What is claimed is:

1. An inspection system comprising:

at least one light source that illuminates a contoured surface of a part being inspected; and

a surface profile compensator for the light source,

wherein the surface profile compensator causes light emitted from the at least one light source to be distributed over an inspection area of the contoured surface according to a target light distribution.

2. The inspection system of claim 1 wherein the surface profile compensator comprises a support structure to which the light source is coupled, wherein the support structure is physically configured to complement contours of the contoured surface to distribute the light over the inspection area according to the target light distribution.

3. The inspection system of claim 2 wherein the support structure includes a first support, a second support, and a bridge, wherein the bridge includes the light source and an optical path slot for a camera to view the inspection area through the support structure, is pivotably coupled to the first support, and is removably coupled to the second support to span over the inspection area.

4. The inspection system of claim 2 further comprising one or more actuators that actively deform the support structure to complement the contours of the contoured surface.

5. The inspection system of claim 4 further comprising one or more distance sensors associated with each of the one or more actuators, wherein each of the one or more distance sensors measure a respective current distance to the contoured surface, and wherein a controller directs each of the one or more actuators to deform the support structure such that the respective current distance as measured by each of the one or more distance sensors are within a predetermined range of each other.

6. The inspection system of claim 4 further comprising a controller that receives user input identifying a shape of the contoured surface and that, responsive to the user input,

directs the one or more actuators to deform the support structure to complement the shape of the contoured surface based on the user input.

7. The inspection system of claim 4 further comprising:

a camera that captures images of the contoured surface; and

a processor that receives the images, parses the images to identify regions of the inspection area where the light is distributed contrary to the target light distribution, and directs ones of the one or more actuators associated with the regions to deform the support structure to correct light distribution in the identified regions to conform to the target light distribution.

8. The inspection system of claim 2 wherein the support structure is formed from a pliable material that conforms in part to a shape of the contoured surface when the support structure contacts the contoured surface.

9. The inspection system of claim 1 further comprising a controller electrically coupled to the light source,

wherein the controller acts as the surface profile compensator by adjusting an intensity of the light source at different locations to distribute the light over the inspection area according to the target light distribution.

10. The inspection system of claim 9 further comprising one or more distance sensors associated with different lighting elements of the light source, wherein each of the one or more distance sensors measures a respective current distance to the contoured surface, and wherein the controller adjusts the intensity of the light source by modifying respective light output from the different lighting elements based on the respective current distance as measured by each of the one or more distance sensors.

11. The inspection system of claim 9 wherein the controller receives user input identifying a shape of the contoured surface and that, responsive to the user input, adjusts the intensity of the light source at the different locations based on the user input.

12. The inspection system of claim 9 further comprising a camera that captures images of the contoured surface, wherein the controller receives the images, parses the images to identify regions of the inspection area where the light is distributed contrary to the target light distribution, and adjusts the intensity of the light source at the different locations to correct light distribution in the identified regions to conform to the target light distribution.

13. A method of illuminating an inspection area of a part being inspected, the method comprising:

determining a contoured shape of the inspection area; and

adjusting, via a surface profile compensator, light emitted from a light source to be distributed over the inspection area based on the contoured shape and a target light distribution.

14. The method of claim 13 wherein the surface profile compensator includes a support structure for the light source that physically deforms to complement the contoured shape of the inspection area.

15. The method of claim 13 wherein the surface profile compensator includes a controller that alters an amount of light output by different lighting elements of the light source at different locations to distribute the light over the inspection area based on the determination of the contoured shape.