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Claims

What is claimed is:

1. An additive manufacturing system (10), comprising:
a support (14);
a print head (16) operatively connected to and moveable by the support, the print head including:
a housing (22);
a supply module (44) operatively mounted to the housing and configured to hold a supply of continuous reinforcement (60);
an impregnation module (48) operatively mounted to the housing and configured to wet the continuous reinforcement with a matrix; and
a clamping module (46) operatively mounted to the housing downstream of the supply module relative to movement of a reinforcement through the print head, the clamping module configured to selectively clamp the continuous reinforcement; and
a controller (20) in communication with the support and the print head and configured to coordinate operations of the support and the print head to fabricate a three-dimensional structure (12).
2. The additive manufacturing system of claim 1, wherein the clamping module is configured to inhibit only retraction of the continuous reinforcement into the print head.
3. The additive manufacturing system of claim 1, wherein the clamping module is located upstream of the impregnation module.
4. The additive manufacturing system of claim 3, further including a tensioning subassembly (64) located upstream of the clamping module.
5. The additive manufacturing system of claim 1, further including a tensioning subassembly (64) configured to generate a signal indicative of tension within continuous reinforcement, wherein the controller is configured to regulate operation of the supply module based on the signal.

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6. The additive manufacturing system of claim 1, wherein the impregnation module is configured to direct the matrix to wet the continuous reinforcement in an amount greater than an amount desired to be discharged from the print head with the continuous reinforcement.

7. The additive manufacturing system of claim 6, wherein the impregnation module includes a nozzle (130) configured to restrict passage of the matrix in excess of the desired amount.

8. The additive manufacturing system of claim 6, wherein the impregnation module is configured to generate a pressure differential in the matrix across the continuous reinforcement.

9. The additive manufacturing system of claim 1, further including at least one of a cutting module (52) and a feeding module (52) operatively mounted to the housing.

10. The additive manufacturing system of claim 9, wherein the at least one of the cutting module and the feeding module is mounted downstream of the impregnation module.

12. The additive manufacturing system of claim 1, further including at least one of a compacting module (54) and a curing module (15) operatively mounted to the housing, wherein the at least one of the compacting module, the curing module and a cutting module is configured to move together with the supply module relative to the housing.

13. The additive manufacturing system of claim 12, wherein the at least one of the compacting module and the curing module is a single module configured to compact the continuous reinforcement and cure the matrix.

14. The additive manufacturing system of claim 12, wherein the at least one of the compacting module and the curing module includes:

a leading device (400) configured to pass over and compress the continuous reinforcement; and

a trailing device (402) configured to pass over and compress the continuous reinforcement.

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15. The additive manufacturing system of claim 14, wherein the at least one of the compacting module and the curing module further includes at least one source (404) configured to direct cure energy at least one of through or behind the leading device and toward the matrix wetting the continuous reinforcement.