METHOD FOR EFFICIENT AND LOCALIZED PRODUCTION OF SHOES

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ABSTRACT
Methods and systems relating to efficient shoe manufacturing that reduce the specialized human labor required to manufacture a pair of shoes while avoiding the high costs and special maintenance requirements often associated with highly automated manufacturing equipment are provided. Systems and methods in accordance with the present invention may be used to produce multiple models of custom shoes at a single shoe manufacturing facility using overlapping workflows, thereby reducing the physical footprint of the manufacturing facility. Additionally, embodiments of the invention may provide methods and systems for efficiently producing shoes to meet the demands of a particular geographic location, thereby eliminating the need to import shoes produced in other locations.
FIG. 2.
FIG. 3.

1. INJECTION MOLD RUBBER OUTSOLE
2. CURE OUTSOLE
3. REMOVE FLASH FROM OUTSOLE
4. STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE
5. RECEIVE AN ORDER
6. REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE
7. ALKALINE WASH OUTSOLE
8. ACID WASH OUTSOLE
9. DRY OUTSOLE IN OVEN
10. REMOVE OUTSOLE FROM OVEN
11. STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE
FIG. 3.

LOAD EVA PELLETS INTO INJECTION MOLD

HEAT EVA PELLETS TO 100° C

REMOVE BISCUIT FROM INJECTION MOLD

STAGE BISCUIT IN BISCUIT MARKETPLACE

RECEIVE AN ORDER

REMOVE BISCUIT FROM BISCUIT MARKETPLACE

LOAD BISCUIT INTO HEAT PRESS

HEAT BISCUIT TO 172° C

REMOVE BISCUIT FROM HEAT PRESS

LOAD BISCUIT INTO STABILIZATION OVENS

HEAT BISCUIT TO 75° C

LOWER TEMPERATURE FROM 75° C TO 65° C

LOWER TEMPERATURE FROM 65° C TO 55° C

LOWER TEMPERATURE FROM 55° C TO 45° C

REMOVE MIDSOLE FROM STABILIZATION OVENS

LOAD MIDSOLE INTO SONIC BATHS

WASH MIDSOLE

REMOVE MIDSOLE FROM SONIC BATHS

LOAD MIDSOLE INTO DRIYING OVENS

DRY MIDSOLE

REMOVE MIDSOLE FROM DRIYING OVENS

LOAD MIDSOLE INTO MIDSOLE STAGING MARKETPLACE
FIG. 5.

1. RECEIVE CUSTOMER ORDER
2. REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE
3. REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE
4. PRIME MIDSOLE AND OUTSOLE
5. PLACE MIDSOLE AND OUTSOLE IN IR OVEN
6. REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
7. APPLY ADHESIVE TO MIDSOLE AND OUTSOLE
8. PLACE MIDSOLE AND OUTSOLE IN IR OVEN
REMOVEMIDSOLE AND OUTSOLE FROM IR OVEN

HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE

LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS

HEAT MIDSOLE-OUTSOLE

REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS

LOAD MIDSOLE-OUTSOLE INTO CHILLER

COOL MIDSOLE-OUTSOLE TO 0°C

REMOVE MIDSOLE-OUTSOLE FROM CHILLER

DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA

FIG. 6.
FIG. 7.

RECEIVE ORDER

LOAD MATERIAL CORRESPONDING TO ORDER INTO ECO-SOLVENT PRINTER

LOAD ECO-SOLVENT AND DYE SUB ACCORDING TO ORDER

PRINT TO DYE SUB

PRINT TO ECO-SOLVENT

CUT OUT CUSTOMIZED SYNTHETIC ACCORDING TO ORDER

LOAD CUSTOMIZED SYNTHETIC INTO LASER

LOAD LASER WITH JOB ACCORDING TO ORDER

LASER ETCH CUSTOMIZED SYNTHETIC

LOAD DYE SUB PRESS

REMOVE CUSTOMIZED SYNTHETIC FROM LASER

LOAD RIGHT EMBROIDERY MACHINE

LOAD LEFT EMBROIDERY MACHINE

LOAD EMBROIDERY MACHINES WITH JOBS ACCORDING TO ORDER

EMBROIDER LEFT AND RIGHT PARTS

REMOVE PARTS FROM EMBROIDERY MACHINES

DELIVER CUSTOMIZED PARTS TO RF STAGING AREA
800 RETRIEVE CUSTOMIZED PARTS FROM RF WELDING STAGING AREA

810 GATHER PARTS CORRESPONDING TO ORDER FROM KIT MARKETPLACE

820 ASSEMBLE UPPER FROM CUSTOMIZED PARTS

825 PERFORM RF WELDING

830 FINAL CUTOUT UPPER

840 RETRIEVE MIDSOLE-OUTSOLE FROM SWING ARM STAGING AREA

850 STITCH UPPER TO MIDSOLE-OUTSOLE

FIG. 8.
900

910

RETRIEVE SHOE COMPONENT FROM SWING ARM AREA

920

QUALITY CONTROL AND LAST UPPER

930

QUALITY CONTROL AND DE-LAST UPPER

940

QUALITY CONTROL AND LACE UPPER

950

QUALITY CONTROL AND PACK SHOE

FIG. 9.
FIG. 10.

1000

INJECTION MOLD RUBBER OUTSOLE

1005

CURE OUTSOLE

1010

REMOVE FLASH FROM OUTSOLE

1015

STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE

1020

RECEIVE AN ORDER

1025

REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE

1030

ALKALINE WASH OUTSOLE

1035

ACID WASH OUTSOLE

1040

DRY OUTSOLE IN OVEN

1045

REMOVE OUTSOLE FROM OVEN

1050

STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE

1055
LOAD EVA PELLETS INTO INJECTION MOLD

HEAT EVA PELLETS TO 100°C

REMOVE BISCUIT FROM INJECTION MOLD

STAGE BISCUIT IN BISCUIT MARKETPLACE

RECEIVE AN ORDER

REMOVE BISCUIT FROM BISCUIT MARKETPLACE

LOAD BISCUIT INTO HEAT PRESS

HEAT BISCUIT TO 172°C

REMOVE BISCUIT FROM HEAT PRESS

LOAD BISCUIT INTO STABILIZATION OVENS

HEAT BISCUIT TO 75°C

LOWER TEMPERATURE FROM 75°C TO 65°C

LOWER TEMPERATURE FROM 65°C TO 55°C

LOWER TEMPERATURE FROM 55°C TO 45°C

REMOVE MIDSOLE FROM STABILIZATION OVENS

LOAD MIDSOLE INTO SONIC BATHS

WASH MIDSOLE

REMOVE MIDSOLE FROM SONIC BATHS

LOAD MIDSOLE INTO DRYING OVENS

DRY MIDSOLE

REMOVE MIDSOLE FROM DRYING OVENS

LOAD MIDSOLE INTO MIDSOLE STAGING MARKETPLACE

FIG. 11.
1200

RECEIVE CUSTOMER ORDER

1204

REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE

1206

REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE

1208

PRIME MIDSOLE AND OUTSOLE

1210

PLACE MIDSOLE AND OUTSOLE IN IR OVEN

1220

REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN

1230

APPLY ADHESIVE TO MIDSOLE AND OUTSOLE

1240

PLACE MIDSOLE AND OUTSOLE IN IR OVEN

1250

FIG. 12.
FIG. 13.

1300

REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN

1310

HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE

1320

LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS

1330

HEAT MIDSOLE-OUTSOLE

1334

REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS

1338

LOAD MIDSOLE-OUTSOLE INTO CHILLER

1340

COOL MIDSOLE-OUTSOLE TO 0°C

1344

REMOVE MIDSOLE-OUTSOLE FROM CHILLER

1348

DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA

1350
FIG. 14.
FIG. 15.

1500

1505 RETRIEVE CUSTOMIZED PARTS FROM HEAT PRESS MARKETPLACE

1510 GATHER PARTS CORRESPONDING TO ORDER FROM KIT MARKETPLACE

1520 ASSEMBLE UPPER FROM CUSTOMIZED PARTS

1530 LOAD ASSEMBLED PARTS INTO HEAT PRESS

1534 ACTIVATE HEAT PRESS

1538 REMOVE PARTS FROM HEAT PRESS

1540 LOAD PARTS INTO COOLING RACK

1544 COOL PARTS

1548 REMOVE PARTS FROM COOLING RACK

1550 FORM HEEL

1560 POST STITCH PARTS

1570 STROBEL STITCH PARTS

1580 DELIVER PARTS TO LASTING STATION
FIG. 16.

1600 RETRIEVE SHOE COMPONENT FROM LASTING STATION
1610 QUALITY CONTROL AND LAST UPPER
1620 QUALITY CONTROL AND DE-LAST UPPER
1630 QUALITY CONTROL AND LACE UPPER
1640 QUALITY CONTROL AND PACK SHOE
1650
1700

**FIG. 17.**

1705

INJECTION MOLD RUBBER OUTSOLE

1710

CURE OUTSOLE

1715

REMOVE FLASH FROM OUTSOLE

1720

STAGE OUTSOLE IN FINISHED OUTSOLE MARKETPLACE

1725

RECEIVE AN ORDER

1730

REMOVE OUTSOLE FROM FINISHED OUTSOLE MARKETPLACE

1735

ALKALINE WASH OUTSOLE

1740

ACID WASH OUTSOLE

1745

DRY OUTSOLE IN OVEN

1750

REMOVE OUTSOLE FROM OVEN

1755

STAGE OUTSOLE IN OUTSOLE STAGING MARKETPLACE
FIG. 19.

1900
RECEIVE CUSTOMER ORDER

1904

1906
REMOVE APPROPRIATE OUTSOLE FROM OUTSOLE STAGING MARKETPLACE

1908
REMOVE APPROPRIATE MIDSOLE FROM MIDSOLE STAGING MARKETPLACE

1910
PRIME MIDSOLE AND OUTSOLE

1920
PLACE MIDSOLE AND OUTSOLE IN IR OVEN

1930
REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN

1940
APPLY ADHESIVE TO MIDSOLE AND OUTSOLE

1950
PLACE MIDSOLE AND OUTSOLE IN IR OVEN
FIG. 20.

2000 REMOVE MIDSOLE AND OUTSOLE FROM IR OVEN
2010

2020 HAND FIT MIDSOLE AND OUTSOLE TOGETHER TO FORM MIDSOLE-OUTSOLE

2030 LOAD MIDSOLE-OUTSOLE INTO STOCKFIT PRESS

2034 HEAT MIDSOLE-OUTSOLE

2038 REMOVE MIDSOLE-OUTSOLE FROM STOCKFIT PRESS

2040 LOAD MIDSOLE-OUTSOLE INTO CHILLER

2044 COOL MIDSOLE-OUTSOLE TO 0°C

2048 REMOVE MIDSOLE-OUTSOLE FROM CHILLER

2050 DELIVER MIDSOLE-OUTSOLE TO SWING ARM POST STAGING AREA
FIG. 21.

1. RECEIVE ORDER
2. LOAD MATERIAL CORRESPONDING TO ORDER INTO ECO-SOLVENT PRINTER
3. LOAD ECO-SOLVENT AND DYE SUB ACCORDING TO ORDER
4. PRINT TO DYE SUB
5. PRINT TO ECO-SOLVENT
6. CUT OUT CUSTOMIZED SYNTHETIC ACCORDING TO ORDER
7. LOAD CUSTOMIZED SYNTHETIC INTO LASER
8. LOAD LASER WITH JOB ACCORDING TO ORDER
9. LASER ETCH CUSTOMIZED SYNTHETIC
10. LOAD DYE SUB PRESS
11. REMOVE CUSTOMIZED SYNTHETIC FROM LASER
12. LOAD RIGHT EMBROIDERY MACHINE
13. LOAD LEFT EMBROIDERY MACHINE
14. LOAD EMBROIDERY MACHINES WITH JOBS ACCORDING TO ORDER
15. EMBROIDER LEFT AND RIGHT PARTS
16. REMOVE PARTS FROM EMBROIDERY MACHINES
17. DELIVER CUSTOMIZED PARTS TO HEAT PRESS MARKETPLACE
18. CHECK MARKETPLACE AND CUT IF NEEDED
FIG. 22.

1. Retrieve customized parts from heat press marketplace
2. Gather parts corresponding to order from kit marketplace
3. Assemble upper from customized parts
4. Load assembled parts into heat press
5. Activate heat press
6. Remove parts from heat press
7. Load parts into cooling rack
8. Cool parts
9. Remove parts from cooling rack
10. Form heel
11. Post stitch parts
12. Strobel stitch parts
13. Deliver parts to lasting station
FIG. 23.
FIG. 25.
FIG. 26.
FIG. 27.
METHOD FOR EFFICIENT AND LOCALIZED PRODUCTION OF SHOES

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application No. 61/194,496, filed Sep. 26, 2008, entitled “Method for Efficient and Localized Production of Shoes.”

BACKGROUND OF THE INVENTION

Shoe production is a labor-intensive process that has changed little despite advancements in automation over the past 100 years. Thus, most shoe manufacturing operations today require a significant amount of manual input. For example, one worker may cut, form, align, and stitch an upper piece of a shoe. While this process may utilize a number of machines, there is still a significant amount of human input required that can introduce variation between any two different uppers. This upper piece may then be passed to another worker who may then add embroidery or other embellishments, which also require a significant amount of human input. These high levels of human input can introduce undesired variations in the finished shoe product. Further, the large amount of human labor required in the making of shoes has limited the ability to produce on-demand custom shoes at a price deemed acceptable by most customers.

SUMMARY OF THE INVENTION

This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter. The present invention offers several practical applications in the technical arts, not limited to methods for the production of specific types of shoes that are herein described.

The present invention relates to efficient shoe manufacturing methods and systems that reduce the specialized human labor required to manufacture a pair of shoes while avoiding the high costs and special maintenance requirements often associated with highly automated manufacturing equipment. Systems and methods in accordance with the present invention may be used to produce multiple models of custom shoes at a single shoe manufacturing facility. For example, one customer may order a particular model of shoe while a second customer may order a different model of shoe, yet both shoe models may be manufactured at the same facility by utilizing overlapping workflows.

