Creep of Ribbons in Honeycomb

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Abstract: Honeycomb cores are a low-density man-made cellular material often used in the aerospace industry to make lightweight, stiff sandwich structures. Although core is manufactured in the form of flat sheets, the numerous walls composing its repeating pattern of hexagonal cells possess creep properties which allow it to be permanently shaped under heat into a desired three-dimensional geometry. The objective of this research is to experimentally determine the creep properties of cell walls, which influence the bending capacity of the core. Single-layer cell walls prebaked at 450°F for ten minutes were allowed to cool before being raised to a temperature ranging from 100°F to 425°F. After reaching this temperature, they were forcibly conformed to known radii between 0.125in and 0.75in and held in this state for five minutes. They were then removed from the oven and allowed to relax. The radius of curvature retained by each specimen was measured using a digital microscope. The results of these experiments point to a linear relationship between the amount of creep deformation experienced by the cell walls and the temperature at which forming takes place. This data will be critical to the development and calibration of numerical models used to simulate the formation of large core blocks.

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