What is Claimed:

1. A method of manufacturing a plunger of a drug delivery device, the method comprising:

inserting a blank of sheet metal in an inlet of a stamping machine, the stamping machine including the inlet, an outlet, and a travel path extending between the inlet and the outlet;

activating the stamping machine to advance the blank of sheet metal along the travel path of the stamping machine, the travel path including a plurality of stages configured to process the blank of sheet metal into a plurality of plunger bodies, each of the plunger bodies including an inner wall defining an axial chamber, an outer wall, a first end, and a second end opposite the first end;

forming the plurality of plunger bodies from the blank of sheet metal as the blank of sheet metal passes through the travel path and exits the outlet;

separating each of the plurality of plunger bodies from the blank of sheet metal;

loading at least one of the plurality of plunger bodies into a cavity of a molding tool of a molding system; and

injecting molten plastic into a plurality of channels of the molding tool to form an overmolded plunger body, the overmolded plunger body having at least one overmolded portion.

2. The method of claim 1, wherein injecting molten plastic includes injecting molten plastic to form a head portion coupled to the outer wall and at least partially surrounding the first end of the plunger body and a foot portion coupled to the second end of the plunger body.

3. The method of claim 1 or 2, wherein loading the at least one of the plurality of plunger bodies includes loading a plurality of plunger bodies into a plurality of cavities formed in the molding tool, each of the plurality of cavities is at least partially defined by a first molding portion, a middle portion, and a second molding portion.

4. The method of any one of the previous claims, further comprising coupling a first molding tool to a second molding tool before injecting the plurality of channels of molten plastic, the first molding tool including the cavity sized to receive the plunger body and the first and second molding tools forming the plurality of channels when coupled.

5. The method of claim 4, wherein injecting molten plastic into the plurality of channels includes injecting molten plastic into the second molding tool to distribute the molten plastic into a first molding portion and a second molding portion of the cavity.

6. The method of any one of the previous claims, wherein loading the at least one of the plurality of plunger bodies includes coupling a hanger attached to the first end of each plunger body to a pin of the molding tool, where the stamping machine forms the hanger in the blank of sheet metal for each of the plurality of plunger bodies.

7. The method of any one of the previous claims, wherein forming the plurality of plunger bodies includes cutting a portion of the blank of sheet metal to create a rectangular cut-out, the rectangular cut-out including a first end, a second end opposite the first end, a first side and a second side extending between the first and second ends, a first surface, and a second surface opposite the first surface, wherein the first end is attached to a first parallel edge of the blank of sheet metal, the second end is attached to a parallel second edge of the blank of sheet metal.

8. The method of claim 7, wherein forming the plurality of plunger bodies includes shaping the rectangular cut-out attached to the blank of sheet metal to form a cylindrical shape by stamping at least one of the first surface and the second surface of the rectangular cut-out with a contoured die.

~~9. The method of claim 7 or 8, wherein forming the plurality of plunger bodies includes gradually bending first and second sides of the rectangular cut-out inward, such that as the blank of sheet metal moves in a direction toward the outlet of the stamping machine, the first surface of the rectangular cut-out defines the inner wall of each of the plurality of plunger bodies.~~

~~10. The method of any one of claims 7 through 9, wherein cutting the portion the blank of sheet metal to create the rectangular cut-out includes cutting a corrugated edge to form the first end of the rectangular cut-out.~~

~~11. The method of claim 10, further comprising bending the corrugated edge of the first end of the rectangular cut-out such that the corrugated edge is substantially perpendicular relative to the first surface of the rectangular cut-out.~~

~~12. The method of claim 11, wherein bending the corrugated edge of the first end includes bending the corrugated edge of the first end towards the second surface of the rectangular cut-out.~~

~~13. The method of any one of claims 7 through 12, wherein cutting the portion the blank of sheet metal to create the rectangular cut-out includes cutting a corrugated edge to form the second end of the rectangular cut-out.~~

~~14. The method of claim 13, further comprising bending the corrugated edge of the second end of the rectangular cut-out such that the corrugated edge is substantially perpendicular relative to the first surface of the rectangular cut-out.~~

~~15. The method of any one of the previous claims, wherein separating each of the plurality of plunger bodies includes cutting a portion of a parallel edge of the blank of sheet metal to remove the plunger body, the portion of the parallel edge defining the hanger connected to the first end of the plunger body.~~

~~16. The method of any one of the previous claims, wherein inserting the blank of sheet metal includes inserting a flat sheet of stainless steel having a thickness in a range of approximately 0.0001 inches to approximately 0.0003 inches.~~

~~17. The method of any one of the previous claims, further comprising cooling the overmolded plunger body to form a cured plunger.~~

1~~8~~. A method of manufacturing a plunger of a drug delivery device, the method comprising:

forming a plunger body having an inner wall defining an axial chamber and an outer wall, the plunger body including a first end and a second end opposite the first end;

loading the plunger body into a cavity of a first molding tool of a molding system;

coupling a second molding tool to the first molding tool to form a plurality of channels defined by grooves in the first and second molding tools, the second molding tool including a cavity sized to receive a portion of the plunger body when the plunger body is disposed in the cavity of the first molding tool; and

injecting molten plastic into the plurality of channels to form an overmolded plunger body, the overmolded plunger body having at least one overmolded portion.

