

ABSTRACT

Production of Iron-Aluminum alloys by electroslag melting

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Bachelor's thesis – 81 pages, 32 figures, 12 tables, 33 references.

Object of research: iron-aluminum alloys produced by electroslag remelting.

Subject of research: influence of electroslag remelting parameters on the structure and properties of iron-aluminum alloys.

Aim of the work: to investigate the feasibility of producing Fe-Al alloys by electroslag remelting and to determine the optimal technological parameters to ensure high-performance properties.

Research methods: metallographic analysis, microstructure examination, phase diagram analysis, material property testing, experimental electroslag melting, statistical data processing.

Research results: it was found that electroslag remelting enables the efficient production of iron-aluminum alloys with a high degree of purity, uniform structure, and reduced content of non-metallic inclusions. The influence of remelting parameters on the microstructure and properties of the alloys was studied. The obtained results confirm the viability of ESR technology for the production of heat-resistant, corrosion-resistant, and high-strength Fe-Al based materials.

Implementation level: laboratory experiments with recommendations for industrial application.

Application field: mechanical engineering, power engineering, aerospace industry, protective coatings for components operating under extreme conditions.

Prospective directions for further research: optimization of ESR parameters for large-scale production of Fe-Al alloys with improved plasticity and structural stability; development of new slag compositions and energy-saving refining techniques to improve alloy quality.

KEYWORDS: ELECTROSLAG REMELTING, SLAG COMPOSITION, STEEL STRUCTURE, MECHANICAL PROPERTIES, NON-METALLIC INCLUSIONS.