CLAIMS

WHAT IS CLAIMED IS:

1. A tooling assembly ~~(200)~~ for mounting a component ~~(70)~~ in a powder bed additive manufacturing machine ~~(100),~~comprising a build platform, the tooling assembly ~~(200)~~ comprising:

a component fixture ~~(202)~~ configured for receiving the component ~~(70);~~;

a mounting plate ~~(210)~~ configured for receiving the component fixture ~~(202);~~, the mounting plate being a separate entity from the build platform; and

a magnet assembly ~~(220)~~ operably coupling the mounting plate ~~(210)~~ to the component fixture ~~(202)~~ for securing the component fixture ~~(202)~~ to the mounting plate ~~(210)~~ in a ~~desired~~fixed orientation, the magnet assembly comprising a fixture magnet and a plate magnet, the fixture magnet and the plate magnet being shaped to create an unbalanced geometry.

2. The tooling assembly ~~(200)~~ of claim 1, wherein the magnet assembly ~~(220)~~further comprises:

~~a~~the fixture magnet ~~(222)~~ mounted to the component fixture ~~(202);~~; and

~~a~~the plate magnet ~~(224)~~ mounted to the mounting plate ~~(210),~~, the fixture magnet ~~(222)~~ and the plate magnet ~~(224)~~ having opposing magnetic poles such that the component fixture ~~(202)~~ is urged toward the mounting plate ~~(210).~~.

3. The tooling assembly ~~(200)~~ of claim 2, wherein the fixture magnet ~~(222)~~ and the plate magnet ~~(224)~~ have a non-circular geometry.

4. The tooling assembly ~~(200)~~ of claim 2, wherein the fixture magnet ~~(222)~~ and the plate magnet ~~(224)~~ are substantially circular and have a single protrusion ~~(230)~~ to create an unbalanced geometry.

5. The tooling assembly ~~(200)~~ of claim 1, wherein the magnet assembly ~~(220)~~further comprises:

~~a~~ the fixture magnet comprising a first fixture magnet ~~(240)~~ and a second fixture magnet ~~(242)~~, the first fixture magnet and the second fixture magnet being mounted to the component fixture ~~(202)~~ and being spaced apart along a fixture magnetic axis ~~(244);~~; and

the plate magnet comprising a first plate magnet ~~(224)~~ and a second plate magnet ~~(224),~~ the first plate magnet and the second plate magnet being mounted to the mounting plate ~~(210)~~ and being spaced apart along a plate magnetic axis ~~(254),~~ and

wherein the first fixture magnet ~~(240)~~ and the first plate magnet ~~(224)~~ have opposing magnetic poles and the second fixture magnet ~~(242)~~ and the second plate magnet ~~(224)~~ have opposing magnetic poles such that the component fixture ~~(202)~~ is urged toward the mounting plate ~~(210)~~ such that the fixture magnetic axis ~~(244)~~ is substantially parallel to the plate magnetic axis ~~(254).~~.

6. The tooling assembly ~~(200)~~ of claim 1, wherein the component fixture ~~(202)~~ comprises a magnetic material and wherein the magnet assembly ~~(220)~~further comprises:

an electromagnet ~~(262)~~ electrically coupled to a power supply ~~(264)~~ for selectively generating a magnetic field that urges the component fixture ~~(202)~~ toward the mounting plate ~~(210).~~.

7. The tooling assembly ~~(200)~~ of claim 6, wherein the mounting plate ~~(210)~~ defines a recess ~~(226)~~ for receiving the component fixture ~~(202).~~.

8. The tooling assembly ~~(200)~~ of claim 1, further comprising:

a material removal assembly ~~(54)~~ for removing material above a repair surface ~~(72)~~ of the component ~~(70)~~ while positioned in the component fixture ~~(202).~~.

9. The tooling assembly ~~(200)~~ of claim 1, wherein the tooling assembly ~~(200)~~ is configured for supporting the component ~~(70)~~ during a subsequent additive manufacturing repair process, the additive manufacturing repair process comprising:

depositing a layer of additive powder ~~(172)~~ over a repair surface ~~(72)~~ of the component ~~(70)~~ using a powder dispensing assembly ~~(112);~~; and

selectively irradiating the layer of additive powder ~~(172)~~ to fuse the layer of additive powder ~~(172)~~ onto the repair surface ~~(72)~~ of the component ~~(70).~~.