~~19~~2. The method of claim 1~~8~~, wherein injecting molten plastic includes injecting molten plastic to form a head coupled to the first end of the plunger body and a foot coupled to the second end of the plunger body, the foot at least partially coupled to the inner wall and the head coupled to the outer wall of the plunger body.

3~~20~~. The method of claim 1~~8~~ or 2~~19~~, further comprising moving the first molding tool from a first position to a second position before coupling the second molding tool to the first molding tool.

~~21. The method of claim 20, wherein moving the first molding tool includes rotating a movable table, the first molding tool attached to a surface of the movable table.~~

~~22. The method of claim 20 or 21, wherein injecting the plurality of channels includes injecting the second molding tool with molten plastic when the first molding tool is in the second position.~~

~~23~~4. The method of any one of claims 1~~8~~ through 3~~22~~, further comprising inserting a rod into the axial chamber of the plunger body before coupling the first molding tool to the second molding tool.

~~24~~5. The method of any one of claims 1~~8~~ through 4~~23~~, injecting the plurality of channels includes injecting a curved channel formed in the second molding tool, the curved channel including a diameter in a range of approximately 0.1 mm to approximately 0.2 mm and coupled to a second molding portion of the cavity, the cavity at least partially defined by a first molding portion, a middle portion, and the second molding portion.

~~25~~6. The method of any one of claims 1~~8~~ through 5~~24~~, further comprising removing the cured plunger from the first molding tool by activating an ejector pin in the first molding tool, the ejector pins pushing the cured plunger away from the cavity formed in the first molding tool.

~~26. The method of claim 25, wherein removing the cured plunger includes automatically severing a plurality of plastic tubes formed in the plurality of channels that are connected to the head and the foot of the cured plunger, thereby providing a plunger.~~

~~27. The method of any one of claims 18 through 26, wherein loading the plunger body includes loading the first end into a first molding portion of the cavity and loading the second end into a second molding portion of the cavity.~~

~~28. The method of any one of claims 18 through 27, wherein injecting the plurality of channels includes injecting molten plastic into the first and second molding tools, the plurality of channels extending between a first molding portion and a second molding portion of the cavity of the first molding tool and between a first molding portion and a second molding portion of the second molding tool.~~

~~29. The method of claim 28, wherein injecting molten plastic into the first and second molding tools includes forming the head having at least one flange extending radially outwardly from the first end of the plunger body and forming a cam follower on at least one flange.~~

~~30~~7. The method of any one of claims 1~~8~~ through 6~~29~~, wherein loading the plunger body includes loading a plurality of plunger bodies onto the first molding tool of the molding system, the first molding tool including a plurality of cavities.

~~31~~8. The method of any one of claims 1~~8~~ through 7~~30~~, wherein loading the plunger body into the cavity includes placing the plunger body over a vacuum slot formed in a wall of the first molding tool, the vacuum configured to adhere the plunger body to the molding tool.

~~32. The method of claim 31, further comprising triggering an alarm when the plunger body is not loaded into the cavity, the vacuum including a sensor communicatively coupled to the alarm and configured to signal the alarm when the sensor detects a condition of the plunger body and the cavity.~~

~~33~~9. The method of any one of claims 1~~8~~ through 8~~32~~, wherein forming the plunger body includes stamping a plurality of plunger bodies from blank of sheet metal.

~~34. The method of claim 33, wherein stamping the plurality of plunger bodies from the blank of sheet metal includes advancing the blank of sheet metal in a stamping machine, the blank of metal sheet moving between a plurality of stations in which the axial chamber of the plunger body is formed.~~

~~35. The method of any one of claims 18 through 33, wherein forming the plunger body includes shaping a blank of sheet metal into a cylindrical shape with a body thickness of less than 0.6 millimeters.~~

~~36~~10. The method of any one of claims 1~~8~~ through 10~~35~~, wherein forming the plunger body includes cutting a corrugated edge into a blank of sheet metal and bending the corrugated edge such that the first end of the plunger body includes the corrugated edge bent outwardly relative to the axial chamber.

