fluid communication with the valve. The spray nozzle is configured and located to distribute the sealant or coating material over an area on a surface of a structure which is covered by the hood. The spray-on repair module further includes a first electronic switch for controlling a state of the first valve, a vacuum pump in fluid communication with a first volume of space inside the hood, a controller configured to control a switching state of the first electronic switch to cause the first valve to open and distribute sealant or coating material from the pressurized storage canister over the area on the surface of the structure, and further configured to control operation of the vacuum pump so that air is removed from the first volume of space, a first sealing lip comprising a first flexible substrate attached to the hood, and a second sealing lip comprising a second flexible substrate attached to the hood. The second sealing lip surrounds the first sealing lip with a second volume of space therebetween, and wherein the vacuum pump is in fluid communication with the second volume of space.

Another aspect of the subject matter disclosed in detail below is a method for sealing or coating a surface of a structure, the method comprising: (a) coupling a spray-on repair module to an unmanned aerial vehicle. The spray-on repair module comprises: a hood coupled to the frame of the unmanned aerial vehicle; a pressurized storage canister containing a sealant or coating material in a liquid state; a valve in fluid communication with the pressurized storage canister; and a spray nozzle in fluid communication with the valve. The spray nozzle is configured and located to distribute the sealant or coating material over an area on a surface of a structure which is covered by the hood. The spray-on repair module further includes a first electronic switch for controlling a state of the first valve, a vacuum pump in fluid communication with a first volume of space inside the hood, a controller configured to control a switching state of the first electronic switch to cause the first valve to open and distribute sealant or coating material from the pressurized storage canister over the area on the surface of the structure, and further configured to control operation of the vacuum pump so that air is removed from the first volume of space, a first sealing lip comprising a first flexible substrate attached to the hood, and a second sealing lip comprising a second flexible substrate attached to the hood. The second sealing lip surrounds the first sealing lip with a second volume of space therebetween, and wherein the vacuum pump is in fluid communication with the second volume of space. The method further includes (b) flying the unmanned aerial vehicle to a location where the hood covers an area on a

surface of a structure; and (c) using the sprayer to spray sealing or coating material on at least a portion of the area covered by the hood. In accordance with one embodiment, the method further comprises: (d) sealing the hood to the surface of the structure subsequent to step (b) and prior to (c); and (e) partially evacuating a volume of space under the hood subsequent to step (d) and prior to step (c).

A further aspect of the subject matter disclosed in detail below is an apparatus comprising an unmanned aerial vehicle and an applicator head coupled to the unmanned aerial vehicle. The unmanned aerial vehicle comprises: a body frame; a plurality of rotor motors mounted to the body frame; and a plurality of rotors operatively coupled to respective rotor motors of the plurality of rotor motors. The applicator head comprises: a housing; a supply spool rotatably coupled to the housing and having a first portion of a tape having pressure-sensitive adhesive on one side and a first portion of a release liner wrapped around the supply spool; an applicator roller rotatably coupled to the housing and having a compliant and air-permeable outer surface in contact with a second portion of the tape; and a take-up spool rotatably coupled to the housing and having a second portion of the release liner wrapped around the take-up spool. The applicator roller and take-up spool form a nip where the second portions of the tape and release liner are in contact.

Yet another aspect of the subject matter disclosed in detail below is a method for repairing a surface area of a structure using an unmanned aerial vehicle, the method comprising: (a) coupling an applicator head comprising an applicator roller to an unmanned aerial vehicle; (b) adhering a portion of a tape having pressure-sensitive adhesive on one side to an outer surface of the applicator roller; (c) flying the unmanned aerial vehicle to a location where the pressure-sensitive adhesive on the portion of tape adhered to the outer surface of the applicator roller contacts a surface of a structure; and (d) moving the applicator head so that the applicator roller rolls and presses incremental