BRIEF DESCRIPTION OF THE DRAWING

The present invention is described in detail below with reference to the attached drawing figures, wherein:

FIG. 1 illustrates a diagram of a shoe component-manufacturing facility for the manufacture of custom shoe components in accordance with an embodiment of the present invention;

FIG. 2 illustrates a flowchart of a method of efficiently manufacturing multiple models of custom shoes at a single manufacturing facility in accordance with an embodiment of the present invention;

FIG. 3 illustrates a flowchart of an outsole manufacturing workflow for a running shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 4 illustrates a flowchart of a midsole manufacturing workflow for a running shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 5 illustrates a flowchart of a workflow for a running shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

FIG. 6 illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a running shoe in accordance with an embodiment of the present invention;

FIG. 7 illustrates a flowchart of a workflow for customizing an upper for a running shoe in accordance with an embodiment of the present invention;

FIG. 8 illustrates a flowchart of a workflow for assembling an upper for a running shoe in accordance with an embodiment of the present invention;

FIG. 9 illustrates a flowchart of a workflow for lasting and quality control for a running shoe in accordance with an embodiment of the present invention;

FIG. 10 illustrates a flowchart of an outsole manufacturing workflow for a basketball shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 11 illustrates a flowchart of a midsole manufacturing workflow for a basketball shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 12 illustrates a flowchart of a workflow for a basketball shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

FIG. 13 illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a basketball shoe in accordance with an embodiment of the present invention;

FIG. 14 illustrates a flowchart of a workflow for customizing an upper for a basketball shoe in accordance with an embodiment of the present invention;

FIG. 15 illustrates a flowchart of a workflow for assembling an upper for a basketball shoe in accordance with an embodiment of the present invention;

FIG. 16 illustrates a flowchart of a workflow for lasting and quality control for a basketball shoe in accordance with an embodiment of the present invention;

FIG. 17 illustrates a flowchart of an outsole manufacturing workflow for a skate shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 18 illustrates a flowchart of a midsole manufacturing workflow for a skate shoe for the outsole/midsole module in accordance with an embodiment of the present invention;

FIG. 19 illustrates a flowchart of a workflow for a skate shoe for the priming and adhesive module in accordance with an embodiment of the present invention;

FIG. 20 illustrates a flowchart of a workflow for joining an outsole and a midsole into a midsole-outsole on a skate shoe in accordance with an embodiment of the present invention;
[0026] FIG. 21 illustrates a flowchart of a workflow for customizing an upper for a skate shoe in accordance with an embodiment of the present invention;

[0027] FIG. 22 illustrates a flowchart of a workflow for assembling an upper for a skate shoe in accordance with an embodiment of the present invention;

[0028] FIG. 23 illustrates a flowchart of a workflow for lasting and quality control for a skate shoe in accordance with an embodiment of the present invention;

[0029] FIG. 24 illustrates a work flow diagram of a shoe component-manufacturing facility for the manufacture of custom shoe components in accordance with an embodiment of the present invention;

[0030] FIG. 25 illustrates a schematic of a module configuration for use in shoe production in accordance with an embodiment of the present invention;

[0031] FIG. 26 illustrates a system for producing and assembling shoe components in accordance with an embodiment of the present invention; and

[0032] FIG. 27 illustrates a flowchart of a workflow of a shoe manufactured through a process in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0033] The subject matter of the present invention is described with specificity herein to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different steps or combinations of steps similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term “step” may be used herein to connote different components of methods employed, the terms should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0034] Embodiments of the invention may provide a method for efficiently producing shoes that may meet the demands of a geographic location. By way of example only and not limitation, a production facility for efficient production of shoes may be divided into particular modules, wherein a module may refer to an area of distributive labor or of specificity relating to one or more aspects of the shoemaking process, such as embroinder or production of midsoles. In one embodiment, one or more modules may be designed to best benefit the working environment of individual operators such that the interaction between the operator and the machines in an operator’s module are ergonomically designed to be conducive to the worker’s good health. Each module may be referred to as a “module.” As a shoe component moves through modules, different processes and modifications may occur that comprise the steps in the overall manufacture of a shoe.

[0035] A shoe article, wherein a shoe article may be a final shoe or a partially final shoe or a component of a final shoe, may be produced only after a customer order has been received. A customer order may contain custom shoe parameters that pertain to one or more shoes produced for a given consumer. Moreover, since each shoe may be custom-made, each shoe may have a variety of characteristics according to each customer’s request (e.g., a left-foot men’s size 9 in blue with medium-level hardness may be paired with a right-foot men’s size 9.5 with high-level hardness in red).

[0036] Once a customer has placed an order for one or more shoes, the order may be tracked throughout the production system so as to notify one or more operators of the unique characteristics of each order. In one method, the customer order may be presented to one or more operators on one or more sheets of paper. Each sheet of paper may travel to an appropriate operator so as to indicate to the operator what modifications to make to the shoe and/or shoe component the operator is modifying. The operator may then select the desired characteristics, such as a preferred color, from a source of materials within the modularized production facility, or the operator may select the desired design and/or markings from a series of program choices on a computer system. In the latter method, the operator may search through a predefined set of designs available for printing and/or embroi- dering and/or etching onto a material and may program the computer to print and/or embroider and/or etch the design onto a material. In another method, the operator may input a design or program supplied by the customer as a customized design on one or more shoe components.

[0037] In another embodiment, an operator can access information pertaining to a customer order throughout the shoe component-manufacturing facility by having the customer information stored on a database that is accessible to an operator in the shoe component-manufacturing facility. An operator may access the customer order information through a computer network at or near one or more modules in the shoe-component manufacturing facility. An operator may also access information pertaining to the customer through the use of one or more bar codes. In one method, a bar code may access customer order info from a database that may contain all of the necessary information for the production of a customer’s order of one or more shoes. A bar code may be used to access all information related to one or more shoe components, or may be used to access particular information related to one or more shoe components.

[0038] For example, an operator may scan one bar code at each software access point along the process. In another example, a bar code may be associated with each characteristic aspect and/or component of a shoe. For example, a bar code may be associated with the color which is desired to have on the background of a shoe component. In another example, a bar code may be associated with the components and/or designs desired to be reflected on an upper. In still another example, a bar code may be associated with to selection of components from a marketplace. For instance, one bar code may represent men’s running shoes size 9, whereas another bar code may represent women’s basketball shoes size 7. In another example, the use of bar codes may be associated with or supplanted by the use of number codes to supply the characteristics of a customer’s order. For example, if a barcode is damaged or if a barcode reader is simply not working, an operator may input a number code to reflect the characteristic customer information associated with an order of one or more shoes.

[0039] There may be three starting points from which one or more shoe components are produced: the production of the outsole, the production of the midsole, and the production of the upper. The production of the outsole and/or midsole may begin before a customer places an order. An outsole and/or midsole may also be produced on an as-needed basis after a customer order is received for the production of one or more shoes.
Referring to the drawings in general, and initially to FIG. 1 in particular, an exemplary operating environment suitable for implementing embodiments of the present invention is shown and designated generally as shoe component-manufacturing facility 100.

Shoe component-manufacturing facility 100 is but one example of a suitable manufacturing environment and is not intended to suggest any limitation as to the scope of use or functionality of the invention. Neither should the shoe component-manufacturing facility 100 be interpreted as having any dependency or requirement relating to any one or combination of components illustrated.

FIG. 1 shows the floor layout of six shoe component-manufacturing modules organized by the processes performed by an operator associated with a module. The six modules represented in FIG. 1 include: the Outsole and Midsole module; the Midsole, Outsole, Upper Prime and Adhesive module; the Final Assembly & Stockfit module; the Upper Customization module; the Upper Forming and Stitching module; and the Lasting, De-Lasting, Quality Control and Packing module. With reference to the diagram of FIG. 1, the areas of each module in shoe component-manufacturing facility 100 are described. The Outsole and Midsole module may contain injection mold pre-forming machine 102 that may be used to produce phylon biscuits. The Outsole and Midsole module may also contain midsole marketplace 108 that may store phylon biscuits for use in forming midsoles. The Outsole and Midsole module may also contain press 106, that may specifically be a Kingshead Quick Open Press, that may be used for characterizing phylon biscuits as being right-oriented shoes, left-oriented shoes, or neutral-oriented shoes may. The Outsole and Midsole module may also contain a microwave heat source to pre-heat the phylon biscuit. The Outsole and Midsole module may also contain stabilization oven 110 that may be used to stabilize midsoles and may also decrease the volume of midsoles. The Outsole and Midsole module may also contain a wash/dry area 112. The Outsole and Midsole module may also contain a midsole marketplace 104. The Outsole and Midsole module may also contain injection mold rubber machine 116 that may be used to produce outsoles. The Outsole and Midsole module may also contain a wash/dry area 114 that may be used to wash outsoles with an alkaline or acid wash. The Outsole and Midsole module may also contain an outsole marketplace 118.

The Midsole, Outsole, Upper Prime and Adhesive module may contain midsole marketplace 104 and outsole marketplace 118. The Midsole, Outsole, Upper Prime and Adhesive module may also contain primer and adhesive area 120. In another method, the primer area and adhesive area may be two separate areas. The Midsole, Outsole, Upper Prime and Adhesive module may also contain chemical storage area 156 that may contain chemicals related to one or more processes in the manufacturing of shoe components and/or shoe articles in the shoe-components manufacturing facility 100. The Midsole, Outsole, Upper Prime and Adhesive module may also contain infrared (IR) oven 122. In another method, the Midsole, Outsole, Upper Prime and Adhesive module may also contain a standard oven wherein one or more shoe articles may undergo manufacturing processes, such as having adhesive activated.

The Final Assembly & Stockfit module may contain IR oven 122. The Final Assembly & Stockfit module may also contain a bladder press 124 that may be used to fit a midsole and outsole together. The Final Assembly & Stockfit module may also contain standard press 126. The Final Assembly & Stockfit module may also contain chiller 128 that may be used to set the adhesive of a midsole-outsole shoe article. The Final Assembly & Stockfit module may also contain swing arm stage post 130.

The Upper Customization module may contain Eco-Solvent Printer 132 and print desk 134 and dye sub printer 136. The Upper Customization module may also contain custom clicker 138 that may be used to modify material used in upper customization and a tooling area 160 that may contain tools related to one or more processes in the manufacturing of one or more shoe components and/or one or more shoe articles in the shoe-components manufacturing facility 100. The Upper Customization module may also contain laser 140 that may be used to etch material used in upper customization and a laser/embroidery machine 162 and may contain right embroidery machine 164. The Upper Customization module may also contain tooling area 166 that may contain tools related to one or more processes in the manufacturing of one or more shoe components and/or one or more shoe articles in the shoe-component manufacturing facility 100. The Upper Customization module may also contain radio frequency (RF) Welder 148 wherein RF Welder 148 may include an RF staging area that may be used to temporarily store shoe components in the process of producing a shoe.

The Upper Forming and Stitching module may contain RF Welder 148 wherein RF Welder 148 may include an RF staging area that may be used to temporarily store shoe components in the process of producing or modifying a shoe article. The Upper Forming and Stitching module may also contain marketplace 150 that may be used to temporarily store and make easily available customizable parts needed to complete production of a shoe or shoe article. The Upper Forming and Stitching module may also contain material storage 168 that may contain materials and/or shoe components related to one or more processes in the manufacturing of shoe components and/or shoe articles in shoe-component manufacturing facility 100. The Upper Forming and Stitching module may also contain final trim clicker 144 and wing arm staging area 130. The Upper Forming and Stitching module may also contain material clicker 170, heat press 172, cooling rack 174, cutting press 176, heal former 178, post stitch 180 and strobel stitch 182.

The Lasting, De-Lasting, Quality Control and Packing module may contain swing arm staging area 130. The Lasting, De-Lasting, Quality Control and Packing module may also contain lasting area 152, final quality control 154, lacing and packing 156 and storage material 184.

With reference to the diagram of FIG. 1, the production of one shoe through the one or more modules of shoe component-manufacturing facility 100 is described. It should be understood that this and other arrangements described herein are set forth only as examples. Other arrangements and elements (e.g., machines, processes, methods, etc.) can be used in addition to or instead of those discussed, and some elements may be omitted altogether. Further, many of the elements described herein are functional entities that may be implemented as discrete or distributed components or in conjunction with other components, and in any suitable combination and location.
In one embodiment, the first step in the production of the outsole may utilize injection rubber mold machine 102. Different-sized and/or-shaped molds may be used to produce a range of outsoles for a range of shoe sizes and styles. Various types and/or colors of rubber may also be used to produce outsoles with different functional and/or aesthetic properties. For example, indicating marks (such as dotted lines) may be used to guide a designer (e.g., someone who embroiders or adds mechanical lights or who uses glue or another form of adhesive to add fabric and accessories onto one or more shoe components) in the production of the outsole. In another case, different colors of shoe components may have a functional component, such as adding an easily seen color, such as bright yellow, to one or more shoe components to make a shoe-wearer more visible. Alternatively, different rubbers with a higher slippage may be placed along a shoe component in order to minimize the extent to which mud or other outside components stick to the shoe-wearer’s one or more shoes.

The operator of injection rubber mold machine 102 may determine the number of each size, style, color, etc. of outsoles to make initially based on an indicator of outsoles required in outsole marketplace 118. For example, an indicator may include a pre-set range of expected sales for that store. A number of outsoles may also be created upon receipt of an indication of depleting inventory of a particular size, style, color, etc. The pre-set range of sales may be projected for a day or for another period of time, such as a week or a month or a season. The operator of injection rubber mold machine 102 alternatively or additionally may determine which size of outsole to make based on the quantity of outsoles of that size remaining in outsole marketplace 118. Outsole marketplace 118 of may comprise a plurality of temporary storage methods, with each temporary storage method corresponding to a particular style, size, color, functional property, etc. For example, a temporary storage method may comprise placing newly formed outsoles for size 9 in a first-come-first-serve (i.e. FIFO) queue. In another example, a temporary storage method may consist of an operator placing each newly formed outsole into a bin associated with one or more properties of that outsole (e.g., outsoles for men’s size 9 are in one bin while outsoles for men’s size 5 are in another bin). In still another example, a temporary storage method may comprise placing newly formed outsoles into a bin and then allowing the operator to remove the appropriately sized outsole from the bin when needed, e.g., by keeping an outsole based on sight variation between different sized outsoles or by textured indications of different sized outsoles.

