

Increasing efficiency of electric motors by using different casting approaches

Georg Fuchs, Constantin Bauer

Project description

This project aims to save energy by optimising the casting of the rotor components of electric motors. A profound understanding of the influence casting technology has on the resulting electromagnetic characteristics of the rotor of an asynchronous motor can increase the efficiency of electric drives. This leads to a significant contribution to environmental protection by conserving fossil resources and reducing climate-damaging CO₂-emissions. Finally, a suitable primary forming manufacturing process for the production of asynchronous rotors is defined and the influence of the casting process on the resulting magnetic properties is quantified. Squeeze casting, low-pressure casting and gravity die casting with or without tilt casting are considered as potential casting processes. The implementation of a criterion function in the casting process simulation should enable the simulation

to predict magnetic properties of the rotor with sufficient accuracy, which should drastically reduce the experimental development effort for asynchronous motors in the future. The rotors being manufactured by casting are experimentally examined with regard to their magnetic properties as well as their torque behaviour and power consumption. The analysis of cause-and-effect chains in the manufacturing process of cast asynchronous rotors will be used to pursue the overriding goal of optimizing efficiency and thus reducing environmental pollution.

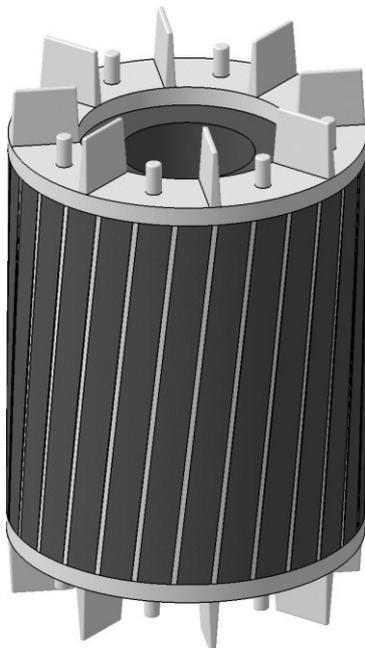


Image 1: Rotor of an asynchronous motor;
grey: squirrel cage, black: electrical sheets

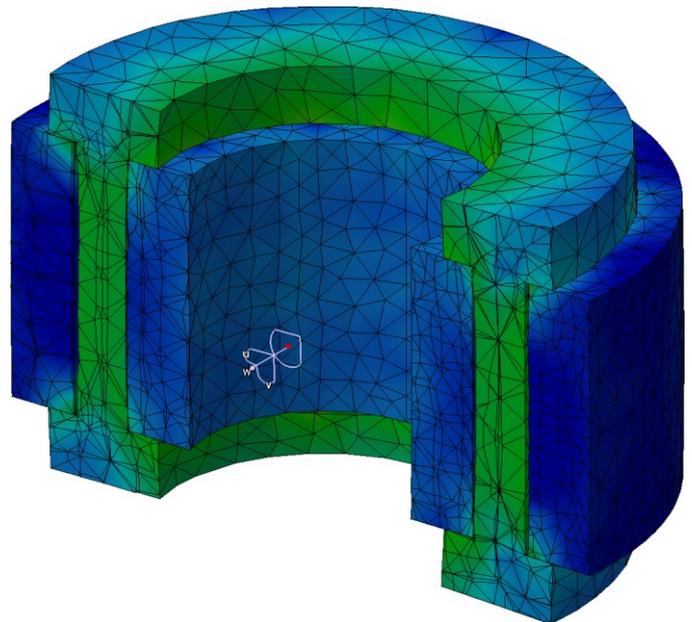


Image 2: FEM-simulation of the stress state in the squirrel cage rotor and the electrical sheets after casting