the wellbore; and the bushing guiding a completion tool through the hole in the wellbore casing.

20. The method of claim 15, wherein the cutting tool cuts with both a drilling action and a milling action.