Upon determining that there is a low quantity of a certain size of outsole remaining in outsole marketplace 118, such as by visual inspection, the operator may then decide to manufacture outsoles of that size. Outsoles may also be produced in direct response to an order, and may be made having the style, size, color, functional properties, etc. specified in an order.

Once the outsole is removed by the operator from injection rubber mold machine 102 it may be placed into wash/dry area 114. Wash/dry area 114 may comprise one or more cleaning steps to clean the shoe and remove any residue from the rubber. For example, rubber residue may be caused by the oils and stearic acid used during a curing process. In another example, a curing process may eliminate the use of stearic acid in the curing process and/or reduce the amount of oil used in the curing process, thereby reducing or eliminating the need for wash/dry area 114. This curing process may reduce or eliminate the rubber residue produced during the curing process and may reduce or eliminate the need for one or more cleaning steps. As such, the outsole could be ready for priming directly after it is formed in injection rubber mold machine 116.

After washing, if any, the outsole may be dried. For example, the outsole may be dried using wash/dry area 114. In another example, the outsole may be dried by placing it in a sufficient heated, sufficiently de-humidified area (e.g., place the one or more shoes next to a window to dry). The operator may remove the dried outsole from wash/dry 114 and place it into outsole marketplace 118 to be available for use.

Outsole marketplace 118 and midsole marketplace 104 may be comprised of one or more temporary storage methods wherein midsoles may be stored in bins that are arranged according to size, style, color, or other attributes of the components stored in the bins. Outsole marketplace 118 and midsole marketplace 104 may store outsoles and midsoles that have been produced upon receipt of an indication of anticipation of customer orders. Outsole marketplace 118 and midsole marketplace 104 may also contain outsoles and midsoles produced upon receiving a specific customer order. By way of further example, outsoles and/or midsoles produced upon receipt of a customer order may bypass outsole marketplace 118 and/or midsole marketplace 104 and move directly onto further production steps. Still more embodiments may be obvious to one of ordinary skill in the art.

The production of the midsole may begin before a customer places an order. A midsole may also be produced on an as-needed basis upon the receipt of a customer order for one or more shoes. Further, a midsole may be produced as a result of the receipt of an indication that the quantity and character of midsoles remaining in midsole marketplace 104 should be adjusted.

To begin midsole production, a pre-measured volume of raw, unblown EVA pellets may be injected into a mold at injection mold pre-form 102 that is heated to approximately 100° Celsius. The temperature of the mold may be hot enough to melt the EVA pellets to conform to the shape of the mold, but not hot enough to activate the EVA’s blowing agent. The product is an injection phylon biscuit, hereinafter referred to as a “biscuit,” that may be stored prior to activating the blowing agent to fabricate a midsole. Different volumes of EVA pellets may be associated with different shoe sizes, styles, densities and/or hardnesses of portions of a midsole. Furthermore, the base polymer that is used in the injection phylon biscuit process may differ based on the ultimate hardness characteristic that is desired in the midsole of a shoe. Each set of shoes may contain one or more biscuits of varying volumes and dimensions comprising the midsole of each shoe. The hardness of one or more biscuits in a midsole may be customized to vary laterally and/or vary lengthwise across the shoe. Such a characteristic may, for example, prevent mald pronation in shoe users, such as runners, or simply enhance comfort.

Once the biscuit is made, it may be removed and placed into biscuit marketplace 108. From biscuit marketplace 108, the biscuits may be taken out on an as-needed basis. When a customer orders one or more shoes, for example, an operator may take one or more biscuits that are in accordance with the customer’s order. In another method, operator may take the one or more biscuits from the marketplace and place them in a machine that exposes the one or more biscuits to a source of microwave radiation. For
example, one or more biscuits may be placed in a Magic Chef MCB780W 1.2 kilowatt microwave and exposed to microwave radiation at high power for a period of sixty-five seconds.

Next, an operator may place each biscuit into press 106 which may be designated for left shoes and right shoes or a combination of both. The operator may load the left shoe designation or right shoe designation of press 106, and may use press 106 to configure each biscuit as “left” or “right.” The operator may then unload each biscuit from press 106. Press 106 may not be limited to holding only one biscuit, but may hold a plurality of biscuits at any given time. Moreover, the pressing of the biscuits need not be in sync with respect to each biscuit in press 106, but rather, may be designed to have multiple biscuits loading and pressing and unloading at any given time. In still a further example, an operator of a module may bypass the step of using a press 106 to designate a shoe article as being oriented “left” or “right,” and may simply use a lathe or a pair of shears or one or more blades to shape the biscuit by hand. An operator may also use another type of machine to designate each biscuit as being oriented “left” or “right” before placing each biscuit into a neutral, un-oriented press 106. An operator may also keep the biscuit as a neutral designation, such that each shoe part is interchangeable as being used for a left shoe and/or a right shoe.

Once press 106 contains the biscuit it may heat up to a temperature of approximately 172° Celsius that is sufficient to melt the biscuit. The temperature is sufficient to activate a blowing agent in the biscuit. This blowing agent may degrade the polymer chains and start a foaming process which increases the volume of the biscuit approximately 200% to conform to the shape of the press. Simultaneously, the a curing agent within the biscuit working at a slower reaction rate than the blowing agent may begin to cross-link polymer chains to hold the form of the augment biscuit.

After the augmented biscuit is formed, an operator may unload the augmented midsole from press 106 and load the augmented midsole into stabilization oven 110. Upon entering stabilization oven 110, the augmented midsole may be approximately 75° Celsius. In another example, the augmented midsole may enter stabilization oven 110 at a temperature that is higher or lower than 75° Celsius. In one example, the augmented midsole may be as hot as the highest temperature achieved in the press 106 and may be transferred at that same temperature into the stabilization oven 110. The stabilization process in stabilization oven 110 may be comprised of three or more cooling stages in which the temperature may decrease from approximately 75° Celsius to approximately 45° Celsius. In another example, the stabilization process in stabilization oven 110 may be conducted over a greater number of steps through the use of water and/or air as mediums of cooling. In still another example, additional media and/or chemical solutions may be used to enhance the cooling process in the stabilization process of stabilization oven 110. The stabilizing process may decrease the volume of the augmented midsole by approximately 20% such that the midsole resulting from the stabilization process is approximately 160% of the original biscuit volume. In another example, the stabilizing process may be modified to increase or decrease the percentage change seen in the volume of the augmented midsole. In another method, any form of stabilization method may be used to stabilize one or more augmented biscuits, including immersion into water or other liquid at a desired temperature. In another example, augmented biscuits may be stabilized through the use of an aerosol solution or exposure to air at a desired temperature.

Another method of changing the volume of an augmented midsole may be to modify the midsole by hand, e.g. by the use of a lathe or the use of one or more cutting tools or the use of a second mold from which the augmented midsole may be placed in to decrease volume either by using pressure to shrink volume or using pressure to press a desired form from the augmented midsole and subsequently cutting and/or trimming off any undesired excess material.

Next, an operator may unload the biscuit from stabilization oven 110 and load the biscuit into wash/dry table 112 wherein a sonic bath may be used to clean one or more midsoles. Wash/dry table 112 may use one or more cleaning stages to clean a midsole. In another embodiment, the stabilization of the augmented biscuit may be combined with wash/dry table 112. In another embodiment, the biscuit may be unloaded from stabilization oven 110 and loaded into another type of cleaning machine and/or solvent and/or solution wash. In another example, each biscuit unloaded from stabilization oven 110 may be hand-polished by one or more operators.

After the outsole and one or more midsoles are removed from outsole marketplace 118 or midsole marketplace 104, respectively, they may be primed with an UV-activated primer at area 120. The primer may be placed on the one or more midsoles within 24 hours of its being activated. In an alternative embodiment, the primer can be placed on each outsole and midsole prior to entering outsole marketplace 118 or midsole marketplace 104, respectively. After the outsole and one or more midsoles are primed, each component may be placed in infrared oven 122. Once in the oven, the temperature may be increased to approximately 55° Celsius. At a sufficiently high temperature, the primer may be activated. Each component may then be removed from the infrared oven and an adhesive may be applied at prime and adhesive area 120. Each component may then be loaded into infrared oven 122, where it may be heated to approximately 55° Celsius, at which point the adhesive may be activated. Each component may then be removed from infrared oven 122. In an alternative embodiment, each component may have adhesive applied at prime and adhesive area 120 and then loaded into a standard oven to be heated. The standard oven may be heated, at which point the adhesive may be activated. The outsole and the one or more midsoles...
may be pressed together. For example, the outsole and the one or more midsoles may be hand-fit together through the use of bladder press 124 and standard press 126. In another example, the outsoles and midsoles may be loaded into a pressing alignment machine that works to fit the outsole and one or more midsoles together.

[0067] Once an outsole is pressed together with its associate midsole, the outsole-midsole is then placed in chiller 128. Chiller 128 may decrease the temperature of the outsole-midsole, to approximately 0° Celsius, allowing the adhesive to set. In an alternative method, the outsole-midsole may be set out to cool for a sufficient amount of time as is necessary to reduce the temperature of the adhesive to a point that it sets the adhesive. Next, the outsole-midsole may be sent to the staging area at swing arm post 130.

[0068] In one embodiment, the production of the upper may begin when the customer places an order for one or more shoes. After a customer places an order for one or more shoes, an operator may load a piece of synthetic material (e.g., synthetic leather, polyester, or mesh, etc.) onto eco-solvent printer 132. The synthetic material may be white, which may allow customer to request synthetic material to be printed with one or more desired aesthetic elements pertaining to the customer’s order. Alternatively, the synthetic material may be dyed to customize the customer’s order for one or more shoes. In another method, an operator may load a natural material (e.g., cotton or natural leather) onto eco-solvent printer 132. In another method, the desired color of a material may be loaded into eco-solvent printer 132. Loading a desired color of a material may reduce or eliminate steps for dying material.

[0069] The operator may then load eco-solvent printer 132 and dye sub printer 136 with materials associated with imprinting and/or dyeing and/or marking the parameters of customer’s order onto eco-solvent printer 132. Eco-solvent printer 132 may then print to dye sub printer 136. Next, eco-solvent printer 132 may print. Next, eco-solvent printer 132 may cut out a customized synthetic from an original piece of synthetic material. In another method, the customized synthetic may be cut with the use of shears or a blade or the use of a press.

[0070] After the piece of customized synthetic has been cut, the operator may load a piece of customized synthetic into laser 140. The operator may then input the specifications given by the customer and may start the laser etching job, if applicable.

[0071] Next, the operator may remove the piece of customized synthetic and may load it into dye sub press 142. The dye sub press 142 may be used to imprint designs, such as a Nike swoosh, onto material. The operator may load the laser cut upper from the dye sub press 142 and load the upper into embroidery machine 146. The operator may then start embroidering machine 146, customizing the upper by embroidering a desired set of designs using a desired set of colors. The operator can then unload the customized upper from embroidering machine 146 and deliver it to radio frequency welder 148.

[0072] At this point in the process, the upper and outsole-midsole may be retrieved by an operator. The operator may also retrieve a kit of the remaining shoe components from marketplace 150. In one embodiment, the remaining shoe components are composed in a “kit” wherein an operator can, for example, retrieve the remaining components needed for a Men’s size 9 running shoe. In another method, one or more operators may retrieve one or more remaining shoe components from a marketplace of kit components. After the shoe components are gathered, the operator may utilize radio frequency welder 148 to combine the components.

[0073] After the parts of the upper have been assembled, the operator may make one or more final cuts with final trim clicker 144 to define the shape of an upper. In another example, the upper may be cut by an operator using visual judgment and or expertise to guide the operator in knowing where and/or at which angle and/or how much to cut. Swing arm 130 may then stitch the upper to the outsole-midsole. In another example, the upper may be stitched by an operator using visual judgment and or expertise to guide the operator in knowing where and/or at which angle and/or how much to cut. This sub-assembly may then be sent to lasting area 152.

[0074] In FIG. 2, a method 200 for the efficient manufacturing of multiple models of custom shoes at a single manufacturing facility, such as the facility disclosed above, is illustrated. In accordance with the present invention, a first customer may place an order for a first model of shoe and one or more customization parameters particular to that customer’s order. A second customer may place an order for a second model of shoe and one or more customization parameters particular to that customer’s order. By utilizing systems and methods in accordance with the present invention, both the first and second customers’ shoes may be manufactured in the same facility efficiently, at a reasonable cost and within a reasonable amount of time. By utilizing the systems and methods in accordance with the present invention, the physical footprint of a manufacturing facility capable of producing multiple models of shoes may also be reduced.

[0075] Again, it should be understood that this and other arrangements and workflows described herein are set forth only as examples. Other arrangements and elements (e.g., processes, methods, etc.) can be used in addition to or instead of those shown and discussed, and some elements may be omitted altogether.

[0076] In step 205, shoe model options may be presented to a customer. Shoe model options presented in step 205 may include, for example, a running shoe model, a basketball shoe model, and a skate shoe model. Of course, other shoe models, both athletic and non-athletic may be alternatively or additionally comprise available shoe model options presented in step 205. Step 205 may optionally comprise, for example, all available shoe model options that are available to be made on-site at a connected or local shoe manufacturing facility. Additionally, shoe model options may comprise shoe models capable of being made on-site at a connected or local shoe manufacturing facility along with shoe models not capable of being made on-site at a connected or local shoe manufacturing facility. An indication of whether a particular shoe model may optionally be made on-site at a connected or local manufacturing facility or not may also be optionally presented. Step 205 may comprise, for example, presenting information describing the available shoe model options, along with an indication of local manufacturing availability for each particular model, to a customer on a computer using a graphical user interface.

