

The Comparative Analysis of the Performances of the Synchronous Generator Air Gap Magnetic Induction as Main Variable

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Abstract— In this paper the authors aim to make a comparative analysis of performance for the same synchronous generator, resulting from the calculations of classical designing and the calculations of optimal designing. The analysis is done for different values of the air gap magnetic induction, B_{δ} , within the range indicated in the design manuals. Both of designing methods using the MathCad software. The optimal designing is done using a program written by authors and pursues the objective function for the 200 independent variable values, in the range $0.6 \div 0.9$ T (tesla) [1]. This paper aims to restrain the range indicated for the air gap magnetic induction variation. The imposed objective function is the minimum cost of the synchronous generator, presenting the values that help obtaining this function. In this sense it was analyzed the influence of air gap magnetic induction variation on the outer dimensions, of the active material mass and the total mass, the active material losses and the total losses. The end of the paper analyzes the variation efficiency and the manufacturing costs, C_f , operating cost, C_e , and total cost, C_t , according to the same independent variable. A performance comparison is made between the two generators with the same power, designed with the same programs, but with different speed (300 rpm. and 1000 rpm).