10. The tooling assembly ~~(200)~~ of claim 1, wherein the component ~~(70)~~ is one of a plurality of components and the component fixture ~~(202)~~ is one of a plurality of component fixtures ~~(202),~~ each of the plurality of component fixtures ~~(202)~~ being configured for receiving one of a plurality of components ~~(70),~~ wherein the mounting plate ~~(210)~~ is configured for receiving

the plurality of component fixtures ~~(202),~~, and wherein the magnet assembly ~~(220)~~ operably couples the mounting plate ~~(210)~~ to the plurality of component fixtures ~~(202)~~ for securing the plurality of component fixtures ~~(202)~~ to the mounting plate ~~(210)~~ in a ~~desired~~fixed orientation.

11. The tooling assembly ~~(200)~~ of claim 10, wherein the plurality of components ~~(70)~~ comprises at least one airfoil ~~(70)~~ of a gas turbine engine.

12. The tooling assembly ~~(200)~~ of claim 10, wherein each of the plurality of components ~~(70)~~ is an airfoil ~~(70)~~ of a gas turbine engine having a chord line ~~(214),~~, and wherein the plurality of components ~~(70)~~ are in the ~~desired~~fixed orientation when the chord line ~~(214)~~ of each of the plurality of components ~~(70)~~ are parallel.

13. A method ~~(300)~~ of mounting a component in a powder bed additive manufacturing machine comprising a build platform, the method ~~(300)~~ comprising:

mounting the component in a component fixture ~~(310);~~;

positioning the component fixture on a mounting plate ~~(320);~~, the mounting plate being a separate entity from the build platform; and

securing the component in ~~the desired~~a fixed orientation on the mounting plate using a magnet assembly ~~(330).~~, the magnet assembly comprising a fixture magnet and a plate magnet, the fixture magnet and the plate magnet being shaped to create an unbalanced geometry.

14. The method ~~(300)~~ of claim 13, wherein the magnet assembly further comprises:

~~a~~the fixture magnet mounted to the component fixture; and

~~a~~the plate magnet mounted to the mounting plate, the fixture magnet and the plate magnet having opposing magnetic poles such that the component fixture is urged toward the mounting plate.

15. The method of claim 13, wherein the magnet assembly further comprises:

the fixture magnet comprising a first fixture magnet and a second fixture magnet, the first fixture magnet and the second fixture magnet being mounted to the component fixture and being spaced apart along a fixture magnetic axis; and

the plate magnet comprising a first plate magnet and a second plate magnet, the first plate magnet and the second plate magnet being mounted to the mounting plate and being spaced apart along a plate magnetic axis, and

wherein the first fixture magnet and the first plate magnet have opposing magnetic poles and the second fixture magnet and the second plate magnet have opposing magnetic poles such that the component fixture is urged toward the mounting plate such that the fixture magnetic axis is substantially parallel to the plate magnetic axis.

16. The method of claim 13, wherein the component fixture comprises a magnetic material and wherein securing the component in the fixed orientation on the mounting plate using the magnet assembly comprises:

selectively generating a magnetic field using an electromagnet electrically coupled to a power supply to urge the component fixture toward the mounting plate.

17. The method of claim 13, further comprising:

removing material above a repair surface of the component using a material removal assembly while the component is positioned in the component fixture.

~~15~~18. The method ~~(300)~~ of claim 13, further comprising:

depositing a layer of additive powder over a repair surface of the component using a powder dispensing assembly ~~(350);~~; and

selectively irradiating the layer of additive powder to fuse the layer of additive powder onto the repair surface of the component ~~(360).~~.

19. The method of claim 13, wherein the component is one of a plurality of components and the component fixture is one of a plurality of component fixtures, each of the plurality of component fixtures being configured for receiving one of a plurality of components, wherein the mounting plate is configured for receiving the plurality of component fixtures, and wherein the magnet assembly operably couples the mounting plate to the plurality of component fixtures for securing the plurality of component fixtures to the mounting plate in a fixed orientation.

20. The method of claim 19, wherein each of the plurality of components is an airfoil of a gas turbine engine having a chord line, and wherein the plurality of components are in the fixed orientation when the chord line of each of the plurality of components are parallel.

21. A tooling assembly for mounting a component in a powder bed additive manufacturing machine, the tooling assembly comprising:

a component fixture configured for receiving the component;

a mounting plate configured for receiving the component fixture; and

a magnet assembly operably coupling the mounting plate to the component fixture for securing the component fixture to the mounting plate in a fixed orientation, the magnet assembly comprising a fixture magnet and a plate magnet, the fixture magnet and the plate magnet being shaped to create an unbalanced geometry.