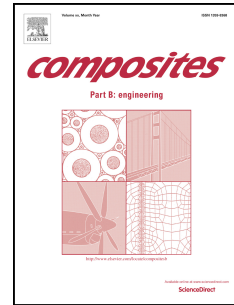


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# The Shot Peen Forming of Fiber Metal Laminates based on the Aluminum-lithium Alloy: Deformation Characteristics

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**Abstract:** The deformation behavior of novel fiber metal laminates based on aluminum-lithium alloy (NFMLs) after shot peen forming was investigated to further reveal their deformation mechanism and seek a desired forming method. AZB425 ceramic balls were used to sharp the NFMLs strips with various shot peening intensity and coverage. Furthermore, arc height of the laminates was measured to describe the deformation behavior. The X-ray and layer removal methods were adopted to reveal the distribution characteristics of residual stress. The results indicated that the forming curvature of 165.24 mm was achieved for 3/2 cross-ply NFMLs. Plastic deformation was produced only in the shot peened metal layer, while elastic deformation in other fiber and metal layers. Comparing with metal materials, NFMLs possessed similar deformation rules following the variation of shot peening intensity and coverage. However, the laminates were inclined to deform perpendicular to fiber direction. Besides, shot peening significantly changed the residual stress state of NFMLs. The distribution of residual stress for shot peened NFMLs was obtained qualitatively in this study. The relaxation behavior of complicated residual stress was negligible even after 1000 times thermal impact from 100°C to 0°C.

**Keywords:** Fiber metal laminates; Aluminum-lithium alloy; Shot peen forming; Deformation behavior; Failure behavior; Residual stress

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