FALL PROTECTION SYSTEM AND METHOD

BACKGROUND

[0001] The present disclosure relates to a system and method that may be employed to restrain an operator that is performing an operation on a portion of an aircraft or other vehicle or apparatus.

[0002] Aircraft technicians may walk across a wing of an aircraft or other aircraft component so as to service, inspect, or maintain the aircraft. There is an increased desire to improve safety protocol for such technicians, as current protocols in some situations only require the technician to wear steel-toed shoes and a bump cap with ear protection.

[0003] There have been employed methods to secure a person overhead to aid in safety when performing operations on, for example, an aircraft wing. However, these methods of securing a person involve attachment to a ceiling or other overhead portion of a hangar or other building component that is impractical, expensive, or otherwise difficult to provide in various situations. Further, such a configuration may be difficult to utilize when working with aircraft when there is no overhead structure, such as, for field service of an aircraft or on an aircraft carrier.

SUMMARY

[0004] In one embodiment, a restraint system is provided comprising a first and second adapter. The first adapter is configured to be connected to a forward section of a component of an aircraft. The first adapter includes a first body including a plurality of holes, the plurality of holes configured to correspond to holes in a first attachment point of the aircraft to allow for fastening the first adapter to the first attachment point, a first engagement component connected to the first body, and a first fastening component configured to fasten to the first attachment point. The second adapter is configured to be connected to an aft section of the component of the aircraft. The second adapter includes a second body, a second engagement component connected to the second body, and a second fastening component configured to fasten to a second attachment point of the aircraft. The second fastening component includes a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the second attachment point. The second attachment point is different from the first attachment point. The first and second engagement components are each configured to connect with a safety harness, and the first fastening component has a physical structure different from a physical structure of the second fastening component.

[0005] In another embodiment, a method for securing an operator to a component of an aircraft is provided. The component includes a surface, a forward attachment point and an aft attachment point. The method includes connecting a forward adapter to the forward attachment point, the forward adapter including a first body including a plurality of holes, the plurality of holes configured to correspond to holes in the forward attachment point to allow for fastening the first adapter to the forward attachment point, a first ring connected to the first body, and a first fastening component that connects the first body to the forward attachment point. The method further includes connecting an aft adapter to the aft attachment point, the aft adapter including a second body, a second ring connected to the second body, and a second fastening component that connects the second body to the aft attachment point. The second fastening component includes a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the aft attachment point. The first fastening component has a different physical structure from the second fastening component. The method further includes connecting a lanyard to each of the adapters and connecting each lanyard to a harness worn by the operator.

[0006] In another embodiment, a kit is provided. The kit includes a forward adapter configured to connect with a forward attachment point of a wing of an aircraft, the forward adapter comprising a body including a plurality of holes, the plurality of holes configured to correspond to holes in the forward attachment point to allow for fastening the forward adapter to the forward attachment point, a ring rotatably connected to the body, and a forward fastening component configured to connect the body of the forward adapter to the forward attachment point of the wing of the aircraft. The kit further includes an aft adapter configured to connect with an aft attachment point of the wing of the aircraft, the aft adapter comprising a body, a ring rotatably connected to the body, and an aft fastening component configured to connect the body of the aft adapter to the aft attachment point of the wing of the aircraft. The aft fastening component including a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the aft attachment point. The forward and after adapters are configured to allow multi-axis movement along the wing of the aircraft while limiting a travel distance forward and aft on the wing of the aircraft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figure 1 is a diagram illustrating a configuration of an adapter.

[0008] Figure 2 is a diagram of a bottom view of a portion of the adapter.

[0009] Figure 3 is a diagram showing portions of the adapter.

[0010] Figure 4 is a diagram illustrating another configuration of an adapter.

[0011] Figure 5 is another diagram illustrating the another configuration of the adapter.

[0012] Figure 6 is a diagram illustrating a portion of the another configuration of the adapter.

[0013] Figure 7 is a diagram illustrating another portion of the another configuration of the adapter.

[0014] Figure 8 is a diagram illustrating a restraint system in use.

[0015] Figure 9 is a diagram showing the components of the restraint system prepared for transport.

[0016] Figure 10 is a flow chart of a method for securing an operator to a component of an aircraft.

DETAILED DESCRIPTION

[0017] The following detailed description of certain embodiments will be better understood when read in conjunction with the appended drawings. It should be understood that the various embodiments are not limited to the arrangements and instrumentality shown in the drawings.

[0018] Various embodiments include apparatus, system, kits, and methods for securing or restraining an operator to a component, which may be an aircraft wing. The apparatus, system, kits, and methods employed herein in various embodiments allow an operator to be able to move forward and aft, and side-to-side along a wing so as to perform the appropriate maintenance, inspection, service, and/or other operations, while restraining the operator to a predetermined area of the wing.

