CLAIMS

What is claimed is:

1. A method for the verification and authentication of additive manufactured product, comprising the steps of:

receiving, from a customer, at least one customer requirement for a product;

developing, from said at least one customer requirement, at least one manufacturing requirement for said product;

generating, from said manufacturing requirement, a product geometry file and at least one printer parameter;

recording, by a first computing device, to a distributed transaction register, a first transaction reflecting said product geometry file;

printing, with a 3D additive printer meeting said printer parameter, a product using the product geometry file;

obtaining a first output from said distributed transaction register that is associated with said first transaction in response to said recording said first transaction on the distributed transaction register;

generating a unique code based on said first output;

embedding within or affixing to said product said unique code;

recording, by a second computing device, to said distributed transaction register, a second transaction based on said printing of said product and said first output;

obtaining a second output from said distributed transaction register that is associated with said second transaction;

verifying with said unique code and said second output such that said product was printed based on said at least one manufacturing requirement.

2. The method set forth in claim 1, wherein said at least one customer requirement for said product is selected from a group consisting of quality parameters, material composition requirements, product definitions, manufacturing requirements and an IP artifact.

3. The method set forth in claim 1, wherein said at least one manufacturing requirement for said product is selected from a group consisting of product size, product

weight, product strength, product geometry, a computer aided design (CAD) file, and an IP artifact.

4. The method set forth in claim 1, wherein said product geometry file comprises an additive manufacturing file or a stereolithography file.

5. The method set forth in claim 1, wherein said distributed transaction register comprises a blockchain, and wherein said step of recording said first transaction comprises the step of recording said first transaction to a first block of said blockchain.

6. The method set forth in claim 5, wherein said first transaction comprises a transaction datum and said first output.

7. The method set forth in claim 6, wherein said first output comprises a blockchain address and said transaction datum comprises a cryptographic hash digest reflecting said product geometry file.

8. The method set forth in claim 5, wherein said step of recording said second transaction comprises the step of recording said second transaction to a second block of said blockchain.

9. The method set forth in claim 8, wherein said second transaction comprises a transaction datum and said second output.

10. The method set forth in claim 9, wherein said second output comprises a blockchain address and said transaction datum comprises a cryptographic hash digest reflecting said printing of said product.

11. The method set forth in claim 1, wherein said step of embedding to said product said unique code reflecting said first output comprises the step of printing said product with said unique code or etching said product with said unique code.

12. The method set forth in claim 1, comprising the steps of:

generating, from said manufacturing requirement, as said at least one printer parameter, at least one 3D additive printer material parameter and at least one 3D additive printer calibration parameter;

recording to said distributed transaction register said first transaction such that said first transaction reflects said at least one 3D additive printer material parameter and said at least one 3D additive printer calibration parameter:

printing, with said 3D additive printer meeting said 3D additive printer calibration parameter, said product using said product geometry file and said at least one 3D additive printer material parameter;

whereby said at least one 3D additive printer material parameter and said at least one 3D additive printer calibration parameter may be verified with said unique code such that said product may be authenticated.

13. The method set forth in claim 12, wherein said at least one 3D additive printer calibration parameter is selected from a group consisting of speed, power, scan rate, and feed rate.

14. The method set forth in claim 12, wherein said at least one 3D additive printer material parameter is selected from a group consisting of aluminum, titanium, stainless steel, cobalt chrome, inconel, maraging steel, hastalloy-X, and copper.

15. The method set forth in claim 12, wherein said distributed transaction register comprises a blockchain, and wherein said step of recording said first transaction comprises the step of recording said first transaction to a first block of said blockchain.

16. The method set forth in claim 15, wherein said step of recording said first transaction comprises the step of recording to said first block an entry reflecting said product geometry file, said 3D additive printer calibration parameter, and said 3D additive printer material parameter.

17. The method set forth in claim 1, comprising the steps of:

recording, by a third computing device, to said distributed transaction register, a third transaction reflecting said at least one customer requirement for said product;

obtaining a third output from said distributed transaction register that is associated with said third transaction;

recording, by a fourth computing device, to said distributed transaction register, a fourth transaction reflecting said at least one manufacturing requirement for said product;

obtaining a fourth output from said distributed transaction register that is associated with said fourth transaction;

wherein said fourth output reflects said third output and said first output reflects said fourth output;

whereby said at least one customer requirement for said product and said at least one manufacturing requirement for said product may be verified with said unique code such that said product may be authenticated.