CLAIMS

1. An apparatus comprising an unmanned aerial vehicle and a spray-on repair module coupled to the unmanned aerial vehicle,

wherein the unmanned aerial vehicle comprises:

a body frame;

a plurality of rotor motors mounted to the body frame; and

a plurality of rotors operatively coupled to respective rotor motors of the plurality of rotor motors, and

wherein the spray-on repair module comprises:

a hood coupled to the frame of the unmanned aerial vehicle;

a pressurized storage canister containing a sealant or coating material in a liquid state;

a first valve in fluid communication with the pressurized storage canister;

a spray nozzle in fluid communication with the first valve, wherein the spray nozzle is configured and located to distribute the sealant or coating material over an area on a surface of a structure which is covered by the hood;

a first electronic switch for controlling a state of the first valve;

a vacuum pump in fluid communication with a first volume of space inside the hood;

a controller configured to control a switching state of the first electronic switch to cause the first valve to open and distribute sealant or coating material from the pressurized storage canister over the area on the surface of the structure, and further configured to control operation of the vacuum pump so that air is removed from the first volume of space;

a first sealing lip comprising a first flexible substrate attached to the hood; and

a second sealing lip comprising a second flexible substrate attached to the hood, wherein the second sealing lip surrounds the first sealing lip with a second volume of space therebetween, and wherein the vacuum pump is in fluid communication with the second volume of space.

2. The apparatus as recited in claim 1, wherein the spray-on repair module further comprises a radiation source configured to emit radiation for curing the sealant or

coating material, and wherein the controller is further configured to control operation of the radiation source in accordance with a curing protocol.

3. The apparatus as recited in claim 1 or 2, wherein the spray-on repair module further comprises:

a compressed gas container containing a gas;

a second valve in fluid communication with the compressed gas container; and

an air nozzle in fluid communication with the second valve, wherein the air nozzle is configured and located to direct a jet of air toward an area on a surface of a structure which is covered by the hood when the second valve is open.

4. The apparatus as recited in claim 3, wherein:

the spray-on repair module further comprises a second electronic switch for controlling a state of the second valve; and

the controller is further configured to control a switching state of the second electronic switch to cause the second valve to open.

5. The apparatus as recited in any one of claims 1 to 4, wherein the second sealing lip has a thickness greater than a thickness of the first sealing lip.

6. A method for sealing or coating a surface of a structure, the method comprising:

(a) coupling a spray-on repair module to an unmanned aerial vehicle, wherein the spray-on repair module comprises: a hood coupled to the frame of the unmanned aerial vehicle; a pressurized storage canister containing a sealant or coating material in a liquid state; a first valve in fluid communication with the pressurized storage canister; a spray nozzle in fluid communication with the first valve, wherein the spray nozzle is configured and located to distribute the sealant or coating material over an area on the surface of the structure which is covered by the hood; a first electronic switch for controlling a state of the first valve; a vacuum pump in fluid communication with a first volume of space inside the hood; a controller configured to control a switching state of the first electronic switch to cause the first valve to open and distribute sealant or coating material from the pressurized storage canister over the area on the surface of the structure, and further configured to control operation of the vacuum pump so that air is

removed from the first volume of space; a first sealing lip comprising a first flexible substrate attached to the hood; and a second sealing lip comprising a second flexible substrate attached to the hood, wherein the second sealing lip surrounds the first sealing lip with a second volume of space therebetween, and wherein the vacuum pump is in fluid communication with the second volume of space;

(b) flying the unmanned aerial vehicle to a location where the hood covers the area on the surface of the structure; and

(c) using the spray nozzle to spray the sealant or coating material on at least a portion of the area covered by the hood.

7. The method as recited in claim 6, further comprising partially evacuating the first volume of space to seal the hood to the surface of the structure subsequent to step (b) and prior to step (c).

8. The method as recited in claim 6 or 7, further comprising emitting a jet of air from an air nozzle mounted to the hood subsequent to step (b) and prior to step (c).

9. The method as recited in any of claims 6 to 8, further comprising emitting radiation from a light or heat source mounted to the hood to accelerate curing of sealing or coating material sprayed in step (c).

10. The method as recited in any of claims 6 to 9, further comprising:

(d) heating the area covered by the hood;

(e) capturing an infrared image of the area covered by the hood during or after heating;

(f) processing the infrared image to detect a presence of moisture on the covered area; and

(g) partially evacuating the second volume of space underneath the hood to remove moisture which is present,

wherein steps (d) through (g) are performed subsequent to step (b) and prior to step (c).