[0077] In step 210, a customer’s shoe model selection may be received. For example, step 210 may comprise receiving a user selection of a presented shoe model from within a graphical user interface. A customer may select a checkbox associated with a basketball shoe model, for instance, to indicate that he or she would like to order a basketball shoe.
In step 215, functional options for the selected shoe model may be presented to the customer. Similarly to step 205, step 215 may be performed, for example, within a graphical user interface operating on a computer. Functional options may include parameters such as shoe size. Other types of options that may be selected in step 215 may include outsole hardness options, support options, motion control options, outsole texture options, outsole material options, and the like. It should be appreciated that step 215 need not necessarily be presented after step 205 and step 210, but that in many instances the functional options available may depend upon the shoe model selected. For instance, functional options relating to foot motion control may be relevant to a running shoe and therefore made available for customer selection after a customer has selected a running shoe model, while motion control options are not relevant for a basketball shoe, and therefore need not be available for basketball shoe models. Additionally, similarly to step 205, site-manufacturing information specific to each functional option may be indicated. For example, some functional options may be available for shoes manufactured on-site at a connected or local manufacturing facility, while others may only be available at a non-local manufacturing facility. One or ordinary skill in the art will readily appreciate any number of other types of functional options that are relatively specific to one or more particular model type of shoe.

In step 220, a customer's functional options selection may be received. Similarly to step 210, step 220 may be performed, for example, within a graphical user interface operating on a computer. For example, step 220 may comprise receiving a user selection of a specific functional option, such as midsole hardness, within a graphical user interface. For example, a customer may select a checkbox associated with an indication of midsole hardness to indicate that he or she would like the midsoles on his or her shoes to be of a specific hardness.

In step 225, aesthetic options for the selected shoe model and/or functional options may be presented to the customer. Step 225 may occur using a graphical user interface on a computer, similarly to step 205 and step 215. The aesthetic options presented in step 225 may depend, at least in part, upon the model option selected by a customer and/or the functional options selected by a customer. However, it is also possible that aesthetic options may exist entirely or partially independent of model and/or functional options, in which case step 225 may occur prior to or in conjunction with step 205 and/or step 215. For example, options regarding shoe color may not depend upon shoe model or functional options. On the other hand, options relating to the color of a particular functional element, for example, will necessarily be dependent upon whether that functional element has been selected, either as part of a shoe model selection or as a functional option. Also, similarly to step 205, site-manufacturing information specific to each aesthetic option may be indicated. For example, some aesthetic options may be available for shoes manufactured on-site at a connected or local manufacturing facility, while others may only be available at a non-local manufacturing facility.

In step 230, the aesthetic option selections may be received from the customer. Step 230 may be performed, for example, by receiving customer selections using a pointing device in a graphical user interface on a computer, for example, by clicking checkboxes appropriate for each aesthetic option selected.

In step 235, a customer's site manufacturing options may be presented. Similarly to step 205, step 235 may be performed, for example, within a graphical user interface operating on a computer. Site manufacturing options presented in step 235 may comprise, for instance, an option for on-site manufacture at a connected or local manufacturing facility, the option for manufacture at a specific local or non-local facility, or an option to indicate no site-manufacturing preference. It may be appreciated that the options presented in this step may be influenced by the customer's selection of shoe model in step 210, the customer's selection of functional shoe options in step 220, and/or the customer's selection of aesthetic options in step 230. For example, if a customer selects a shoe model in step 210 that cannot be manufactured on-site at a connected or local manufacturing facility, step 215 might not present such a manufacturing option to the user. Also, as an example, if a customer selects a functional option in step 220 or an aesthetic option in step 230 that cannot be incorporated into a shoe at a specific manufacturing site, such manufacturing site might not be included in the list of manufacturing options in step 235. Step 235 may comprise, for example, presenting to the user a list of options comprising all sites where a particular model of shoe with the particular selected functional and aesthetic options may be manufactured.

In step 240, a customer's site manufacturing selection may be received. Similarly to step 210, step 240 may be performed, for example, within a graphical user interface operating on a computer. For example, step 240 may comprise receiving a user selection of a presented manufacturing facility from within a graphical user interface. For example, a customer may select a checkbox associated with an local manufacturing facility to indicate that he or she would like his or her shoes to be manufactured on-site at a connected or local manufacturing facility.

In step 245, pickup options for the selected shoe model may be presented to the customer. For example, step 245 may comprise presenting a list of options to the user comprising the option of picking up the shoes at the store where an order has been placed, the option of picking up the shoes from a connected or local manufacturing facility, the option of having the shoes delivered to a different store location, and the option of having the shoes delivered to the customer at his or her residence. It will be appreciated by one of ordinary skill in the art that the options presented in this step may be tailored to reflect the customer's manufacturing site selection in step 240. For example, if in step 240 a user selects on-site manufacturing for his or her order, step 245 may present the user with the option of picking his or her shoes up from the store or from a connected or nearby manufacturing facility. On the other hand, if, for example, the customer in step 240 selects a shoe that cannot be manufactured on-site, the options presented in step 245 might not comprise the option to pick up the shoes at a nearby manufacturing facility.

In step 250, a customer's pickup selection may be received. Similarly to step 210, step 250 may be performed, for example, within a graphical user interface operating on a computer. Step 250 may comprise, for instance, receiving a user selection of a pickup option from within a graphical user interface. For example, a customer may select from a drop-down list to indicate that he or she would like his or her shoes to be available for pickup at the store in which the order was placed. Alternatively, step 250 may comprise receiving an
indication that the user would prefer to have his or her order mailed to his or her residence. In another example, step 250 may comprise receiving an indication that the user would prefer to have his or her order delivered to another store site for pickup.

In step 255, a workflow may be initiated in a facility designated by the user in step 240 to construct an outsole in accordance with the shoe model option selected by the customer. The workflow may also incorporate the functional options, and/or aesthetic options selected by a customer. For example, if, in step 210, the customer selected a basketball shoe model, a basketball shoe workflow may be initiated in the outsole manufacturing compartment. It should be noted that the specific basketball shoe workflow for any particular basketball shoe may vary to some degree such that the customer’s particular functional and/or aesthetic selections be incorporated into the final basketball shoe yet the workflow may still be considered a basketball shoe workflow (as opposed to being a skate shoe workflow). Alternatively, had the customer selected a running shoe model in step 210, for instance, a running shoe workflow may be initiated to construct an outsole in accordance with a running shoe model.

It should first be noted that step 255 need not necessarily incorporate a different workflow for each shoe model, as some shoe models may exhibit a certain amount of overlap in certain component manufacturing compartments. For example, a workflow for a skate shoe outsole may be similar enough to a workflow for a basketball shoe outsole such that there need be only one outsole workflow for the production of both basketball and skate shoe outsoles. This does not necessarily mean, however, that each component for these shoes can similarly share a workflow; while the workflow for a basketball shoe outsole may converge with the workflow for a skate shoe outsole that such a single outsole workflow common to both shoe models may be utilized, for instance, the workflows for each shoe may diverge significantly in the production of their respective midsoles so that separate midsole workflows need be maintained. Different shoe model workflows may thus be implemented in various component manufacturing compartments with varying degrees of overlap. These overlapping, converging and converging workflows allow for the efficient manufacture of multiple models of shoes in a single manufacturing facility while at the same time reducing physical footprint of said manufacturing facility.

It should finally be noted that step 255 need not be necessarily initiated by a specific selection by a specific customer. For example, a predetermined level of inventory of outsoles having various characteristics may be maintained. Outsoles in three different colors may be made in each available size for each of these different models of shoes available at a facility, for instance. Outsoles may then be used from the inventory based upon customer orders. Whenever a given model, size, and color of outsole begins to run low in inventory, an operator may then initiate a workflow for that model to construct additional outsoles meeting those parameters. In this way, step 255 may be performed in a way that is responsive to the shoe model, functional options, and/or aesthetic options selected by customers, while not being directly initiated by those customer selections. Further, step 255 may be performed in different ways for different types of outsoles, for example by using an inventory system to initiate workflows for commonly used outsoles and initiating workflows that produce less commonly used outsoles only in response to orders requiring them.

In step 260, a workflow for the production of a midsole may be initiated in accordance with the shoe model; functional and/or aesthetic options may also be incorporated in accordance with the customer’s selected options. First, it should be noted that, similarly to step 255, each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Second, similarly to step 255, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. Third, also similarly to step 255, step 260 need not be initiated in response to any given shoe order by a particular customer, but may instead optionally utilize an inventory system to initiate workflows to produce midsoles having the desired characteristics. Finally, similarly to step 255, initiating workflows to produce midsoles may be performed in different ways for different types of midsoles, for example by using an inventory system to initiate workflows for commonly used midsoles and initiating workflows to produce less commonly used midsoles only in response to orders requiring them.

In step 265, a workflow may be initiated to ready the outsole and midsole to be affixed together in accordance with the selected shoe model; functional options and aesthetic options desired by the customer may also be incorporated. Step 265 may comprise, for example, removing from outsole marketplace one or more outsoles appropriate to the customer’s order, removing from midsole marketplace one or more midsoles appropriate to customers order, skiving the edges of the removed midsole(s) and outsole(s), placing the removed midsole(s) and outsole(s) in infrared oven, priming the removed midsole(s) and outsole(s), and again placing the removed midsole(s) and outsole(s) in infrared oven. It should be noted that similarly to steps 255 and 260, each shoe model may not necessarily have its own specific workflow at step 265 but rather may share workflows with other shoe models. Also similarly to step 255 and 260, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

It should also be noted that any and/or all workflows for any and/or all compartments, including those utilized in steps 255 and 260, may advantageously take similar amounts of time to complete, allowing for completed components to be complete at similar times. For example, the workflows from steps 255 and 260 may produce components that arrive at similar times so that they may be readied in step 265 without the need to delay initiating a workflow in step 265 to wait for certain necessary components to arrive.

As an example, if a customer selected a basketball shoe model, step 255 may comprise initiating a basketball shoe workflow that comprises the steps of (1) injection molding a rubber outsole taking approximately 220 seconds of machine time and approximately 15 seconds of human time, (2) removing flash and staging the outsole in a finished outsole marketplace taking approximately 5 seconds of human time, (3) removing the outsole from the finished marketplace taking approximately 5 seconds of human time, (4) alkaline washing the outsole taking approximately 50 seconds of machine time, (5) acid washing the outsole taking approximately 5 seconds of machine time, (6) drying the outsole
taking approximately 90 seconds of machine time, (7) removing the outsole from the drying oven taking approximately 2 seconds of human time, and (8) staging the outsole in the outsole marketplace taking approximately 3 seconds of human time. Thus, the workflow for producing a basketball shoe outsole in this example may take approximately 350 seconds.

[0094] This being the case in this example, it may be advantageous for the workflow utilized in step 260 to similarly take approximately 350 seconds so that the parts may arrive at similar times so that step 265 may proceed without undue delay.

[0095] It should further be noted that any workflow may overlap not only spatially but also temporally with another workflow. For example, a workflow for the production of a basketball midsole in step 260 may comprise (1) injection molding a biscuit taking approximately 30 seconds of machine time, (2) placing the biscuit in biscuit marketplace taking approximately 10 seconds of human time, (3) heat pressing the biscuit taking approximately 420 seconds of machine time and approximately 20 seconds of human time, (4) loading the biscuit into a stabilization oven taking approximately 5 seconds of human time, (5) heating the biscuit to produce a midsole taking approximately 3600 seconds of machine time, (6) removing the biscuit from the stabilization oven taking approximately 5 seconds of human time, (7) water washing the midsole taking approximately 600 seconds of machine time, (8) drying the midsole and staging it in midsole staging marketplace taking approximately 300 seconds of machine time and approximately 5 seconds of human time, (9) removing the midsole from midsole staging marketplace taking approximately 2 seconds of human time, and (10) staging the midsole for assembly taking approximately 3 seconds of human time.

[0096] Utilizing this example workflow without temporal overlap would thus produce a midsole approximately every 5000 seconds. However, while step (5) for instance may in this example take approximately 3600 seconds, the stabilization may be done by a load stabilization oven that may comprise a unit that allows multiple midsoles to be in the process of stabilization at once. So, for instance, a first basketball midsole workflow may be initiated, and steps (1), (2), (3) and (4) may be performed on a first biscuit. In step (5), the first biscuit may need to remain in the stabilization oven for approximately 3600 seconds to become a first midsole. During this time, while this first biscuit is thus in the stabilization oven, a second midsole workflow, basketball or otherwise, may be initiated, starting with step (1) for that particular workflow, and progressing up to the step in that particular workflow wherein the second biscuit is loaded into the stabilization oven, for example. At this point in the example, two separate workflows are in progress, each having progressed up to and being currently in the stabilization step; accordingly, two or more different biscuits, associated with different models of shoe or not, may be in the stabilization oven in different stages of stabilization at any given time. Any number of workflows may thus be initiated be in varying stages of progress and overlap in such a manner. At the point in time when the stabilization of step (5) for the first workflow is finished, the first midsole may be removed from the stabilization oven and the first initiated basketball midsole workflow may be resumed at step (6).

[0097] Another example of temporally overlapping workflows, and again referring to the example basketball midsole workflow above, after having loaded the first biscuit into the stabilization oven at step (5), a second workflow may be initiated to produce a basketball shoe outsole. This second workflow may be completed and a third basketball outsole workflow may be initiated and completed. As would be appreciated by one of ordinary skill in the art, any number of workflows may be thus initiated while the first midsole workflow from the above example remains in step (5). At any point in time, the midsole workflow of the original example may be resumed at step (6) to complete the first midsole.

[0098] It may be noted that these workflows may overlap in any advantageous manner as would be obvious to one of ordinary skill in the art. In this example, each workflow may be tailored to overlap such that a new midsole will emerge in an amount of time similar to the amount of time it takes to produce other shoe components in this or other shoe component manufacturing compartments. This may advantageously allow various components to arrive at similar times to undergo a joining workflow for instance. In the current example, for instance, through the use of temporally overlapping workflows, a midsole may be produced approximately every 350 seconds to coincide with the amount of time it takes to execute an outsole workflow from the example used in step 255. These two workflows may thus take a similar amount of time to produce two components to be joined utilizing a joining workflow without undue delay. It should also be noted that the use of temporally overlapping workflows can be applied to any step utilizing workflows, such as, for example, steps 255 and 260, as would be obvious to one of ordinary skill in the art.