[0019] As described herein, a restraint system 800 includes a first adapter 100 and a second adapter 400. Figure 1 shows an example of a first adapter 100. The first adapter 100 includes a body 110, an engagement component 112, and a fastening component 114. The body 110 may be referred to as a first body, the engagement component 112 may be referred to as a first engagement component, and the fastening component 114 may be referred to as a first fastening component. The first adapter 100

WHAT IS CLAIMED IS:

1. A restraint system comprising:

a first adapter configured to be connected to a forward section of a component of an aircraft, the first adapter comprising:

a first body including a plurality of holes, the plurality of holes configured to correspond to holes in a first attachment point of the aircraft to allow for fastening the first adapter to the first attachment point;

a first engagement component connected to the first body; and

a first fastening component configured to fasten to the first attachment point; and

a second adapter configured to be connected to an aft section of the component of the aircraft, the second adapter comprising:

a second body;

a second engagement component connected to the second body; and

a second fastening component configured to fasten to a second attachment point of the aircraft, the second fastening component including a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the second attachment point, the second attachment point being different than the first attachment point,

wherein the first and second engagement components are each configured to connect with a harness, and the first fastening component has a physical structure different from a physical structure of the second fastening component.

2. The restraint system according to claim 1, wherein the component of the aircraft is a wing of the aircraft.

3. The restraint system according to claim 1 or 2, wherein the first and second engagement components are rings, and the first and second attachment points are aircraft hoisting points.

4. The restraint system according to claim 3, wherein the ring of the first adapter is connected to the first body to swivel with respect to the first body, and the ring of the second adapter is connected to the second body to swivel with respect to the second body.

5. The restraint system according to claim 1, wherein the plurality of holes are counter-bored.

6. The restraint system according to any one of claims 1 to 5, wherein the second attachment point is a lug disposed on an aft section of an aircraft wing.

7. The restraint system according to claim 6, wherein the second adapter is configured to cover a portion of the aft section of the aircraft wing, wherein a surface of the second adapter is configured to prevent alteration of a surface of the aircraft wing.

8. The restraint system according to any one of claims 1 to 7, wherein the first body includes a bottom surface and a recess defined in the bottom surface, and the first engagement component is connected to the first body by a nut inserted into the recess in the bottom surface of the first body.

9. The restraint system according to any one of claims 1 to 8, wherein the first and second engagement components are first and second rings each having a stem, and the first and second adapters each include a bushing configured to receive therein the stem of the respective ring.

10. The restraint system according to any one of claims 1 to 9, further comprising lanyards and a harness, wherein the first adapter and the second adapter are each configured to connect to a respective lanyard, the lanyards configured to connect to a harness.

11. The restraint system according to claim 10, wherein the lanyards are sized to define a maximum movement direction along a wing of the aircraft.

12. A method for securing an operator to a component of an aircraft, the component including a forward attachment point, and an aft attachment point, the method comprising:

connecting a forward adapter to the forward attachment point, the forward adapter including a first body including a plurality of holes, the plurality of holes configured to correspond to holes in the forward attachment point to allow for fastening the first adapter to the forward attachment point, a first ring connected to the first body, and a first fastening component that connects the first body to the forward attachment point;

connecting an aft adapter to the aft attachment point, the aft adapter including a second body, a second ring connected to the second body, and a second fastening component that connects the second body to the aft attachment point, the second fastening component including a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the aft attachment point, wherein the first fastening component has a different physical structure from the second fastening component; and

connecting a lanyard to each of the adapters and connecting each lanyard to a harness worn by the operator.

13. The method according to claim 12, wherein the connecting of a lanyard to each of the adapters and connecting of each lanyard to the harness include connecting the lanyards to the harness in a location whereby the operator is positioned between the first adapter and the second adapter and movement in at least one direction is limited.

14. The method according to claim 12 or 13, wherein the forward attachment point is at a forward portion of an aircraft wing and the aft attachment point is at an aft portion of the aircraft wing.

15. A kit comprising:

a forward adapter configured to connect with a forward attachment point of a wing of an aircraft, the forward adapter comprising a body including a plurality of holes, the plurality of holes configured to correspond to holes in the forward attachment

point to allow for fastening the forward adapter to the forward attachment point, a ring rotatably connected to the body, and a forward fastening component configured to connect the body of the forward adapter to the forward attachment point of the wing of aircraft; and

an aft adapter configured to connect with an aft attachment point of the wing of the aircraft, the aft adapter comprising a body, a ring rotatably connected to the body, and an aft fastening component configured to connect the body of the aft adapter to the aft attachment point of the wing of the aircraft, the aft fastening component including a plurality of legs defining a slot between the legs, each leg of the plurality of legs having a hole for receiving a pin therethrough, the pin arranged to extend through the plurality of legs and through the aft attachment point,

wherein the forward and aft adapters are configured to allow multi-axis movement along the wing of the aircraft while limiting a travel distance forward and aft on the wing of the aircraft.

16. The kit according to claim 15, wherein the rings are rotatably connected to the bodies to allow multi-directional movement along the wing of the aircraft.

17. A kit comprising the first adapter and the second adapter of any one of claims 1 to 11.

18. The kit according to any one of claims 15 to 17, further comprising lanyards and a harness, wherein the lanyards are configured to connect the fastening components or the rings to the harness.