WHAT IS CLAIMED IS:

1. A method for removing a deposit from at least one component of an assembled, on-wing gas turbine engine, the gas turbine engine comprising a core gas turbine engine positioned downstream of a fan section, the core gas turbine engine having an absence of powered rotation during the removal of the deposit, the method comprising:

operably coupling a delivery assembly to an annular inlet of the core gas turbine engine, the delivery assembly being coupled to a control unit and a storage vessel containing a cleaning fluid;

atomizing a portion of the cleaning fluid with the delivery assembly to develop a cleaning mist, the cleaning mist comprising a plurality of atomized droplets;

suspending the atomized droplets of the cleaning mist within an airflow within at least one flow path of the core gas turbine engine, wherein the cleaning mist occupies a cross-sectional area of the at least one flow path to establish a simultaneous cross-sectional contact therein, wherein at least a portion of the atomized droplets remain suspended within the at least one flow path from the annular inlet to an axial position downstream of a high-pressure compressor of the core gas turbine engine;

impacting or precipitating a portion of the cleaning mist onto the at least one component so as to wet at least 80% of an exposed, inlet-facing surface of the at least one component; and

dissolving at least a portion of the deposit on the at least one component.

2. The method of claim 1, wherein the atomized droplets have a median diameter of less than or equal to 50 microns and the cleaning mist has a fluid-to-air mass ratio of at least 0.05 and less than or equal to 5.0 kilograms of cleaning fluid to kilograms of air.

3. The method of claim 1, wherein a thermal state of the core gas turbine engine is less than or equal to 135% of an ambient air temperature, and wherein the axial position downstream of the compressor is an axial position downstream of the on-wing gas turbine engine.

4. The method of claim 1, further comprising:

establishing an elevated delivery temperature of the cleaning mist which increases a vapor content of the cleaning mist within the at least one flow path.

5. The method of claim 1, further comprising:

supplying a surge portion of the cleaning mist to the core gas turbine engine;

operably decoupling the delivery assembly from the annular inlet; and

establishing a soak period during which the cleaning fluid affects the deposit.

6. The method of claim 1, wherein the delivery assembly comprises an array of nozzles, wherein each nozzle of the array of nozzles is configured to develop atomized droplets having a median diameter of less than or equal to 50 microns, the method further comprising:

actuating at least one nozzle of the array of nozzles to establish a cleaning mist volume, wherein the cleaning mist volume comprises a concentration of atomized droplets within a specified portion of the at least one flow path, the cleaning mist volume being characterized by a fluid-to-air mass ratio of at least 0.05 and less than or equal to 5.0 kilograms of cleaning fluid to kilograms of air.

7. The method of claim 6, further comprising:

obtaining environmental data, the environmental data comprising an ambient temperature, an ambient pressure, and an ambient humidity affecting the on-wing gas turbine engine;

obtaining data indicative of a thermal state of the core gas turbine engine; and

based on the environmental data and the data indicative of the thermal state of the core gas turbine engine, establishing the cleaning mist volume delivered to the annular inlet, wherein establishing the cleaning mist volume further comprises establishing a cleaning mist flow rate within the at least one flow path.

8. The method of claim 7, wherein the environmental data further comprises data indicative of at least one of a type of suspended atmospheric particulate, an atmospheric particulate concentration, and an atmospheric particulate size for an operating environment of the on-wing gas turbine engine.

9. The method of claim 7, wherein further comprising:

monitoring an absolute humidity level at a point-of-departure from the on-wing gas turbine engine;

utilizing the monitored absolute humidity level to determine a percentage of the delivered cleaning mist remaining suspended at the point-of-departure from the on-wing gas turbine engine; and

adjusting the cleaning mist volume delivered to the annular inlet based on the determined percentage so as to achieve a desired level of wetting of the at least one component.

