CLAIMS

1. A system for inspecting an aircraft window installed on an aircraft, the aircraft defining an interior and an exterior, and the aircraft window defining an interior surface and an exterior surface, the system comprising:

a. an interior subsystem operable in the aircraft interior, the interior subsystem including a light source and an interior polarizer, the light source and interior polarizer operable to direct light at the interior surface of the window with the light polarized at a first angle;

b. an exterior subsystem operable adjacent the aircraft exterior, the exterior subsystem including an exterior polarizer, the exterior polarizer operable for polarizing light from the exterior surface of the window at a second angle;

wherein the polarizer of the exterior subsystem is operable in a nominal position in which the second angle is rotated relative to the first angle and further wherein the light source produces light that shines through the exterior surface of the window and to produce an image at the exterior polarizer.

2. The system of claim 1, wherein the exterior subsystem further includes a camera directed at the exterior polarizer.

3. The system of claim 1, wherein the exterior subsystem further includes a vacuum hood encompassing the exterior polarizer.

4. The system of claim 3, wherein the vacuum hood is operable to produce a pressure differential between a pressure in the aircraft interior and a pressure at the exterior surface of the window wherein the pressure in the aircraft interior is at least about 6.895 kPa (one pound per square inch (PSI)) greater than the pressure at the exterior surface of the window.

5. The system of claim 3, wherein the vacuum hood is operable to produce a pressure differential between a pressure in the aircraft interior and a pressure at the exterior surface of the window wherein the pressure in the aircraft interior is no more than about 13.790 kPa (two PSI) greater than the pressure at the exterior surface of the window.

6. The system of claim 1, further wherein the interior and exterior subsystems are operable while the aircraft interior is pressurized to at least about 6.895 kPa (one PSI) greater than the aircraft exterior.

7. The system of claim 1, wherein the exterior subsystem includes a measurement tool between the exterior surface of the window and the exterior polarizer, the measurement tool operable to measure the intensity of light shining through the exterior surface of the window.

8. The system of claim 1 for use with the aircraft window wherein the window defines a main stress axis, and further wherein the interior polarizer is operable to polarize light at about 45-degrees relative to the main stress axis.

9. The system of claim 1, wherein at least one of the interior polarizer and the exterior polarizer are rotatable about an axis perpendicular to the surfaces of the window to change at least one of the first and second angles of polarization of light.

10. A system for inspecting an aircraft window installed on an aircraft, the aircraft defining an interior and an exterior, and the aircraft window defining an interior surface and an exterior surface substantially parallel to the interior surface, the system comprising:

a. an interior subsystem operable in the aircraft interior, the interior subsystem including a light source and an interior polarizer, the light source and interior polarizer operable to direct polarized light at the interior surface of the window to shine through the exterior surface of the window, the interior polarizer further operable to polarize light at a first angle;

b. an exterior subsystem operable adjacent the aircraft exterior, the exterior subsystem including an exterior polarizer and a camera, the exterior polarizer operable for polarizing light from the exterior surface of the window at a second angle, and wherein the camera is directed at the exterior polarizer and receives an image produced by the polarized light passing through the exterior polarizer;

wherein the polarizer of the exterior subsystem is operable in a nominal position in which the second angle is rotated about 90-degrees relative to the first angle.

11. The system of claim 10 further comprising an analysis subsystem coupled to the camera, the analysis subsystem operable to receive and to analyze the image from the camera of light passing through the exterior polarizer.

12. The system of claim 10, wherein the exterior subsystem further includes a vacuum hood encompassing the exterior polarizer and the camera, the vacuum hood operable to produce a pressure differential between a pressure in the aircraft interior and a pressure at the exterior surface of the window wherein the pressure in the aircraft interior is greater than the pressure at the exterior surface of the window.

13. The system of claim 10, wherein the exterior subsystem includes a measurement tool between the exterior surface of the window and the exterior polarizer, the measurement tool operable to measure the intensity of light shining through the exterior surface of the window.

14. The system of claim 10, wherein at least one of the interior polarizer and the exterior polarizer are rotatable about an axis perpendicular to the surfaces of the window to change at least one of the first and second angles of polarization of light.

15. A method for inspecting an aircraft window installed on an aircraft, the aircraft defining an interior and an exterior, and the aircraft window defining an interior surface and an exterior surface, the method comprising the steps of:

a. providing in the aircraft interior a source of light polarized at a first angle and directed at the interior surface of the aircraft window;

b. providing exterior to the aircraft an exterior polarizer, the exterior polarizer positioned adjacent the exterior surface of the window and operable for polarizing light from the exterior surface of the window at a second angle;

c. positioning the polarized light source and the exterior polarizer relative to one another so that the second angle is rotated about 90-degrees relative to the first angle;

d. directing the polarized light source at the interior surface of the window to shine through the exterior surface of the window and to produce an image of the window at the exterior polarizer;

e. analyzing the image of the window to detect any anomalies in the window.

16. The method of claim 15 further comprising a step of creating a pressure differential between a pressure in the interior of the aircraft and a pressure at the exterior surface of the window, wherein the pressure in the aircraft interior is greater than the pressure at the exterior surface of the window by at least about 6.895 kPa (one pound per square inch (PSI)).

17. The method of claim 16 wherein the step of creating a pressure differential includes varying the pressure differential repeatedly and wherein the step of analyzing the image includes analyzing changes in the image during the varying of the pressure differential.

18. The method of claim 15 further comprising steps of providing a camera adjacent to the exterior polarizer; directing the camera at the image at the exterior polarizer; and recording the image with the camera, and wherein the step of analyzing the image includes analyzing the image as recorded by the camera.

19. The method of claim 15 further comprising a step of developing a pre-determined threshold for the window and wherein the step of analyzing the image includes comparing the image to the pre-determined threshold for the window.

20. The method of claim 15 further wherein the exterior polarizer is polarized glasses and wherein the step of analyzing the image includes a person looking at the image through the polarized glasses.