[0099] In step 270, one or more customization workflows for an upper for a particular shoe model may be initiated in accordance with the shoe model; again, functional options, and/or aesthetic options selected by a customer may be incorporated. It should again be noted that, similarly to step 255, 260, and 265, each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Also similarly to step 255, 260, and 265, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. While step 270, similarly to step 255, 260, and 265, may be performed without regard to any particular order by a customer, in practice the customization attainable in a shoe upper will likely result in step 270 being performed in response to a specific customer order. For example, step 270 may initiate a workflow to construct an upper for a running shoe having a red color. Similarly, step 270 may initiate a workflow to construct uppers for other types of shoe models, such as basketball shoes or skate shoes; these workflows may further incorporate any of a variety of functional characteristics, such as additional ankle support, side ventilation, and other similar functional options, with any of a variety of aesthetic options, such as particular colors, stitching patterns, insignia, and the like.

[0100] As another example, step 270 may comprise initiating a basketball shoe upper customization workflow comprising (1) printing echo-solvent customization taking approximately 120 seconds of machine time and approximately 30 seconds of human time, (2) cutting vamp liner and vamp qtr. taking approximately 30 seconds of human time, (3) laser customization taking approximately 120 seconds of machine time and approximately 30 seconds of human time, (4) embroidery customization taking approximately 120 seconds
of machine time and approximately 30 seconds of human time, (5) delivering parts to heat press taking approximately 5 seconds of machine time, and (6) checking the marketplace and cutting the parts if needed, taking approximately 6 seconds of human time. Thus, the basketball workflow in this example may take approximately 491 seconds. It should be noted that this process may, similarly to steps 255, 260, and 265, use varying degrees of temporarily overlapping workflows such that an upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For example, temporarily overlapping workflows may be utilized such that a customized upper, of any model type, may be produced approximately every 350 seconds.

As another example, and to further illustrate how workflows may overlap spatially, step 270 may comprise initiating a running shoe upper customization workflow in response to having received certain customer model selection input. This workflow might comprise, for example, (1) printing echo-solvent customization taking approximately 120 machine seconds and approximately 30 human seconds, (2) cutting vamp liner and vamp qtr. taking approximately 30 human seconds, (3) print dye sublimation customization taking approximately 120 machine seconds and approximately 20 human seconds, (4) press dye sub.

Customization taking approximately 12 machine seconds and approximately 10 human seconds, (5) laser customization taking approximately 120 machine seconds and approximately 30 human seconds, (6) embroidery customization taking approximately 120 machine seconds and approximately 30 human seconds, (7) delivering customized parts to radiofrequency welding marketplace taking approximately 5 human seconds, and (8) checking radiofrequency welding marketplace and cutting parts if needed, taking approximately 6 human seconds. Thus, in this example, a customized running shoe upper may be constructed in approximately 613 seconds. It should be noted that this process may, similarly to previous steps utilizing workflows, use varying degrees of temporarily overlapping workflows such that a running upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For example, temporally overlapping workflows may be utilized such that a customized running upper, of any model type, may be produced approximately every 350 seconds. It should be noted also that it will be obvious to one of ordinary skill in the art how, in these examples, this running shoe upper customization workflow overlaps similar machines, skills, and work areas involved in the basketball shoe upper customization workflow given as an example above.

In step 275, one or more workflows for further manufacturing an upper for a particular shoe model may be initiated in accordance with the shoe model; again, functional options, and/or aesthetic options selected by a customer may be incorporated. It should again be noted that, similarly to step 255, 260, 265, and 270 each shoe model may not necessarily have its own specific workflow but rather may share a workflow with another shoe model. Also similarly to step 255, 260, 265, and 270, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model. While step 275, similarly to step 255, 260, 265, and 270, may be performed without regard to any particular order by a customer, in practice the customization attainable in a shoe upper will likely result in step 275 being performed in response to a specific customer order, or, more specifically, to the upper piece produced in step 270. For example, step 275 may initiate a workflow to stitch an upper for a running shoe according to the user selections, said upper having been produced and customized according the user selections in step 270.

As an example, step 275 may comprise initiating a basketball upper forming and stitching workflow comprising (1) gathering parts from marketplace taking approximately 15 seconds of human time, (2) assembling the upper pieces taking approximately 20 seconds of machine time and approximately 30 seconds of human time, (3) activating heat press taking approximately 10 seconds of human time, (4) radiofrequency welding marketplace taking approximately 2 seconds of human time, (4) loading the parts into cooling rack taking approximately 60 seconds of machine time and approximately 1 second of human time, (5) cutting final trim taking approximately 15 seconds of human time, (6) heel forming taking approximately 180 seconds of machine time and approximately 20 seconds of human time, (7) post stitching taking approximately 30 seconds of human time, (8) strobel stitching taking approximately 40 seconds of human time, and (9) delivering the upper to lasting station taking approximately 5 seconds of human time. Thus, the basketball upper forming and stitching workflow in this example may take approximately 428 seconds. It should be noted that the process in the above example may, similarly to steps 255, 260, 265, and 270, use varying degrees of temporarily overlapping workflows such that an upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in other compartments utilizing different workflows. For example, in step (6), while waiting for a machine to stitch the heel, the operator may initiate another workflow for the same or another model of shoe. When the operator reaches step (6) in this second workflow, for instance, the first upper may be finished with step (6) and the operator may then perform step (6) on the second upper and, while allowing the machine to continue with step (6) on the second upper, may continue with steps (7), (8), and (9) on the first upper. Any of these or steps any other steps of a given workflow may be advantageously overlapped as would be obvious to one of ordinary skill in the art.

As another example, and to further illustrate how workflows may overlap spatially, step 275 may comprise initiating a running shoe upper radiofrequency welding and stitching workflow. This workflow might comprise, for example, (1) gathering parts from radiofrequency welding marketplace taking approximately 15 seconds of human time, (2) assembling upper pieces taking approximately 30 seconds of human time, (3) activating the radiofrequency welding cycle taking approximately 10 seconds of machine time and approximately 10 seconds of human time, (4) cutting final trim taking approximately 15 seconds of human time, (5) stitching upper to sole taking approximately 60 seconds of human time, and (6) delivering to final quality control area taking approximately 5 seconds of human time. This example workflow may thus take approximately 145 seconds. It should be noted that this process may, similarly to previous steps utilizing workflows, use varying degrees of temporally overlapping workflows such that a running shoe upper may be produced in a shorter amount of time more similar to the amount of time it takes to produce other components in this or other compartments utilizing different workflows. For
example, temporally overlapping workflows may be utilized such that a customized running upper, of any model type, may be produced approximately every 350 seconds. It should be noted also that it will be obvious to one of ordinary skill in the art how, in these examples, this running shoe upper radiofrequency welding and stitching workflow overlaps similar machines, skills, and work areas involved in the basketball upper forming and stitching workflow given as an example above.

[0106] In step 280, a workflow may be initiated such that the outsole, midsole, and upper may be affixed together to form the selected shoe model in accordance with the selected shoe model; functional options and aesthetic options desired by the customer may also be incorporated. Step 280 may comprise, for example, matching the appropriate outsole, the appropriate midsole, and a specially customized upper to form a single shoe as ordered by a customer. It should be noted that similarly to steps 255, 260, 265, 270, and 275, each shoe model may not necessarily have its own specific workflow at step 280 but rather may share workflows with other shoe models. Also similarly to step 255, 260, 265, 270, and 275, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

[0107] In another example, step 280 may comprise (1) applying adhesive to the upper produced by step 275, the midsole produced by step 260, and the outsole produced by step 255 taking approximately 75 human seconds, (2) placing the parts in oven taking approximately 120 machine seconds, (3) hand fitting the parts together taking approximately 75 human seconds, (4) pressing the parts taking approximately 30 machine seconds and approximately 10 human seconds, (5) chilling the parts taking approximately 60 machine seconds and approximately 5 human seconds. Thus, the workflow in this example may take approximately 460 seconds. It should be noted that, like the other steps utilizing workflows in this example, and number of workflows may be temporally overlapped to lower the amount of time it takes to complete step 280 as would be appreciated one of ordinary skill in the art.

[0108] In step 285, a workflow may be initiated to quality control, lace and last the customized combined shoe component; functional options and aesthetic options desired by the customer may also be incorporated. It should be noted that similarly to steps 255, 260, 265, 270, and 275, each shoe model may not necessarily have its own specific workflow at step 280 but rather may share workflows with other shoe models. Also similarly to step 255, 260, 265, 270, 275, and 280, a workflow for a particular shoe model may vary to some degree to allow for the functional and/or aesthetic customizations selected by the user to be incorporated into the shoe model.

[0109] In an example, step 285 may comprise (1) quality control checking and lasting the combined shoe component taking approximately 90 seconds of machine time and approximately 90 seconds of human time, (2) quality control checking and de-lasting the combined shoe component taking approximately 30 seconds of human time, (3) lacing the combined shoe component taking approximately 60 seconds of human time, and (4) packing the shoe taking essentially no time. Thus, the workflow in this example may take approximately 270 seconds. It should be noted that, like the other steps utilizing workflows in this example, and number of workflows may be temporally overlapped to change the amount of time it takes to complete step 285 as would be appreciated by one of ordinary skill in the art.

[0110] In step 290, the customized shoe may be delivered to a customer in accordance with the customer’s selected pickup options from step 245. Step 290 may further include inspection and approval by the customer, payment, etc. It should be appreciated that while step 290 may occur geographically distant from the location at which all or parts of the other steps of method 200 are performed, one desirable attribute of method 200 is that it permits the localized manufacture of shoes to custom orders. Such localized manufacturing can be more responsive to local needs and preferences than remote manufacturing, and can provide reduced inventory and shipping costs. Accordingly, step 290 may occur geographically near, in fact in the same larger facility, as does the remainder of steps of method 200.

[0111] Turning now to FIG. 3, an illustrative method for creating an outsole for a running shoe is referenced generally by the numeral 300. At a step 305, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be carved and/or cut from a piece of rubber. At 310, an outsole is cured. In another method, an outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole.

[0112] At step 315, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At a step 320, the outsole is staged in an outsole pre-wash marketplace. In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step 325, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps 305-320 are not performed until after an order is received. In that alternative, the outsole is produced on a as-needed basis, not as a result of a projected market demand. At step 330, the outsole is removed from the outsole pre-wash marketplace.

[0113] At step 335 the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step 315, where the flash is removed from the outsole, to step 335, where the outsole is washed. At step 340 the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps 335 and/or 340 may be a means of removing excess rubber residue created by the curing process at step 310. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps 335 and/or 340 would be reduced in time and/or materials, or could be eliminated. At step 345 the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step 350 the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from
the outsole mold. At step 355, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process 315, the outsole may go directly from the curing process 315 to being staged in the outsole staging marketplace 355. In another method, where there is minimal rubber residue, the outsole may go from the curing process 315 to a cleaning step 335 wherein the outsole is wiped with a material, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process 315 to a cleaning step 335, or may go from the curing process 315 to an outsole marketplace 320 before being removed from an outsole marketplace 330. The outsole would be able to skip the time spent in an outsole marketplace 320-330 when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0114] Referring to FIG. 4, an illustrative method for creating a midsole for a running shoe is referenced generally by the numeral 400. At step 402, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step 402 may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step 404, the injection mold is then heated to 100° Celsius to form the volume of EVA pellets into a biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet may not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardnesses. At step 406 the biscuit is then removed from the injection mold. At step 410, the biscuit is then staged into a biscuit marketplace. At step 415, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0115] At step 420, the biscuit is removed from the biscuit marketplace. At step 430, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold 406 to being loaded into a heat press 430. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step 434, the biscuit is then heated to 170° Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step 438, the biscuit is removed from the heat press. In step 440, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step 444, the biscuit may be placed into an air stabilization oven and the temperature may be lowered to 75° Celsius. The process by which air is passed over a biscuit in a stabilization oven may be through the use of one or more air knife centrifugal blowers. In steps 448-452, the biscuit may have its temperature lowered over three stages. At step 448, the temperature of the biscuit may be lowered from 75° Celsius to 65° Celsius. At step 452, the temperature of the biscuit may be lowered from 65° Celsius to 55° Celsius. At step 454, the temperature of the biscuit may be lowered from 55° Celsius to 45° Celsius. In another method, the cooling stages of 448-452 may be done in three or more stages. In another alternative method, the step at 444 of lowering biscuit temperature to 75° Celsius may be adjusted to a higher or lower temperature. In another method, one or more biscuits may be stabilized using a series of baths of water that may range from 90° Celsius to 45° Celsius. The temperature of the biscuit may decrease from 90° Celsius to 75° Celsius, then 75° Celsius to 45° Celsius, wherein the time within each bath may be spread evenly.

[0116] At step 458, the midssole is removed from the stabilization oven. At step 460, the midssole is loaded into one or more sonic baths. At step 464 in the sonic bath, the midssole is washed. In another method, step 458 may be removed and the midssole may be washed while it is still in a dual stabilization oven-sonic-bath device. At step 468 the midssole is removed from the sonic bath. At step 470, the midssole is loaded into one or more drying ovens. At step 474 the midssole is dried. At step 478, the midssole is removed from the one or more drying ovens. At step 480, the midssole is loaded into a midssole staging marketplace.

[0117] Turning now to FIG. 5, an illustrative method for applying primer and adhesive on a running shoe is referenced generally by the numeral 500. At step 504, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired running shoes, such as size or style or color. At step 506, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step 508, a midssole fitting the characteristics defined in the customer order may be removed from the midssole staging marketplace. At step 510, a midssole and an outsole are primed. At step 520, the primed midssole and the primed outsole may be placed in an infrared (hereinafter “IR”) oven. At step 530, the midssole and outsole may be removed from the IR oven. At step 540, adhesive may be applied to the midssole and the outsole. At step 550, the midssole and the outsole are placed in an IR oven.

