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# Magnetic property evaluation in electrical steel at ANTARES

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Rotors and stators made from electrical steel are core elements of electric machines. Typically, these are built up of thin shear cut lamellae. However, due to the cutting process, residual stress is introduced into the lamellae and it was found that this detrimentally alters the magnetic properties of the material. The magnetic properties of electrical steels are related to their domain structure and residual stress hinders domain growth in electric fields. With the help of Neutron-Grating-Interferometry (NGI) and a magnetizing yoke, the domain wall density in the cutting affected area of shear cut samples can be evaluated at different field strengths. Generally, a high domain wall density indicates poor magnetic properties. This approach allows to compare different cutting strategies with regard to resulting magnetic properties. More than that, Neutron-Grating-Interferometry allows to determine a gradient of magnetic property deterioration from the cutting edge to the inner regions of the sample. The results of the NGI-measurements are in good accordance with FEA calculations and contribute continuously to their improvement. In this research project, different cutting clearances, materials, and tool geometries are investigated at the cold neutron radiography and tomography station (ANTARES) of MLZ with the aim of finding production strategies for loss-optimized electric machines.

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