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 supply ~~(19)~~ of continuous reinforcement;

an outlet ~~(54)~~ configured to discharge the continuous reinforcement ~~(R)~~; and

a tensioning module ~~(48)~~ disposed between the supply and outlet, the tensioning module being configured to generate a signal indicative of at least one of a tension in the continuous reinforcement and a position of the tensioner module; and

a processor ~~(20)~~ programmed to selectively cause the supply to dispense the continuous reinforcement based on the signal.

2. The additive manufacturing system of claim 1, further including a wetting module ~~(52)~~ configured to wet the continuous reinforcement with a matrix prior to discharge from the outlet, wherein the tensioning module is located between the supply and the wetting module.

3. The additive manufacturing system of claim 1, wherein the tensioning module includes:

a swing arm ~~(98)~~;

at least one redirect ~~(102)~~ located at end of the swing arm and configured to receive the continuous reinforcement;

a pivot ~~(100)~~ located away from the end of the swing arm; and

a rotary sensor ~~(104)~~ configured to generate the signal during pivoting of the swing arm about the pivot.

4. The additive manufacturing system of claim 3, wherein the at least one redirect is rotationally mounted to the end of the swing arm.

5. The additive manufacturing system of claim 3, wherein the pivot is coincident with the at least one redirect.

6. The additive manufacturing system of claim 3, wherein:

the at least one redirect is a first redirect located at a first end of the swing arm; and

the tensioning module includes a second redirect ~~(102)~~ located at a second end of the swing arm and configured to receive the continuous reinforcement.

7. The additive manufacturing system of claim 6, wherein:

the first redirect is located upstream of the second redirect relative to travel of the continuous reinforcement through the print head; and

the pivot is coincident with the first redirect.

8. The additive manufacturing system of claim 7, wherein the rotary sensor is associated with the first redirect.

9. The additive manufacturing system of claim 7, further including a counterbalance ~~(108)~~ mounted to the swing arm at the first end.

10. The additive manufacturing system of claim 9, further including a spring ~~(106)~~ at the first end and configured to bias the swing arm toward a low-tension position.

11. The additive manufacturing system of claim 3, further including a counterbalance ~~(108)~~ mounted to the swing arm.

12. The additive manufacturing system of claim 3, further including a hard end stop ~~(109a)~~ located at a first side of the swing arm and configured to limit a low-tension position of the swing arm.

13. The additive manufacturing system of claim 12, further including a biased end stop ~~(109b)~~ located at a second side of the swing arm and configured to limit a high-tension position of the swing arm.

14. The additive manufacturing system of claim 3, further including a biased end stop ~~(109b)~~ located at a first side of the swing arm and configured to limit a high-tension position of the swing arm.

15. The additive manufacturing system of claim 3, further including a spring ~~(106)~~ configured to bias the swing arm toward a low-tension position.