18. The method set forth in claim 17, wherein said at least one customer requirement for said product is selected from a group consisting of quality parameters, material composition requirements, product definitions, and manufacturing requirements.

19. The method set forth in claim 17, wherein said at least one manufacturing requirement for said product is selected from a group consisting of product size, product weight, product strength, and product geometry.

20. The method set forth in claim 17, wherein said distributed transaction register comprises a blockchain, and wherein said step of recording said third transaction comprises the step of recording said third transaction to a third block of said blockchain and said step of recording said fourth transaction comprises the step of recording said fourth transaction to a fourth block of said blockchain.

21. The method set forth in claim 17, comprising the steps of:

recording, by a fifth computing device, to said distributed transaction register, a fifth transaction reflecting said embedding within or affixing to said product said unique code reflecting said second output;

obtaining a fifth output from said distributed transaction register that is associated with said fifth transaction and said second output;

inspecting said product;

recording, by a sixth computing device, to said distributed transaction register, a sixth transaction reflecting said inspection of said product;

whereby said embedding within or affixing to said product said unique code and said inspection of said product may be verified with said distributed transaction register.

22. The method set forth in claim 17, wherein said distributed transaction register comprises a blockchain, and wherein said step of recording said fifth transaction comprises the step of recording said fifth transaction to a fifth block of said blockchain and said step

of recording said sixth transaction comprises the step of recording said sixth transaction to a sixth block of said blockchain.

23. The method set forth in claim 22, comprising the steps of:

obtaining a sixth output from said distributed transaction register that is associated with said sixth transaction and said fifth output;

delivering said product to an end user;

recording, by a seventh computing device, to said distributed transaction register, a seventh transaction reflecting said delivery of said product to said end user;

whereby said delivery of said product to said end user may be verified with said distributed transaction register.

24. The method set forth in claim 23, comprising the steps of

obtaining a seventh output from said distributed transaction register that is associated with said seventh transaction and said sixth output;

installing said product for end use;

recording, by a eighth computing device, to said distributed transaction register, an eighth transaction reflecting said installation of said product for end use;

whereby said installation of said product for end use may be verified with said distributed transaction register.

25. The method set forth in claim 24, wherein said distributed transaction register comprises a blockchain, and wherein said step of recording said seventh transaction comprises the step of recording said seventh transaction to a seventh block of said blockchain and said step of recording said eighth transaction comprises the step of recording said eighth transaction to an eighth block of said blockchain.

26. The method set forth in claim 1, comprising the step of generating a transaction record reflecting said first transaction and said second transaction from said distributed transaction register.

27. The method set forth in claim 1, comprising the steps of:

scanning, by a computing device, said unique code embedded within or affixed to said product;

verifying, by the computing device, that said code is associated with said second output of said distributed transaction register; and

obtaining, by said computing device, at least one current transaction datum; and

determining, based on the verification and said at least one current transaction datum, that the product is authentic.

28. An additive manufactured part produced with a method comprising the steps set forth in claim 1.

29. A database system comprising:

at least one customer requirement for a product;

at least one manufacturing requirement for said product developed from said at least one customer requirement;

a product geometry file generated from said manufacturing requirement;

a distributed transaction register having a first transaction reflecting said product geometry file;

said distributed transaction register having a second transaction reflecting a printing of said product with an additive printer meeting a printer parameter;

whereby said product geometry file and said printing of said product may be verified with a unique code such that said product may be authenticated.

30. A computer system comprising:

a first computing device configured to communicate with a server network having a plurality of node servers storing a distributed transaction ledger;

a second computing device configured to communicate with said server network having said plurality of node servers storing said distributed transaction ledger;

a 3D additive printer for printing a product;

a mechanism for embedding or affixing a code to a product;

whereby said first computing device is configured to record to said distributed transaction register a first transaction reflecting a product geometry file generated from at least one manufacturing requirement for a product;

whereby said 3D additive printer is configured to print said product using said product geometry file;

one of said first, second or a third computing device is configured to generate a unique product code that reflects said first transaction;

whereby said mechanism is configured to embed or affix said unique product code reflecting said first transaction to said product;

whereby said second computing device is configured to record to said distributed transaction register a second transaction reflecting said printing of said product;

whereby said product geometry file may be verified with said unique code and an output from said second transaction such that said product may be authenticated.

31. The computer system set forth in claim 30, wherein said 3D additive printer comprises said mechanism for embedding or affixing said unique product code to said product.