10. The method of claim 9, further comprising:

determining a first volume of cleaning fluid atomized and delivered as the cleaning mist to the annular inlet;

determining a second volume of cleaning fluid suspended at the point-of-departure from the on-wing gas turbine engine based on the monitored humidity level;

computing the portion of the first volume of cleaning fluid precipitated onto the at least one component based on a difference between the first and second volumes; and

adjusting the cleaning mist volume delivered to the annular inlet so that the second volume is less than or equal to 35% of the first volume.

11. The method of claim 1, wherein the delivery assembly comprises an array of nozzles, and wherein operably coupling the delivery assembly to the annular inlet further comprises:

positioning the array of nozzles within the fan section so that an outlet of each nozzle of the array of nozzles is arranged at an axial location between the fan section and the annular inlet of the core gas turbine engine; and

circumscribing the array of nozzles with at least one blocking element, wherein the at least one blocking element at least partially occludes an alternative flow path.

12. The method of claim 1, further comprising:

establishing a negative pressure differential between the annular inlet and a point-of-departure from the on-wing gas turbine engine, wherein the negative pressure differential draws a portion of the cleaning mist through the core gas turbine engine.

13. The method of claim 1, wherein operably coupling the delivery assembly to the annular inlet of the core gas turbine engine further comprises operably coupling the delivery assembly to the annular inlet of the core gas turbine engine of an aircraft parked at a gate of an airport.

14. The method of claim 1, wherein removing the deposit from at least one component of the on-wing gas turbine engine is repeated at least once every 30 days.

15. The method of claim 1, further comprising:

establishing a cleaning cycle, wherein the cleaning cycle has a duration of 30 minutes or less; and

operably decoupling the delivery assembly from the annular inlet by a conclusion of the cleaning cycle.

16. The method of claim 1, wherein atomizing a portion of the cleaning fluid comprises atomizing less than 120 liters of cleaning fluid.

17. The method of claim 1, further comprising:

a heating element positioned in thermal contact with the cleaning mist so as to establish an elevated delivery temperature of the cleaning mist which increases a vapor content of the cleaning mist.

18. The method of claim 1, further comprising

a humidity sensor positioned at a point-of-departure from the gas turbine engine and communicatively coupled to the control unit, wherein the humidity sensor monitors a humidity level at the point-of-departure from the gas turbine engine, wherein the control unit utilizes the monitored humidity level to determine a percentage of the delivered cleaning mist remaining suspended at the point-of-departure from the on-wing gas turbine engine, and wherein the control unit adjusts a cleaning mist volume delivered to the annular inlet based on the determined percentage so as to achieve a desired level of wetting of the at least one component, wherein the atomized droplets have a median diameter of less than or equal to 50 microns and the cleaning mist volume is characterized by a fluid-to-air mass ratio of at least 0.05 and less than or equal to 5.0 kilograms of the cleaning fluid to kilograms of air.

19. A method for removing a deposit from at least one component of an assembled, on-wing gas turbine engine, the gas turbine engine comprising a core gas turbine engine

positioned downstream of a fan section, the core gas turbine engine having an absence of powered rotation during the removal of the deposit, the method comprising:

operably coupling a delivery assembly to an annular inlet of the core gas turbine engine, the delivery assembly being coupled to a control unit and a storage vessel containing a cleaning fluid;

atomizing a portion of the cleaning fluid with the delivery assembly to develop a cleaning mist, the cleaning mist comprising a plurality of atomized droplets;

suspending the atomized droplets of the cleaning mist within an airflow within at least one flow path of the core gas turbine engine, wherein the cleaning mist occupies a cross-sectional area of the at least one flow path to establish a simultaneous cross-sectional contact therein, wherein at least a portion of the atomized droplets remain suspended within the at least one flow path from the annular inlet to an axial position downstream of a high-pressure compressor of the core gas turbine engine;

impacting or precipitating a portion of the cleaning mist onto the at least one component so as to wet at least 80% of an exposed, inlet-facing surface of the at least one component; and

debonding at least a portion of the deposit on the at least one component.