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MmeCa33-002 - INVESTIGATION OF THE ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF HORIZONTALLY SOLIDIFIED 6201 ALLOY SUBJECTED TO T8 HEAT TREATMENT

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Introduction

Among aluminum alloys, the 6xxx series [Al-Mg-Si] are widely used in electric power transmission and distribution (Tx and Dx). Their main advantage over the 1xxx series alloys, especially AA-1350, is the significant improvement in mechanical properties.

This allows the installation of conductors without a steel core in transmission and distribution lines. Alloys of the 6xxx series also have the advantage of being heat-treatable, which significantly improves their hardness.

Objective

The goal of the work was to analyze the effects of T8 heat treatment on the electrical properties of the AA-6201 alloy.

Methodology

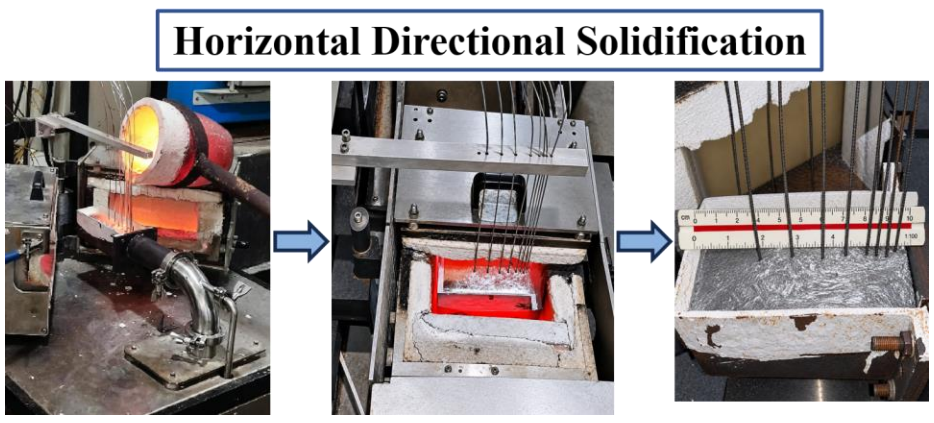


Figure 1. alloy leak in the horizontal ingot mold

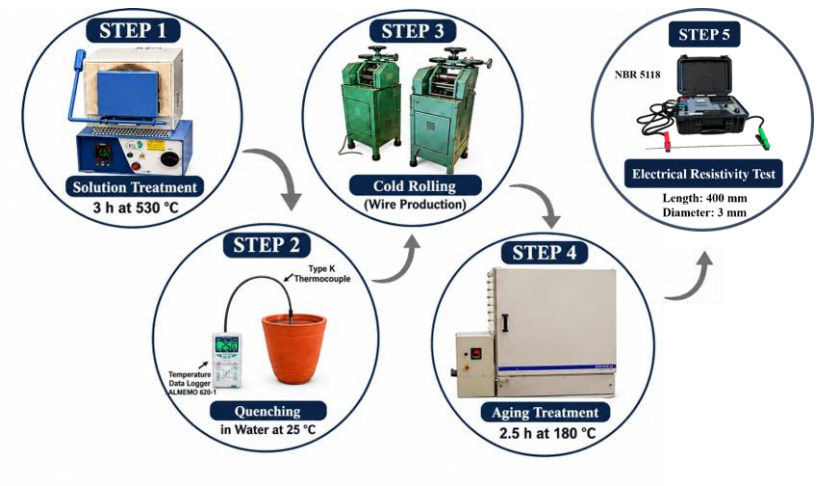


Figure 2. Flowchart of the steps up to electrical characterization

Results and Discussion

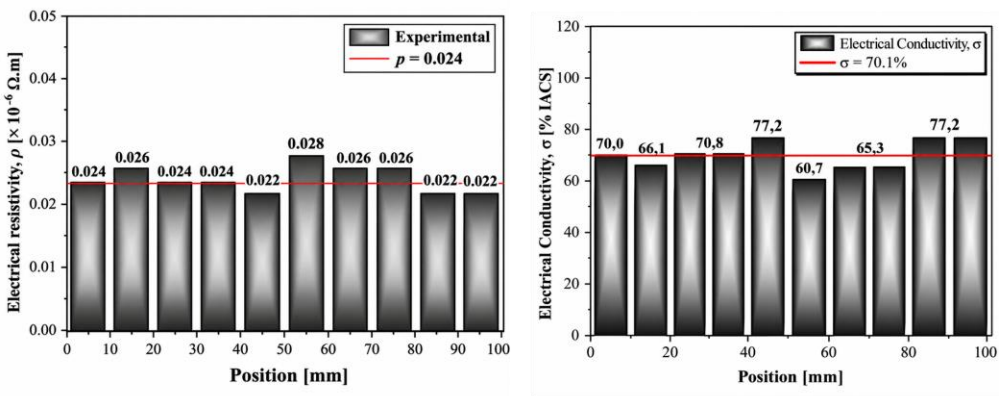


Figure 3. Resistivity vs Conductivity as a function of the ingot position

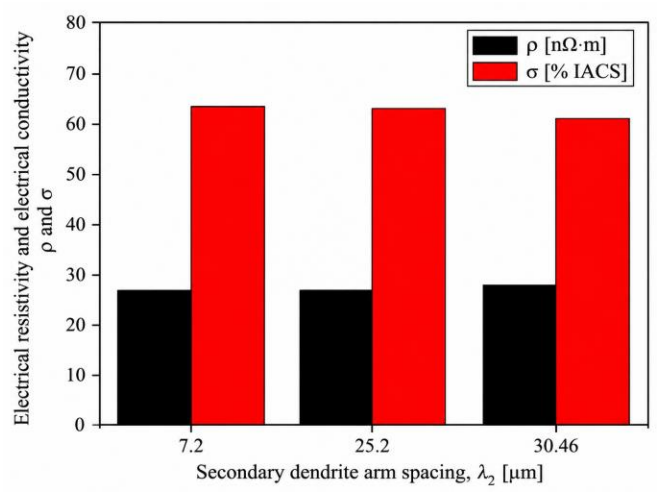


Figure 4. Electrical properties after T8

Electrical resistivity remained approximately between 27 and 28 nΩ·m, corresponding to conductivity values of about 61–64% IACS.

Only limited variations were observed along the analyzed positions. Despite differences in secondary dendrite arm spacing, no pronounced trend in electrical properties was identified under the investigated conditions.

Conclusion

The T8 heat treatment proved to be effective in producing conductive wires with relatively uniform electrical properties, regardless of the variations in secondary dendrite spacing observed across the analyzed positions. Electrical resistivity values stayed around 27–28 nΩ·m, while electrical conductivity showed values roughly between 61 and 64% IACS.

References

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