[0004] In some implementations, the present disclosure relates to a method of manufacturing a target device or component (e.g., to a method of manufacturing, or suturing, a prosthetic implant device, prosthetic human implant device, prosthetic heart valve, prosthetic human heart valve, etc.). The method can comprise disposing the target device (e.g., prosthetic human implant device, etc.) on a holder component of an automated fixture (e.g., an automated suture fixture). The method can also comprise directing or providing input to cause the automated fixture (e.g., automated suture fixture) to position the target device (e.g., prosthetic human implant device, etc.) in a first position, executing a first operation/procedure (e.g., a stitch, inspection, other operation/procedure) on the target device (e.g., prosthetic human implant device, etc.), directing or providing input to cause the automated fixture (e.g., automated suture fixture) to position the target device (e.g., prosthetic human implant device, etc.) in a second position, the second position including a change in orientation of an axis of rotation of the human implant device relative to the first position, and executing a second operation/procedure (e.g., stitch, inspection, etc.) on the target device (e.g., prosthetic human implant device, etc.). The target device can be a prosthetic human implant device. The prosthetic human implant device can be a heart valve or other type of implant device.

[0005] The step of directing or providing input to cause the automated fixture (e.g., automated suture fixture) to position the target device (e.g., prosthetic human implant device, etc.) in the first position can involve directing or providing input to cause the automated fixture (e.g., automated suture fixture) to move the target device (e.g., prosthetic human implant device) to a desired focal length from a visualization or imaging system (e.g., a camera lens of an imaging system/camera, etc.). The method can also comprise directing or providing input to cause the automated fixture (e.g., automated suture fixture) to move or rotate (e.g., rotate; circumferentially rotate; flip; rotate with respect to an axis, such as an axis that passes through a center point of the device; etc.) the target device (e.g., prosthetic human implant device, etc.) in place, while maintaining at least some portion of an outer surface of the prosthetic human implant device in focus of a visualization or imaging system (e.g., a camera, etc.). This can be done with or without moving the visualization system (e.g., without moving a camera or camera lens). Operation of the automated fixture (e.g., automated suture fixture) can provide for reduced physical strain

rotating support members of one or more of the plurality of actuator devices (e.g., motorized actuator devices) based on the control signals to provide at least 6 degrees of freedom of movement for the holder component to present a prosthetic human implant device held by the holder component in a variety of positions and orientations to an operator.

[0017] Each of the plurality of actuator devices (e.g., motorized actuator devices) can further comprise a servo feedback component configured to generate a signal indicating a position of a respective rotor component. The servo feedback component can be a digital encoder. The plurality of actuator devices (e.g., motorized actuator devices) can comprise one or more base actuator devices and at least one intermediate-stage actuator device fixed at a base thereof to the rotating support members of the one or more base actuator devices, wherein the distal actuator device can be fixed at a base thereof to the rotating support member of the intermediate-stage actuator device. The base of the intermediate-stage actuator device can be fixed to the rotating support members of the one or more base actuator devices via a connector plate mounted to the rotating support members of the one or more base actuator devices. The rotating support members of the one or more base actuator devices can be fixed to one another. The one or more base actuator devices can consist of one motorized actuator device, or two motorized actuator devices, or more motorized actuator devices. The holder assembly or holder (e.g., suture target holder assembly) can comprise one or more components configured to rotate about an axis substantially orthogonal to an axis of rotation of the rotating support member of the distal actuator device. The holder assembly or holder (e.g., suture target holder assembly) can comprise one or more components configured to rotate about an axis substantially parallel to an axis of rotation of the rotating support member of the distal actuator device.

[0018] The/an assistance system (e.g., suturing assistance system, manufacturing assistance system, inspection assistance system, other procedure assistance system, etc.) can comprise an automated fixture (e.g., automated suture fixture) comprising a plurality of actuator devices (e.g., motorized actuator devices) and a holder (e.g., a suture target holder, etc.). The automated fixture (e.g., automated suture

fixture) can be configured to position a target device (e.g., target suture device, implant, heart valve, etc.) mounted to the holder. The assistance system and/or automated fixture can include a data store (e.g., memory, database, etc.) storing procedure script data (e.g., suturing procedure

WHAT IS CLAIMED IS:

1. An automated suture fixture comprising:

a plurality of motorized actuator devices, each comprising a motor and a rotating support member coupled to a rotor component of the motor; and

a holder component attached to the rotating support member of a distal actuator device of the plurality of motorized actuator devices and configured to hold a prosthetic human implant device;

wherein each of the plurality of motorized actuator devices is fixed to one or more other motorized actuator devices of the plurality of motorized actuator devices; and

wherein the automated suture fixture is configured to receive control signals and rotate the rotating support members of one or more of the plurality of motorized actuator devices based on the control signals to provide at least 6 degrees of freedom of movement for the holder component to present a prosthetic human implant device held by the holder component in a variety of positions and orientations to an operator.

