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Optical Strain Indicators[1] JONATHAN HEATH, Francis Marion University, DAKOTAH ANDERSON, JEFFREY ANKER, Clemson University — Remote non-destructive methods to measure strain are need for many NASA projects e.g. for astronauts to check on exterior equipment without having to be exposed to space, ground observatories to monitor tension of bolts miles away in the sky, and scientists to monitor how effective an airbag would stand against full impact of 200lb individual. We designed prototype optical strain indicators to accurately measure the strain of various objects and materials through nondestructive measures. These indicators may be used to label structural components, such as bolts, so that improper strain can be seen by the eye or camera. Strain gauges with alternating bands of red and blue were created that appeared to change color when a "window pattern" with transparent and opaque regions was displaced relative to the colored bands below. The strain gauges were attached to various objects/materials as they moved, stretched, or bent. The fabricated optical strain gauges were found to be quite versatile for many applications. Future work includes minimalizing the alternating color lines printed on the indicators, constructing and testing a screw design, and pursuing additional tests that involve expansion and bending.

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