



Third Laureate Applied Research

Project Title: Technology of amorphous magnetic Co-based alloys
by rapid solidification method

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Abstract:

Amorphous magnetic alloys which have outstanding properties including high permeability and very low coercivity have found extensive applications in transformer cores, electromagnetic article surveillance systems, magnetic shields and filters, as well as force, impact and rotational velocity sensors. These alloys are produced by Chill Block Melt Spinning/Planar Flow Casting technologies. In these methods, molten metal transforms directly into 20-30_{mm} thin ribbons/strips with a cooling rate of 10⁵-10⁶ °C/s and as a result, their atomic structure becomes amorphous which is a unique characteristic in soft magnets.

In this research, Cobalt-, iron- and nickel-based amorphous magnetic ribbons were produced by a protective gas/vacuum melt spinner designed and manufactured in Sharif branch of Jahad Daneshgahi. Upon performing characterization tests and measuring the magnetic properties of the ribbons produced in optimum conditions, their performance was evaluated in practical conditions for electromagnetic article surveillance applications. The results were then compared with ANSI standard specifications and confirmed by the employer.