

INFLUENCE OF THERMAL CYCLING ON
WELDMENTS OF NON-FERROUS METAL
I. ALUMINIUM ALLOY 6061 (*)

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With a view to investigate the effect of thermal cycling, usually encountered by scientific earth satellites exposed once to the sunlit side, and subsequently to very low temperature in the dark side, the study on weldments subjected to similar thermal cycling has been undertaken.

EXPERIMENTAL PROCEDURE:

The material under investigation was 6061 Aluminium alloy (Cu 0.15-0.4, Si 0.4-0.8, Mn 0.3-0.9, Mg 0.8-1.2) which was heat treated to T6 condition after arc-welding under argon atmosphere. The thermal cycling was effected under thermal amplitude ($\Delta T = 110^\circ\text{C}$) in air and cycle duration, $t = 1$ hour/cycle.

Tensile and hardness samples were prepared, and data on tensile strength (σ) and elongation (e) as well as Brinell Hardness Number (H) were obtained.

RESULTS:

At $N = 1$, σ decreases to about 18% while e and H increase to 25% and 13% respectively. By subsequent cycling $N = 2$, σ , e and H decrease simultaneously, while by $N = 5$ both σ and e reach a minimum and H tends to increase. By repeated cycling upto $N = 40$ all the three parameters show appreciable tendency to increase.

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DISCUSSION OF RESULTS:

Compared with similarly thermally cycled non-welded material, the variation in the mechanical properties of the welded specimens like σ , e and H may be explained in terms of the typical precipitation hardening phenomena in the background of welding effects as observed by metallographic studies.

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