~~37~~11. The method of any one of claims 1~~8~~ through 10~~36~~, wherein forming the plunger body includes cutting a corrugated edge into a blank of sheet metal and bending the corrugated edge such that the second end of the plunger body includes the corrugated edge bent inwardly relative to the axial chamber.

~~38. The method of any one of claims 18 through 37, wherein injecting molten plastic into the plurality of channels includes forming the head adjacent to the outer wall of the plunger body and coupling the head to the corrugated edge of the first end of the plunger body.~~

~~39. The method of any one of claims 18 through 38, wherein injecting molten plastic into the plurality of channels includes forming the foot at least partially adjacent to the inner wall of the plunger body and coupling the foot to the corrugated edge of the second end of the plunger body.~~

~~40. The method of any one of claims 18 through 39, further comprising cooling the overmolded plunger body to form a cured plunger.~~

~~41. A method of manufacturing a plunger body of a drug delivery device, the method comprising:~~

~~inserting a blank of sheet metal in an inlet of a stamping machine, the stamping machine including the inlet, an outlet, and a travel path extending between the inlet and the outlet;~~

~~activating the stamping machine to advance the blank of sheet metal along the travel path of the stamping machine, the travel path including a plurality of stages configured to process a portion of the blank of sheet metal into a plurality of plunger bodies, each of the plurality of plunger bodies including an inner wall defining an axial chamber, an outer wall, a first end, and a second end opposite the first end;~~

~~forming the plurality of plunger bodies from the blank of sheet metal as the blank of sheet metal advances along the travel path and exits the outlet; and~~

~~separating each of the plurality of plunger bodies from the blank of sheet metal.~~

~~42. The method of claim 41, wherein inserting the blank of sheet metal includes inserting the blank of sheet metal having a thickness in a range of approximately 0.0001 inches to approximately 0.0003 inches~~

~~43. The method of claim 41 or 42, wherein forming the plurality of plunger bodies includes cutting the blank of sheet metal to create a rectangular cut-out, the rectangular cut-out including a first end, a second end opposite the first end, a first side, and a second side connecting the first and second ends, a first surface and a second surface opposite the first surface.~~

~~44. The method of claim 43, wherein forming the plurality of plunger bodies includes shaping the rectangular cut-out attached to the blank of sheet metal to form a cylindrical shape by stamping at least one of the first surface and the second surface of the rectangular cut-out with a contoured die.~~

~~45. The method of claim 43 or 44, wherein forming the plurality of plunger bodies includes gradually bending first and second sides of the rectangular cut-out inward, such that as the blank of sheet metal moves in a direction toward the outlet of~~

~~the stamping machine, the first surface of the rectangular cut-out gradually defines the inner wall of each of the plurality of plunger bodies.~~

~~46. The method of any one of claims 43 through 45, wherein cutting the blank of sheet metal includes cutting a corrugated edge to form the first end of the rectangular cut-out.~~

~~47. The method of claim 46, further comprising bending the corrugated edge of the first end of the rectangular cut-out towards the second surface of the rectangular cut-out such that the corrugated edge is substantially perpendicular relative to the second surface of the rectangular cut-out.~~

~~48. The method of any one of claims 43 through 47, wherein cutting the blank of sheet metal includes cutting a corrugated edge to form the second end of the rectangular cut-out.~~

~~49. The method of claim 48, further comprising bending the corrugated edge of the second end towards the first surface of the rectangular cut-out such that the corrugated edge of the second end is substantially perpendicular relative to the first surface of the rectangular cut-out.~~

~~50. The method of any one of claims 41 through 49, wherein separating the plurality of plunger bodies includes cutting a portion of a first edge of the blank of sheet metal to remove the plunger body from the blank of sheet metal, the portion of the first edge defining the hanger connected to the first end of the plunger body.~~

~~51~~12. A method of molding a plunger of a drug delivery device, the method comprising:

loading a plunger body into a cavity of a first molding tool of a molding system, the plunger body including an inner wall defining an axial chamber, an outer wall, a first end, a second end opposite the first end, wherein the cavity at least partially defines a first molding portion, a middle portion, and a second molding portion;

coupling a second molding tool to the first molding tool to form a plurality of channels defined by grooves in the first and second molding tools; and

injecting molten plastic into the plurality of channels of the first and second molding tools and into the first molding portion and the second molding portion to form an overmolded plunger body, the overmolded plunger body including a head coupled to the outer wall and at least partially surrounding the first end of the plunger body and a foot coupled to the second end of the plunger body.

~~52~~13. The method of claim 12~~51~~, further comprising moving the first molding tool from a first position to a second position before coupling the second molding tool to the first molding tool.

~~53~~14. The method of claim ~~52~~13, wherein moving the first molding tool includes rotating a movable table at least 180 degrees, the first molding tool attached to a surface of the movable table.