[0118] Turning now to FIG. 6, an illustrative method for joining an outsole and a midssole into a midssole-outsole on a running shoe is referenced generally by the numeral 600. At step 610, the outsole and the midssole are removed from the IR oven. At step 620, the outsole and midssole are cut together to form a midssole-outsole. At step 630, the midssole-outsole is loaded into a stockfiet press. At step 634, the midssole-outsole is heated. The heat may allow the adhesive to more permanently bind the components of the midssole-outsole. At step 638, the midssole-outsole is removed from the stockfiet press. At step 640, the midssole-outsole is loaded into a chiller. The chiller is used to cool down the midssole-outsole to approximately 0° Celsius to allow the adhesive to set. In another method, the midssole-outsole may be placed in a more temperate area where the midssole-outsole may be left to cool over a longer period of time. In another method, at step 644, the temperature of the midssole-outsole is lowered. In another method, the press may be turned off and the midssole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating
component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step 648, the midsole-outsole is removed from the chiller. At step 650, the midsole-outsole is delivered to the swing arm post staging area.

[0119] Referring to FIG. 7, an illustrative method for customizing an upper for a running shoe is referenced generally by the numeral 700. At step 702, an order is received.

[0120] An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. At step 704, material associated with the order for the upper (e.g., synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step 706, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step 708, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step 710, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step 712, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step 720, the customized synthetic is loaded into a laser. At step 724, the laser is loaded with the specification of the design associated with the order. At step 728, the laser etches a customized design onto the customized synthetic.

[0121] At step 730, the dye sub press is loaded. At step 735, the customized synthetic is removed from the laser. At step 740, the right embroidery machine is loaded with the customized synthetic. At step 742, the left embroidery machine is loaded with the customized synthetic. At step 744, the embroidery machines are loaded with design specifications associated with the order. At step 746, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step 750, the lefthand parts are retrieved from the embroidery machines. At step 760, the customized parts are delivered to the radio frequency (hereinafter "RF") welding staging area.

[0122] Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times.

[0123] Referring to FIG. 8, an illustrative method for assembling an upper for a running shoe is referenced generally by the numeral 800. At step 805, customized parts for the upper are retrieved from the RF welding staging area. At step 810, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step 820, an upper is assembled from the customized parts. At step 825, an RF welding cycle is activated, binding together the assembled upper constructed of the customized parts. At step 830, a final trim is cut on the upper to define the final shape of the upper. At step 840, the midsole-outsole is retrieved from the swing arm staging area. At step 850, the upper is stitched to the midsole-outsole.

[0124] Referring to FIG. 9, an illustrative method for lasting and quality control for a running shoe is referenced generally by the numeral 900. At step 910, the shoe component is retrieved from the swing arm area. At step 920, a quality control check is performed and the upper is lasted. At step 930, a quality control check is performed on the lasted upper and the upper is then de-lasted. At step 940, a quality control check is performed and the upper is laced. At step 950, a quality control check is performed and the shoe is packed.

[0125] Turning now to FIG. 10, an illustrative method for creating an outsole for a basketball shoe is referenced generally by the numeral 1000. At step 1005, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold-rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be cast and/or cut from a piece of rubber. At step 1010, an outsole is cured. In one alternative, the outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole.

[0126] At step 1015, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At step 1020, the outsole is placed in a pre-wash marketplace.

[0127] In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step 1025, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps 1005-1020 are not performed until a customer order is received. In that alternative, the outsole is produced on an as-needed basis, not as a result of a projected market demand. At step 1030, the outsole is removed from the outsole pre-wash marketplace.

[0128] At step 1035 the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step 1015, where the flash is removed from the outsole, to step 1035, where the outsole is washed. At step 1040 the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps 1035 and/or 1040 may be means of removing excess rubber residue created by the curing process at step 1010. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps 1035 and/or 1040 would be reduced in time and/or materials, or could be eliminated. At step 1045 the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step 1050 the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from the outsole mold. At step 1055, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process 1015, the outsole may go directly from the curing process 1015 to being staged in the outsole staging marketplace 1055. In another method, where there is minimal rubber residue, the outsole may go from the curing process 1015 to cleaning step 1035 wherein the outsole is wiped with a matte-
rial, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process 1015 to a cleaning step 1035, or may go from the curing process 1015 to an outsole marketplace 1020 before being removed from an outsole marketplace 1030. The outsole would be able to skip the time spent in an outsole marketplace 1020-1030 when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0129] Referring to FIG. 11, an illustrative method for creating a midsole for a basketball shoe is referenced generally by the numeral 1100. At step 1102, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step 1102 may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step 1104, the injection mold is then heated to 100° Celsius to form the volume of EVA pellets into an biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardnesses. At step 1106 the biscuit is then removed from the injection mold. At step 1110, the biscuit is then staged into a biscuit marketplace. At step 1115, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0130] At step 1120, the biscuit is removed from the biscuit marketplace. At step 1130, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold 1106 to being loaded into a heat press 1130. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step 1134, the biscuit is then heated to 172° Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step 1138, the biscuit is removed from the heat press. In step 1140, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step 1144, the biscuit is lowered to a temperature 75° Celsius. In steps 1148-1152, the biscuit has its temperature lowered over three stages. At step 1148, the temperature of the biscuit is lowered from 75° Celsius to 65° Celsius. At step 1152, the temperature of the biscuit is lowered from 65° Celsius to 55° Celsius. At step 1154, the temperature of the biscuit is lowered from 55° Celsius to 45° Celsius. In another method, the cooling stages of 1148-1152 may be done in three or more stages. In another method, the step at 1144 of lowering biscuit temperature to 75° Celsius may be adjusted to a higher or lower temperature.

[0131] At step 1158, the midsole is removed from the stabilization oven. At step 1160, the midsole is loaded into one or more sonic baths. At step 1164 in the sonic bath, the midsole is washed. In an alternative method, step 1158 may be removed and the midsole may be washed while it is still in a dual stabilization-oven-sonic-bath device. At step 1168 the midsole is removed from the sonic bath. At step 1170, the midsole is loaded into one or more drying ovens. At step 1174 the midsole is dried. At step 1178, the midsole is removed from the one or more drying ovens. At step 1180, the midsole is loaded into a midsole staging marketplace.

[0132] Turning now to FIG. 12, an illustrative method for applying primer and adhesive on a basketball shoe is referenced generally by the numeral 1200. At step 1204, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired basketball shoes, such as size or style or color. At step 1206, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step 1208, a midsole fitting the characteristics defined in the customer order may be removed from the midsole staging marketplace. At step 1210, a midsole and an outsole are primed. At step 1220, the primed midsole and the primed outsole may be placed in an IR oven. At step 1230, the midsole and outsole are removed from the IR oven. At step 1240, adhesive may be applied to the midsole and the outsole. At step 1250, the midsole and the outsole are placed in an IR oven.

[0133] Turning now to FIG. 13, an illustrative method for joining an outsole and a midsole into a midsole-outsole on a basketball shoe is referenced generally by the numeral 1300. At step 1310, the outsole and the midsole are removed from the IR oven. At step 1320, the outsole and midsole are fit together to form a midsole-outsole. At step 1330, the midsole-outsole is loaded into a stockfit press. At step 1334, the midsole-outsole is heated. The heat may allow the adhesive to more permanently bind the components of the midsole-outsole. At step 1338, the midsole-outsole is removed from the stockfit press. At step 1340, the midsole-outsole is loaded into a chiller. The chiller is used to cool down the midsole-outsole to approximately 0° Celsius to allow the adhesive to set. In another method, the midsole-outsole may be placed in a more temperate area where the midsole-outsole may be left to cool over a longer period of time. In another method, at step 1344, the temperature of the midsole-outsole is lowered. In another method, the press may be turned off and the midsole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step 1348, the midsole-outsole is removed from the chiller. At step 1350, the midsole-outsole is delivered to the swing arm post staging area.

[0134] Referring to FIG. 14, an illustrative method for customizing an upper for a basketball shoe is referenced generally by the numeral 1400. At step 1402, an order is received. An illustrative method for receiving an order includes receiving an order manually.
In still another method, an order may be received by uploading details of an order through a web interface. At step 1404, material associated with the order (e.g., synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step 1406, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step 1408, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step 1410, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step 1415, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step 1420, the customized synthetic is loaded into a laser. At step 1424, the laser is loaded with the specification of the design associated with the order. At step 1428, the laser etches a customized design onto the customized synthetic. At step 1430, the dye sub press is loaded. At step 1435, the customized synthetic is removed from the laser. At step 1440, the right embroidery machine is loaded with the customized synthetic. At step 1442, the left embroidery machine is loaded with the customized synthetic. At step 1444, the embroidery machines are loaded with design specifications associated with the order. At step 1446, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step 1450, the left part and right part are removed from the embroidery machines. At step 1460, the customized parts are delivered to the heat press marketplace. At step 1470, uppers are checked for excess material and cut when needed. Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times. Referring to FIG. 15, an illustrative method for forming and stitching an upper for a basketball shoe is referenced generally by the numeral 1500. At step 1505, customized parts for the upper are retrieved from the heat press marketplace. At step 1510, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step 1520, an upper is assembled from the customized parts. At step 1530, the assembled upper parts are loaded into a heat press. At step 1534, the heat press is activated and the assembled upper parts are heated. The temperature reached is high enough that the adhesive used to bind parts is activated. At step 1538, the parts are removed from the heat press. At step 1540 the parts are placed on a cooling rack. At step 1548, the parts are removed from the cooling rack. At step 1550, a heel is formed by stitching. In an alternative, the heel may be formed by another binding method. At step 1560, the parts are post-stitched. At step 1570, the parts are strobel stitched. At step 1580, the parts are delivered to a lastling station. Referring to FIG. 16, an illustrative method for lasting and quality control for a basketball shoe is referenced generally by the numeral 1600. At step 1610, the shoe component is retrieved from the lastling station. At step 1620, a quality control check is performed and the upper is lasted. At step 1630, a quality control check is performed on the lasted upper and the upper is then de-lasted. At step 1640 a quality control check is performed and the upper is laced. At step 1650, a quality control check is performed and the shoe is packed. Turning now to FIG. 17, an illustrative method for creating an outsole for a skate shoe is referenced generally by the numeral 1700. At a step 1705, an injection rubber mold outsole is created by way of an injection-mold process. In the illustrative injection-mold-rubber process, rubber is injected into a mold that forms an outsole. In another method, an outsole may be carved and/or cut from a piece of rubber. At step 1710, an outsole is cured. In one alternative, an outsole may be cured using stearic acid and oils. This combination may cause blooming of the rubber, resulting in rubber residue which may not be desired on an outsole. At step 1715, flash is removed from the outsole. One method of removing flash from the outsole includes cutting and/or removing and/or trimming undesired excess rubber. Another method of removing flash may be to hand-wipe or hand-pick the flash off the rubber outsole. At a step 1720, the outsole is staged in an outsole pre-wash marketplace. In one alternative, the number and character (e.g., size, shape, color, etc.) of outsoles placed into a marketplace are based on an expectation of demand. At a step 1725, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. In one alternative, steps 1705-1720 are not performed until after an order is received. In that alternative, the outsole is produced on an as-needed basis, not as a result of a projected market demand. At step 1730, the outsole is removed from the outsole pre-wash marketplace. At step 1735 the outsole is washed. In one method, the outsole is washed by way of an alkaline solution. In another method, the outsole may go directly from step 1715, where the flash is removed from the outsole, to step 1735, where the outsole is washed. At step 1740 the outsole is washed. In one method the outsole is washed by way of an acid solution. The washing steps 1735 and/or 1740 may be a means of removing excess rubber residue created by the curing process at step 1710. In another method, a curing process may be used wherein stearic acid is not used, thereby reducing or minimizing the rubber residue produced. In this method, the cleaning steps 1735 and/or 1740 would be reduced in time and/or materials, or could be eliminated. At step 1745 the outsole is dried in an oven. In another way, an outsole may be dried in any way that is capable of producing heat that dries the outsole to a desired dryness within a desired period of time. At step 1750 the outsole is removed from the oven. In another method, the outsole may be removed from another heating device that has been used to take away moisture from the outsole mold. At step 1755, the outsole is staged in an outsole staging marketplace. In another method, where there is little or no rubber excess produced from the curing process 1715, the outsole may go directly from the curing process 1715 to being staged in the outsole staging marketplace 1755. In another method, where there is minimal rubber residue, the outsole may go from the curing process 1715 to a cleaning step 1735 wherein the outsole is wiped with a material, such as a cloth, to remove the excess rubber. In the former example, the outsole may either go directly from the curing process 1715 to a cleaning step 1735, or may go from the curing process 1715 to an outsole marketplace 1720 before being removed from an outsole marketplace 1730. The outsole would be able to skip the time spent in an outsole mar-
ketplace 1720-1730 when an order is received prior to the production of the outsole (e.g. when the outsole is produced on an as-needed basis).

[0143] Referring to FIG. 18, an illustrative method for creating a midsole for a skate shoe is referenced generally by the numeral 1800. At step 1802, a pre-specified volume of EVA pellets are loaded into an injection mold. In an alternative, the selection of the type of polymer injected at step 1802 may be correlated to the desired hardness associated with the customer order of the resulting midsole. The EVA pellets are processed in the same mold at the same conditions, thus the introduction of EVA pellets with longer polymer chains will result in an increased hardness compared to EVA pellets that are introduced with shorter polymer chains, because the longer polymer chains will not be able to break down to the same extent as shorter polymer chains under the same reaction conditions. At step 1804, the injection mold is then heated to 170°Celsius to form the volume of EVA pellets into a biscuit. In another embodiment, the EVA pellets may be heated to a temperature that may be hot enough to form the EVA pellets into the form of a biscuit and yet may not be hot enough to activate the foaming agent within the phylon. In still another embodiment, the reaction conditions of the mold may be changed to influence the extent that a given polymer is allowed to break down, thereby resulting in a variety of different hardesses. At step 1806 the biscuit is then removed from the injection mold. At step 1810, the biscuit is then staggled into a biscuit marketplace. At step 1815, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface.

