

CLAIMS

1. A print engine of an additive manufacturing system, comprising
a print station configured to hold a removable cartridge;
a laser engine including a frame to hold at least one removable field replaceable unit that includes at least some laser optics or patterning optics; and
an optical alignment system attached to at least one of the print station or the laser engine to align the field replaceable unit with respect to the removable cartridge.
2. The print engine of the additive manufacturing system of claim 1, wherein the removable cartridge comprises a sealable chamber having a bed and a laser transparent window.
3. The print engine of the additive manufacturing system of claim 1, wherein the removable cartridge comprises a powder hopper positioned within the sealable chamber and a powder spreader positioned within the sealable chamber for distributing powder from the powder hopper onto the bed.
4. The print engine of the additive manufacturing system of claim 1, wherein the frame of the laser engine is actively mechanically damped.
5. The print engine of the additive manufacturing system of claim 1, wherein laser light is passed between multiple field replaceable units.
6. The print engine of the additive manufacturing system of claim 1, further comprising connections to a facility station that provides gas, fluid, electrical, control, and database systems to the at least one removable field replaceable unit and the removable cartridge.
7. The print engine of the additive manufacturing system of claim 1, further comprising a print cartridge transporter unit.
8. The print engine of the additive manufacturing system of claim 1, further comprising a field replaceable unit transporter unit.
9. The print engine of the additive manufacturing system of claim 1, wherein the laser engine can direct a two-dimensional patterned laser beam into the removable cartridge.

10. The print engine of the additive manufacturing system of claim 1, wherein the removable field replaceable units can direct a laser beam between each other.
11. An additive manufacturing printing method, comprising
a positioning a removable cartridge in a print station;
directing a laser beam from a laser engine including a frame that holds at least one removable field replaceable unit that includes at least some laser optics or patterning optics into the removable cartridge; and
aligning the field replaceable unit with respect to the removable cartridge using an optical alignment system attached to at least one of the print station or the laser engine.
12. The additive manufacturing printing method of claim 1, wherein the removable cartridge comprises a sealable chamber having a bed and a laser transparent window.
13. The additive manufacturing printing method of claim 1, wherein the removable cartridge comprises a powder hopper positioned within the sealable chamber and a powder spreader positioned within the sealable chamber for distributing powder from the powder hopper onto the bed.
14. The additive manufacturing printing method of claim 1, wherein the frame of the laser engine is actively mechanically damped.
15. The additive manufacturing printing method of claim 1, wherein laser light is passed between multiple field replaceable units.
16. The additive manufacturing printing method of claim 1, further comprising connections to a facility station that provides gas, fluid, electrical, control, and database systems to the at least one removable field replaceable unit and the removable cartridge.
17. The additive manufacturing printing method of claim 1, further comprising a print cartridge transporter unit.
18. The additive manufacturing printing method of claim 1, further comprising a field replaceable unit transporter unit.
19. The additive manufacturing printing method of claim 1, wherein the laser engine can direct a two-dimensional patterned laser beam into the removable cartridge.

20. The additive manufacturing printing method of claim 1, wherein the removable field replaceable units can direct a laser beam between each other.
21. A print engine of an additive manufacturing system, comprising
a print station configured to hold a removable cartridge; and
a laser engine including a frame to hold multiple removable field replaceable units, each field replaceable unit having at least some laser optics or patterning optics to direct a laser beam toward the removable cartridge in the print station.
22. A print engine of an additive manufacturing system, comprising
a print station configured to hold a removable cartridge; and
a laser engine including a frame to hold multiple removable field replaceable units, each field replaceable unit having at least some laser optics or patterning optics to direct a laser beam toward the removable cartridge in the print station, with the laser beam passing through multiple field replaceable units before direction into the removable cartridge.