~~54~~15. The method of any one of claims ~~51~~12 through ~~53~~14, wherein injecting molten plastic into the plurality of channels includes injecting molten plastic into the second molding tool when first molding tool is coupled to the second molding tool.

~~55~~16. The method of any one of claims ~~51~~12 through ~~54~~15, further comprising inserting a rod into the axial chamber of the plunger body before coupling the first molding tool to the second molding tool.

5617. The method of any one of claims 5112 through 5516, wherein injecting molten plastic into the plurality of channels includes injecting molten plastic into a curved channel formed in the second molding tool, the curved channel coupled to the second molding portion of the cavity.

5718. The method of any one of claims 5112 through 5617, wherein loading the plunger body includes loading the first end into the first molding portion and loading the second end into the second molding portion of the cavity.

5819. The method of any one of claims 5112 through 5718, wherein injecting molten plastic into the plurality of channels includes injecting molten plastic into the first and second molding tools, the plurality of channels extending between the first molding portion and the second molding portion of the first molding tool and between a first molding portion and a second molding portion of the second molding tool.

5920. The method of claim 5819, wherein injecting molten plastic into the first and second molding tools includes forming the head including at least one flange extending radially outwardly from the plunger body and forming a cam follower on the at least one flange.

60. The method of any one of claims 51 through 59, wherein loading the plunger body includes loading a plurality of plunger bodies into a plurality of cavities the first molding tool of the molding system.

61. The method of any one of claims 51 through 60, wherein loading the plunger body into the cavity includes placing the plunger body over a vacuum slot formed in a wall of the first molding tool, the vacuum configured keep the plunger body in the cavity of the first molding tool.

62. A molding system for forming a portion of a plunger of a drug delivery device, the system comprising:

a first molding tool having a cavity at least partially defined by a first molding portion, a middle portion, and a second molding portion;

a second molding tool having a cavity corresponding to the cavity of the first molding tool and including a first molding portion, a middle portion, and a second molding portion; and

a plurality of grooves formed in the first molding tool and the second molding tool, the plurality of grooves arranged to form a plurality of channels when the first molding tool is coupled to the second molding tool;

wherein when the first and second molding tools are coupled, the first molding portions of the first molding tool and the second molding tool define a head mold for a plunger and the second molding portions of the first molding tool and the second molding tool define a foot mold for the plunger.

63. The system of claim 62, further comprising a vacuum component disposed in the middle portion of the cavity of the first molding tool.

64. The system of claim 63, further comprising a sensor coupled to the vacuum component, the sensor configured to detect an absence of an object covering a slot of the vacuum component and to signal to a processor to activate an alarm.

65. The system of any one of claims 62 through 64, further comprising a curved channel formed in the second molding tool and in fluid connection with the second molding portion, the curved channel having a diameter in a range of approximately 0.1 mm to approximately 0.3 mm.

66. The system of any one of claims 62 through 65, wherein the first molding portion and the second molding portion of the first molding tool are fluidly coupled by at least one of the plurality of channels.

67. The system of any one of claims 62 through 66, wherein the first molding tool is movable relative to the second molding tool between a first station and a second station, the second molding tool disposed at the second station.

68. The system of any one of claims 62 through 67, wherein the first molding tool rotates relative to the second molding tool.

69. The system of claim 67 or 68, wherein the second molding tool moves axially relative to the first molding tool such that the second molding tool moves towards the first molding tool when the first molding tool is disposed at the second station.

70. The system of any one of claims 62 through 69, further comprising a rotatable table, the first molding tool coupled to the rotatable table.

71. The system of claim 69, further comprising a third molding tool coupled to the rotatable table and spaced away from the first molding tool, the third molding tool substantially identical to the first molding tool.

72. The system of any one of claims 62 through 71, further comprising a slidable plate coupled to the first molding tool.

73. The system of any one of claims 62 through 72, wherein the first molding tool includes a plurality of cavities and the second molding tool includes a plurality of cavities corresponding to the plurality of cavities of the first molding tool.

74. The system of any one of claims 62 through 73, wherein the first molding portion of the first molding tool is removably coupled to the first molding tool.

75. The system of any one of claims 62 through 74, wherein the first molding portion of the second molding tool is removably coupled to the second molding tool.

76. A stamping machine for forming a drug delivery device component, the machine comprising:

a housing defining an inlet, and an outlet, and a travel path extending between the inlet and the outlet;

a gripper disposed within the housing and arranged to engage and advance a blank of sheet metal along the travel path of the housing; and

a plurality of movable dies disposed along the travel path and arranged to impact the blank of sheet metal to form a cylindrical plunger body, wherein at least one of the plurality of dies is disposed above the travel path and at least one of the plurality of dies is disposed below the travel path.