2. The automated suture fixture of claim 1, wherein each of the plurality of motorized actuator devices further comprises a servo feedback component, preferably a digital encoder, configured to generate a signal indicating a position of a respective rotor component.

3. The automated suture fixture of claim 2, wherein the plurality of motorized actuator devices comprises one or more base actuator devices and at least one intermediate-stage actuator device fixed at a base thereof to the rotating support members of the one or more base actuator devices, wherein the distal actuator device is fixed at a base thereof to the rotating support member of the intermediate-stage actuator device.

4. The automated suture fixture of claim 3, wherein the base of the intermediate-stage actuator device is fixed to the rotating support members of the one or more base actuator devices via a connector plate mounted to the rotating support members of the one or more base actuator devices.

5. The automated suture fixture of claim 3 or 4, wherein the rotating support members of the one or more base actuator devices are fixed to one another.

6. The automated suture fixture of any of claims 3 to 5, wherein the one or more base actuator devices consists of one or two motorized actuator device.

7. The automated suture fixture of any of claims 1 to 6, wherein the holder component comprises one or more components configured to rotate about an axis substantially tangent to an axis of rotation of the rotating support member of the distal actuator device.

8. The automated suture fixture of any of claims 1 to 7, wherein the automated suture fixture comprises a plurality of servo motor devices daisy-chained together.

9. The automated suture fixture of any of claims 1 to 8, wherein the camera system comprises a first camera and a second camera, the first and second cameras collectively configured to provide images of two different views of the target device.

10. The automated suture fixture of any of claims 1 to 9, wherein the automated fixture comprises an encoder associated with an articulation arm, the encoder configured to provide position information for the articulation arm.

11. The automated suture fixture of any of claims 1 to 10, wherein the automated fixture is configured to move the target device such that a portion of the target device remains in focus with respect to the camera system in each procedure position.

12. A method of suturing a prosthetic human implant device, preferably a heart valve, by an operator, the method comprising:

disposing the prosthetic human implant device on a holder component of an automated suture fixture of any of claims 1 to 11;

directing or providing input to cause the automated suture fixture to position the prosthetic human implant device in a first position;

executing a first stitch on the prosthetic human implant device;

directing or providing input to cause the automated suture fixture to position the prosthetic human implant device in a second position, the second position including a change in orientation of an axis of rotation of the human implant device relative to the first position; and

executing a second stitch on the prosthetic human implant device.

13. The method of claim 12, wherein said directing or providing input to cause the automated suture fixture to position the prosthetic human implant device in the first position involves directing or providing input to cause the automated suture fixture to move the prosthetic human implant device to a desired focal length from a camera lens of an imaging system.

14. The method of claim 12 or 13, further comprising directing or providing input to cause the automated suture fixture to circumferentially rotate the prosthetic human implant device in place, while maintaining at least some portion of an outer surface of the prosthetic human implant device in focus of an imaging system.

15. The method of any of claims 12 to 14, further comprising loading a pre-programmed suturing procedure script using one or more processors configured to at least partially control the automated suture fixture.

16. The method of any of claims 12 to 15, further comprising performing a pre-punch on the prosthetic human implant device using a handheld tool.

17. The method of any of claims 12 to 16, wherein the prosthetic human implant device comprises an outside surface and an inside surface defining an at least partially open inside cylinder cavity.

18. The method of claim 17, wherein the first stitch is an outside-to-inside stitch executed by puncturing a needle through the outside surface to the inside cylinder cavity, and the second stitch is an inside-to-outside stitch executed by puncturing the inside surface.

19. The method of claim 18, wherein the first position presents the outside surface to the operator and the second position presents the inside surface to the operator.

20. A suturing assistance system comprising:

an automated suture fixture of any of claims 1 to 11;

a camera system configured to generate an enlarged image of the prosthetic human implant device held by the holder component of the automated suture fixture; and

a suture target display configured to display the enlarged image, the suture target display indicating a target suture position associated with the prosthetic human implant device.