AN INVESTIGATION ON TEXTURE-PROPERTY CORRELATION IN COLD-ROLLED NON-ORIENTED SILICON STEELS

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Bachelor of Technology

in

METALLURGICAL AND MATERIALS ENGINEERING

by

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CERTIFICATE

This is to certify that the thesis entitled, " **An Investigation on Texture-Property Correlation in Cold Rolled Non-Oriented Silicon Steels"** submitted by **Dibyaranjan Prusty (108MM007)**, **Hitaindra Kumar Pradhan** (**108MM041**) in partial fulfillment of the requirements for the award of **Bachelor of Technology Degree** in **Metallurgical and Materials Engineering** at National Institute of Technology, Rourkela is an authentic work carried out by them under my supervision and guidance.

To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/Institute for the award of any Degree or Diploma.

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Abstract

Soft magnetic materials like cold rolled non-oriented (CRNO) steels are used in electrical appliances like motors, generators small transformer cores due to its superior magnetic permeability and low watt loss and less magnetic anisotropy signifying uniform magnetic properties in all directions. The application of CRNO steels demands uniform property in all angular directions. Keeping this in mind the objective of the present study is to find out the textural and property change in all angular directions of CRNO steel sheets and correlate texture-property. CRNO steel sheets of different silicon percentages (1.4%, 1.52%, 1.88%, and 2%) were observed in the present study. Four different sets of samples were made from the CRNO sheets: (1) samples along rolling direction, (2) samples at 30° to the rolling direction, (3) samples at 60° to the rolling direction and (4) samples at 90° to the rolling direction. Then the textural, electrical and magnetic properties were investigated using standard techniques. X-ray diffraction (XRD) and electron backscattered diffraction (EBSD) were used for bulk- and micro-texture measurements respectively. While four-probe method was used for electrical resistivity and pulse field hysteresis loop tracer was used for magnetic property measurements. The results showed different texture and magnetic properties in all the CRNO samples.

Keywords: CRNO steel, Silicon Steel, Electrical Steel, Texture, Magnetic Permeability, Watt Loss.

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