[0144] At step 1820, the biscuit is removed from the biscuit marketplace. At step 1830, biscuit is then loaded into a heat press. In another method, such as when an order is received prior to the biscuit being made, the biscuit may go directly from being removed from an injection mold 1806 to being loaded into a heat press 1830. In another method, there is a right heat press and a left heat press for the right-shoe-biscuit and left-shoe-biscuit, respectively. In still another method, the right heat press and the left heat press may be operated concurrently. At step 1834, the biscuit is then heated to 172°Celsius. In another embodiment, the biscuit may be heated to a temperature that may be hot enough to activate the foaming agent. At step 1838, the biscuit is removed from the heat press. In step 1840, the biscuit is loaded into a stabilization oven. In the stabilization oven, the biscuit is cooled to a lower temperature that allows the biscuit to become the desired size as a midsole. At step 1844, the biscuit is lowered to a temperature 75°Celsius. In steps 1848-1852, the biscuit has its temperature lowered over three stages. At step 1848, the temperature of the biscuit is lowered from 75°Celsius to 65°Celsius. At step 1852, the temperature of the biscuit is lowered from 65°Celsius to 55°Celsius. At step 1854, the temperature of the biscuit is lowered from 55°Celsius to 45°Celsius. In another method, the cooling stages of 1848-1852 may be done in three or more stages. In another method, the step at 1844 of lowering biscuit temperature to 75°Celsius may be adjusted to a higher or lower temperature.

[0145] At step 1858, the midsole is removed from the stabilization oven. At step 1860, the midsole is loaded into one or more sonic baths. At step 1864 in the sonic bath, the midsole is washed. In an alternative method, step 1858 may be removed and the midsole may be washed while it is still in a dual stabilization-oven-sonic-bath device. At step 1868 the midsole is removed from the sonic bath. At step 1870, the midsole is loaded into one or more drying ovens. At step 1874 the midsole is dried. At step 1878, the midsole is removed from the one or more drying ovens. At step 1880, the midsole is loaded into a midsole staging marketplace.

[0146] Turning now to FIG. 19, an illustrative method for applying primer and adhesive on a skate shoe is referenced generally by the numeral 1900. At step 1904, a customer order is received. The customer order contains specifications for the characteristics associated with one or more desired skate shoes, such as size or style or color. At step 1906, an outsole fitting the characteristics defined in the customer order is removed from the outsole staging marketplace. At step 1908, a midsole fitting the characteristics defined in the customer order may be removed from the midsole staging marketplace. At step 1910, a midsole and an outsole are primed. At step 1920, the primed midsole and the primed outsole may be placed in an IR oven. At step 1930, the midsole and outsole are removed from the IR oven. At step 1940, adhesive may be applied to the midsole and the outsole. At step 1950, the midsole and the outsole are placed in an IR oven.

[0147] Turning now to FIG. 20, an illustrative method for joining an outsole and a midsole into a midsole-outsole on a skate shoe is referenced generally by the numeral 2000. At step 2010, the outsole and the midsole are removed from the IR oven. At step 2020, the outsole and midsole are fit together to form a midsole-outsole. At step 2030, the midsole-outsole is loaded into a stockfit press. At step 2034, the midsole-outsole is heated. The heat may allow the adhesive to more permanently bond the components of the midsole-outsole. At step 2038, the midsole-outsole is removed from the stockfit press. At step 2040, the midsole-outsole is loaded into a chiller. The chiller is used to cool down the midsole-outsole to approximately 0°Celsius to allow the adhesive to set. In another method, the midsole-outsole may be placed in a more temperate area where the midsole-outsole may be left to cool over a longer period of time. In another method, at step 2044, the temperature of the midsole-outsole is lowered. In another method, the press may be turned off and the midsole-outsole may be left to cool in the press until the heat dissipates. In still another method, the press may be wired with both a heating component and a cooling component such that a shoe article, such as a midsole-outsole, may be heated and cooled in one location. In that regard, having a dual heating and cooling press would both save room and would also eliminate the risk of having components of a shoe article become misaligned or fall apart during the period they are moved between the heat press and the chiller. At step 2048, the midsole-outsole is removed from the chiller. At step 2050, the midsole-outsole is delivered to the swing arm post staging area.

[0148] Referring to FIG. 21, an illustrative method for customizing an upper for a skate shoe is referenced generally by the numeral 2100. At step 2102, an order is received. An illustrative method for receiving an order includes receiving an order manually. In still another method, an order may be received by uploading details of an order through a web interface. At step 2104, material associated with the order for the upper (e.g. synthetic leather or mesh or polyester, etc.) is loaded into an eco-solvent printer. At step 2106, the eco-solvent printer and dye sub printer are loaded with material, such as desired colors, associated with an order. At step 2108, the dye sub printer is used to print desired designs and/or markings on the desired material used for the upper. At step
At step 2110, the eco-solvent printer is used to print desired designs and/or markings on the desired material used for the upper. At step 2115, a customized synthetic is cut out from the desired material according to the specifications characterizing an order. At step 2120, the customized synthetic is loaded into a laser. At step 2124, the laser is loaded with the specification of the design associated with the order. At step 2128, the laser etches a customized design onto the customized synthetic. At step 2130, the dye sub press is loaded. At step 2135, the customized synthetic is removed from the laser. At step 2140, the right embroidery machine is loaded with the customized synthetic. At step 2142, the left embroidery machine is loaded with the customized synthetic. At step 2144, the embroidery machines are loaded with design specifications associated with the order. At step 2146, left and right parts are embroidered using the left embroidery machine and right embroidery machine, respectively. At step 2150, the left part and right part are removed from the embroidery machines. At step 2160, the customized parts are delivered to the heat press marketplace. At step 2170, uppers are checked for excess material and cut when needed.

Note that some of the decorative techniques disclosed above may not be applicable to each shoe model and therefore some of the steps disclosed above may be omitted. For instance, not all shoe models may require embroidery or laser etching. Moreover, different components of an upper may proceed through different steps, in different orders, and at different times.

Referring to FIG. 22, an illustrative method for forming and stitching an upper for a skate shoe is referenced generally by the numeral 2200. At step 2205, customized parts for the upper are retrieved from the heat press marketplace. At step 2210, a kit is retrieved from the marketplace which contains necessary parts associated with the customer order. At step 2220, an upper is assembled from the customized parts. At step 2230, the assembled upper parts are loaded into a heat press. At step 2234, the heat press is activated and the assembled upper parts are heated. The temperature reached is high enough that the adhesive used to bind parts is activated. At step 2238, the parts are removed from the heat press. At step 2240, the parts are placed on a cooling rack. At step 2244, the parts are cooled from 2248, the parts are removed from the cooling rack. At step 2250, the heel is formed by another binding method. At step 2260, the parts are post-stitched. At step 2270, the parts are strobe stitched. At step 2280, the parts are delivered to a lasting station.

Referring to FIG. 23, an illustrative method for lasting and quality control for a skate shoe is referenced generally by the numeral 2300. At step 2310, the shoe component is retrieved from the lasting station. At step 2320, a quality control check is performed and the upper is last at step 2330, a quality control check is performed on the lasted upper and the upper is then de-last at step 2340 a quality control check is performed and the upper is laced. At step 2350, a quality control check is performed and the shoe is packed.

Referring now to FIG. 24, a work flow diagram 2400 of a shoe component-manufacturing facility for the manufacture of custom shoe components is illustrated in accordance with an embodiment of the present invention. Work flow diagram 2400 may represent a physical configuration of a factory floor, but may also be viewed as a generalized work flow methodology. A plurality of modules may be utilized in the efficient fabrication of shoes in accordance with the present invention. Each module may be operated by at least one operator 2401 at each module. These modules may vary, but may comprise, as in the example of FIG. 24, cutting and kitting module 2402, customization module 2404, forming and stitching module 2406, midsole and outsole fabrication module 2410, and stock kit and assembly module 2408.

Cutting and kitting module 2402 may cut shoe upper components from an inventory of raw upper materials. At least one of the raw upper components may comprise a customizable gray good. The cut shoe upper materials may then be assembled into kits. In embodiments, the kits comprise all of the upper elements necessary to form an entire shoe upper. The kits may then be temporarily stored.

Initially, cutting and kitting module 2402 may cut out the components required for the fabrication of a shoe upper and prepare those assembled pieces into a kit that may be used in the construction and customization of a shoe. Materials used in the cutting and kitting module 2402 may be stored in a material storage 2413. The raw materials used to create the shoe components may be supplied by vendors that may or may not apply a hot melt lamination across to the raw materials. The lamination treatment may aid in the construction of the shoe components, as the laminations may be used to adhere the shoe components. As such, if materials for the shoe components do not yet have a hot melt lamination as supplied from the vendors, a hot melt lamination may be applied to the raw material. In embodiments, raw materials retrieved from storage 2413 may have a hot melt lamination applied to the materials at hot melt lamination press 2412. However, if materials supplied from vendors already have a hot melt lamination applied, hot melt lamination press 2412 may not be needed in diagram 2400.

After materials have been retrieved from material storage 2413, a component cutting machine 2414 may be used to modify the materials into shoe components. Component cutting machine 2414 may comprise an auto-cutting machine that may utilize blades, lasers, and/or any other cutting methodology or tool to cut the fabrics used to construct a shoe upper into one or more pieces for fabrication. Fabric may be held in place using suction, clamps, etc. when used by an auto-cutting machine such as one that may be used by component cutting machine 2414. The material used in the fabrication of a shoe upper may comprise gray goods that may be readily customized through printing, dyeing, embossing, etc. Cut components may be stored in a component marketplace 2416. Once cut components are stored in the marketplace, the cut components may be assembled into kits. In embodiments, kits may comprise the upper components required to assemble an upper for a single shoe or the uppers for a pair of shoes. In embodiments, storage 2413 and marketplace 2416 may comprise a vertical carousel. Depending upon the shoe designs fabricated, a single kit of upper components may be utilized to assemble a shoe of a single size or a shoe of any of a plurality of sizes. For example, for some shoe designs, a single kit might be able to be used to fabricate and assemble a shoe having men's size 8, 9, or 10.

Upper kits may be provided from cut components stored in marketplace 2416 on an as-needed basis as shoe orders are processed. Cutting and kitting module 2402 may thereafter respond to shortages for particular components of marketplace 2416 by cutting and kitting the needed types of upper materials.

After a kit has been selected from component marketplace 2416, the kit may be customized in customization
module 2404. In alternative embodiments, customization module 2404 may retrieve temporarily stored kits from cutting and kitting module 2402. Customization module 2404 may then layer the shoe upper components of the kit into a flat framed assembly with multiple layers. Customization module 2404 may then customize at least a portion of the shoe upper components by applying decoration to the shoe upper components.

In embodiments, customization module 2404 may comprise a plurality of discrete stations, but no single shoe upper need necessarily be processed by every station in customization module 2404. For example, after a kit has been delivered to desk 2418, an operator, such as operator 2401, may load up any print files related to a customization order. Print files may be related to order customization as input by a customer at a customer input receiver 2422. In embodiments, print files may be sent to an eco-solvent printer 2420 and/or a digital printer dye sublimation stations. In embodiments, eco-solvent printer 2420 may be used to print graphics for application to a shoe upper from the kit. Further, digital printing dye sublimation station 2422 may be used to sublimate designs and/or graphics onto a shoe upper.

The upper customization may also utilize a laminating heat press 2424 to laminate designs onto shoe upper components. Similarly, dye sublimation patterns printed at 2422 may be applied using dye sublimation heat press 2426. Additionally, customization trim work may be performed at station 2428, where station 2428 may comprise a first trim clicker. In embodiments, a first trim clicker may be used to modify material used in upper customization. Further, laser customization, such as customized cutting and/or etching, may be performed at laser customization station 2430. Additionally, a plurality of embroidery stations 2432 may be used to apply embroidered customization to shoe uppers. In embodiments, shoe components may be embroidered once they are loaded into an embroidery machine. After the embroidery of the one or more shoe components, the shoe components may be unloaded from the embroidery machines. In embodiments, the number of embroidery stations may be one or more, although the utilization of four embroidery stations 2432 as illustrated in FIG. 24 may prove desirable. Desk 2434 may also be used in the customization of the shoe upper.

After customization of an upper, forming and stitching module 2406 may form the upper. Forming and stitching module 2406 may receive the customized shoe upper components. The customized shoe upper components may be placed on a flat frame to keep the components in place. The frame may be loaded into a solid state (SS) RF press 2436 to perform RF welding on the components of the shoe upper. Additionally and/or alternatively, the flat frame may be loaded into a heat press 2438. Heat press 2438 may be used to form the upper from heat-activated components. Whether press 2436 and/or press 2438 are used, a press is used to join the components of the shoe upper. Once the shoe components are joined together at press 2436 and/or press 2438, the joined shoe components are cut using shuttle cutter 2440. Shuttle cutter 2440 removes excess material from the joined shoe components. After shuttle cutter 2440 has removed excess material, the joined shoe components are removed from the flat frame. Further, stitching that is desired may be performed to form an upper at stitching stations such as flat-stitch station 2442, zigzag-stitch station 2444, post-stitch station 2448, and gather-stitch station 2454, all of which may be used to stitch shoe components in the form of a shoe upper. Additionally, a hot melt sprayer 2446 may be used to affix shoe components to other shoe components and/or a shoe upper in order to hold components into place as the shoe upper is being formed.

Toe-forming component 2450 may be used in the formation of the toe of an upper. Heel-former component 2452 may be used in the formation of the heel of an upper. Strobel-stitch component 2456 may be used to affix a strobel to a shoe upper for lasting. Toe-condition component 2458 may be used to condition the shoe upper and/or shoe components as part of lasting. For instance, at toe-condition component 2458, the shoe upper and/or shoe components may be exposed to steam to soften the shoe components. Further, lasting component 2460 may be used after the attachment of a strobel to last a shoe upper prior to affixing a midsole and/or outsole. As such, module 2406 may then form the customized shoe upper components into a three-dimensional shoe upper. Further, module 2406 may affix a strobel to the formed shoe upper. Additionally, module 2406 may last the formed shoe upper and strobel.

Midsole and outsole component 2410 may fabricate shoe midsoles and shoe outsoles for use in conjunction with lasted uppers for the assembly of shoes. The midsoles and outsoles may be formed in a variety of fashions and from a variety of materials. Midsoles may be formed from phylon materials, and outsoles may be formed from latex rubber. Possible systems and processes for use in midsole and outsole module 2410 are described elsewhere herein. Midsoles and/or outsoles may be provided to stockit and assembly module 2408 using a marketplace system, or may be provided on an order-by-order basis.

Stockit and assembly module 2408 may receive the lasted and formed shoe upper and strobel from the forming and stitching module 2406. Additionally, module 2408 may receive the shoe midsoles and shoe outsoles from midsole and outsole module 2410. Module 2408 may then assemble the shoe midsole, the shoe outsole, and the lasted and formed shoe upper and strobel into a shoe.

In embodiments, midsoles, outsoles, and/or lasted shoe uppers may be received at vented table 2462. At vented table 2462, adhesive may be applied to the bottom of a midsole and to the top of an outsole. The midsole-outsole combination may then be placed into an IR oven such as IR oven 2462. The adhesive on the shoe midsole and the shoe outsole may then be activated at IR oven 2462. The shoe midsole and the shoe outsole may then be set at blander press station 2466, where the midsole and outsole are pressed together to form a seal. In embodiments, a block press 2468 may be used to press the midsole and outsole together to form a seal.

After the midsole and outsole have been pressed together, the midsole-outsole may be delivered to bite mark machine 2470 to be marked for adhesive. In particular, midsole-outsole may have a shoe upper placed over midsole-outsole to determine the extent of adhesive coverage needed. The midsole-outsole and the shoe upper may then have adhesive applied at vented table 2472. After adhesive has been applied to the shoe upper and to the midsole-outsole in accordance with the bite line, the shoe upper and the midsole-outsole may be placed in IR over 2474. At IR oven 2474, the adhesive applied to the shoe upper and to the midsole-outsole may be activated. The shoe upper and midsole-outsole may then be pressed together at block press 2468. Once a shoe has been formed by pressing together the shoe upper and midsole-outsole, the shoe may be set at chiller 2476. Once the
The shoe has been set, the shoe may be de-lasted at de-lasting station 2478. Further, the shoe may be checked for quality control and packaged at table 2480.

[0169] Referring now to FIG. 25, a schematic 2500 of a module configuration for use in shoe production in accordance with the present invention is illustrated. As illustrated in the example of FIG. 25, shoes may be manufactured using a single cutting and kitting module 2530 and a single outsole and midsole module 2540 in conjunction with two modules to perform customization, forming and fitting, and stockfit and assembly. The operation of customization, forming and fitting, and stockfit and assembly may be performed in a first section 2510 and/or at a second section 2520. First section 2510 may include a first customization module 2512, a first forming and fitting module 2514, and a first stockfit and assembly module 2516. The first customization module 2512 may receive completed kits for shoe uppers from cutting and kitting module 2530. After customization module 2512 performs required customization upon a shoe upper, customization module 2512 may pass the customized shoe upper to first forming and fitting module 2514. First forming and fitting module 2514 may form the shoe upper and then pass the formed shoe upper to first stockfit and assembly module 2516. First stockfit and assembly module 2516 may receive formed shoe uppers from first forming and fitting module 2514 and may receive outsoles and midsoles from outsole and midsole module 2540. First stockfit and assembly module 2516 may assemble and complete a shoe, and thereafter pass the completed shoe to a completed product queue 2518.

[0169] Similarly, a second section 2520 may comprise a second customization module 2522, a second forming and fitting module 2524, and a second stockfit and assembly module 2526. Second customization module 2522 may receive kits for the fabrication of shoe uppers from cutting and kitting module 2530. Second customization module 2522 may then perform any required customization for a shoe upper. Second customization module 2522 may thereafter pass a customized shoe upper to second forming and fitting module 2524, which may then form the required shoe upper. Second forming and fitting module 2524 may then pass a formed shoe upper to second stockfit and assembly module 2526. Second stockfit and assembly module 2526 may receive formed shoe uppers from second forming and fitting module 2524 and may receive outsoles and midsoles from outsole and midsole module 2540. Stockfit and assembly module 2526 may pass completed shoes to complete product queue 2528. Completed product queue 2518 and completed product queue 2528 may be combined into a single completed product queue, and may represent the point at which a customer receives a customized shoe or pair of shoes. All of the modules illustrated in FIG. 25 may be co-located at a single geographical location. However, first section 2510 and first completed product queue 2518 may be located remote from second section 2520 and second completed product queue 2528, from cutting and kitting module 2530, and/or from outsole and midsole module 2540. Similarly, second section 2520 and second completed product queue 2528 may be located remotely from first section 2510 and first completed product queue 2518, from cutting and kitting module 2530, and from outsole and midsole module 2540. The use of a single cutting and kitting module 2530 and/or a single outsole and midsole module 2540 for two or more modules for customization, forming and fitting, and stockfit and assembly may be advantageous to maximize the production of shoes for a set of modules.

[0170] FIG. 26 illustrates a system 2600 for producing and assembling shoe components in accordance with the embodiment of the present invention. System 2600 comprises a customer input receiver 2640. Receiver 2640 receives customer input related to, for example, a customer's customization of shoes. For example, a customer may input into receiver 2640 an order for red shoes. System 2600 further comprises a marketplace 2610 that stores shoe components. In embodiments, marketplace 2610 serves as a temporary storage bin for a first shoe component. A first shoe component may be produced at first module 2620. First module 2620 may comprise a first shoe component-manufacturing module that produces at least a first shoe component upon receiving an indication 2612 from marketplace 2610 to produce the first shoe component. Indication 2612 may be sent to first module 2620 from marketplace 2610 when a threshold amount of the first shoe component stored in marketplace 2610 has fallen below a predefined threshold amount. In embodiments, one or more first shoe components may comprise shoe upper components, midsoles, and/or outsoles.

[0171] System 2600 may also comprise a second module 2630, where second module 2630 produces one or more second shoe components in response to receiving customer input 2642 from customer input receiver 2640. In embodiments, customizable components may be produced by second module 2630, where second shoe components may be produced by modifying shoe components supplied from marketplace 2610 to second module 2630. The shoe components supplied from marketplace 2610 to second module 2630 may comprise first shoe components produced at first module 2620.

[0172] After one or more first components and one or more second components are produced, the one or more first components and the one or more second components may be assembled at third module 2650. The one or more first components may be delivered 2614 to third module 2650 from marketplace 2610. Additionally and/or alternatively, the one or more first components may be delivered 2624 to third module 2650 from first module 2620. Further, the one or more second components may be delivered 2632 to third module 2650 from second module 2630. After the one or more first components and the one or more second components are assembled at third module 2650, one or more completed shoes may be delivered 2652 to completed product queue 2660.

[0173] FIG. 27 illustrates a flowchart 2700 of a workflow of a shoe manufactured through a process. The process comprises steps performed in shoe manufacturing modules, such as cutting and kitting module 2710, customization module 2720, forming module 2730, outsole and midsole module 2740, and stockfit and assembly module 2750. In cutting and kitting module 2710, a plurality of raw materials required for a multilayered shoe upper are provided at step 2712. Further, at step 2714 in module 2710, raw materials are cut into the components of the multilayered shoe upper. Additionally, at module 2710, the components necessary to make a single multilayered shoe upper are placed in kits at step 2716.

[0174] In customization module 2720, a kit is received at step 2722. At step 2724, still at customization module 2720, the shoe upper components are assembled into multiple layers. The multiple layers are aligned on a flat frame. Further, at
step 2426, the multiplayer upper components are customized by applying decoration to at least one layer of the multiplayer shoe upper components. The customization of step 2426, occurring at customization module 2420, is performed while the multiplayer shoe upper components are on a flat frame.

0175 In forming module 2730, the multiplayer upper components are joined to form one integral shoe upper at step 2732 while the multiplayer shoe upper components are on the frame. At step 2734, the excess upper material is cut from the shoe upper. Further, at step 2736, the joined shoe upper is removed from the frame. The formed shoe upper is then formed into a three-dimensional shoe upper at step 2738. Still in forming module 2730, a strobol is stitched to the formed shoe upper at step 2739.

0176 In outsole and midsole module 2740, a shoe midsole is formed at step 2742. Further, a shoe outsole is formed at step 2744, still in outsole and midsole module 2740. In stockfit and assembly module 2750, the shoe midsole is attached to the shoe upper at step 2752. Still in stockfit and assembly module 2750, the shoe outsole is attached to the shoe upper at step 2754.

0177 The present invention has been described in relation to particular embodiments, which are intended in all respects to be illustrative rather than restrictive. 0178 Alternative embodiments will become apparent to those of ordinary skill in the art to which the present invention pertains without departing from its scope. Different models of shoes, for example, could utilize different specific processes, materials, or modules and still fall within the scope of the claimed invention as would be recognized by one of ordinary skill in the art.

0179 From the foregoing, it will be seen that this invention is well adapted to attain all the ends and objects set forth above, together with other advantages which are obvious and inherent to the system and method. It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

What is claimed is:

1. A system for producing and assembling shoe components, the system comprising: a receiving module for receiving a customer input; a market that provides at least one temporary storage bin of a first shoe component; a first shoe component-manufacturing module that produces at least the first shoe component upon receiving an indication from the marketplace, wherein the marketplace temporarily stores the contents of the first shoe component and provides the indication to the first component-manufacturing module upon one of the at least one temporary storage bins of the marketplace dropping below a predefined threshold amount of the first shoe component; a second shoe component-manufacturing module that produces one or more second shoe components upon receiving the customer input; and a third component-manufacturing module that assembles the one or more of the first shoe components and the one or more of the second shoe components to produce a shoe article.

2. The system of claim 1 wherein the one or more first shoe components are processed after the first shoe component is removed from said inventory.

3. The system of claim 1 wherein the first shoe component manufacturing module produces midsoles.

4. The system of claim 1 wherein the first shoe component manufacturing module produces outsoles.

5. The system claim 1 wherein the second shoe component manufacturing module produces custom upper shoe components.

6. The system of claim 1 wherein the custom shoe component is processed before being coupled to the first shoe component.

7. The system of claim 1 wherein the custom shoe component is comprised of two or more coupled custom shoe components.

8. The system of claim 1 wherein the second shoe component manufacturing module comprises a plurality of customization sub-modules.

9. A processing facility for the modularized production of composite custom shoe components, said processing facility comprising: a cutting and knitting module that cuts shoe upper components from an inventory of raw upper materials, at least one of the raw upper materials comprising a customizable gry good, that then assembles the cut shoe upper materials into kits that comprise all of the upper elements necessary to form an entire shoe upper, and that then temporarily stores the kits; a customization module that retrieves temporarily stored kits from the cutting and knitting module, that layers the shoe upper components of the kit into a flat framed assembly with multiple layers, and that customizes at least a portion of the shoe upper components by applying decoration to the shoe upper components; a forming and stitching module that receives the customized shoe upper components, that forms the customized shoe upper components into a three-dimensional shoe upper, that affixes a strobol to the formed shoe upper, and that lasts the formed shoe upper and strobol; a midsole and outsole fabrication module that fabricates shoe midsoles and shoe outsoles; and a stockfit and assembly module that receives the lasted and formed shoe upper and strobol from the forming and stitching module, that receives the shoe midsoles and shoe outsoles from the midsole and outsole module, and that assembles the shoe midsole, the shoe outsole, and the lasted and formed shoe upper and strobol into a shoe.

10. The processing facility of claim 9, wherein the cutting and knitting module comprises a material storage component that holds the raw upper materials, a component cutting machine, and a market that holds the kits after assembly.

11. The processing facility of claim 9, wherein the customization module comprises a hot melt lamination press, an eco-solvent printer, a digital printing dye sublimation station, a trim clicker, and an embroidery station.

12. The processing facility of claim 9 wherein the forming and stitching module comprises a radio frequency press that joins the layers of the shoe upper, a cutting press that removes the joined shoe upper from excess upper material, a toe-forming component that forms the toe of the shoe upper, a heel-forming component that forms the heel of the shoe upper, and a strobol-stitch component that stitches a strobol to the formed shoe upper.

13. The processing facility of claim 9 wherein the forming and stitching module comprises a heat press that joins the layers of the shoe upper, a cutting press that removes the joined shoe upper from excess upper material, a toe-forming component that forms the toe of the shoe upper, a heel-forming component that forms the heel of the shoe upper, and a strobol-stitch component that stitches a strobol to the formed shoe upper.

14. The processing facility of claim 9 wherein the stockfit and assembly module comprises applies at least one adhesive
to assemble the shoe outsole, the shoe midsole and the lasted and formed shoe upper and strobel into a shoe.

15. The processing facility of claim 14, wherein the stockfit and assembly module further comprises a press that applies pressure to the shoe outsole, the shoe midsole, and the lasted and formed shoe upper and strobel after at least one adhesive has been applied between the lasted and formed shoe upper and strobel and the shoe midsole and at least one adhesive has been applied between the shoe midsole and the shoe outsole.

16. A shoe manufactured through a process, the steps of the process comprising: in a cutting and kitting module, providing a plurality of raw materials required for a multilayered shoe upper, cutting the raw materials into the components of the multilayered shoe upper and placing the components necessary to make a single multilayered shoe upper into kits; in a customization module, receiving a kit and assembling the shoe upper components into multiple layers aligned on a flat frame, and customizing the multilayer upper components by applying decoration to at least one layer of the multilayer shoe upper components while the multilayer shoe upper components are on the flat frame; in a forming module, joining the multilayer upper components to form one integral shoe upper while the multilayer shoe upper components are on the frame, removing the joined shoe upper from the frame by cutting the shoe upper from excess upper material, forming joined shoe upper into a three-dimensional shoe upper, and stitching a strobel to the formed shoe upper; in an outsole and midsole module, forming a shoe midsole and forming a shoe outsole; and in a stockfit and assembly module, attaching the shoe midsole to the shoe upper and attaching the shoe outsole to the shoe upper to form a completed shoe.

17. The shoe of claim 16, wherein the joined upper is cut from the excess upper material using a press.

18. The shoe of claim 16, wherein the kits of shoe upper components each includes the components necessary to make a shoe upper for a shoe having a predetermined size.

19. The shoe of claim 16, wherein the multilayer upper components are joined by a heat press.

20. The shoe of claim 16, wherein the multi-layer upper components are joined by a radio frequency welder.