Aspects Regarding Design of Squirrel Cage Asynchronous Motors for Mining Excavators

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Abstract—This paper aims at emphasizing the importance of the electromagnetic stresses and constructive dimensions in the starting characteristics optimization in case of high power squirrel cage asynchronous motors used for surface mining excavators. Since the motor drives a high capacity excavator, the inertia moment is high and a significant increase of the starting period results. Several significant simulations are presented in this paper; they bring information which is necessary for determining the final optimum constructive solution, where a very low starting current is considered, so that the motor is able to cope with it, during the starting period. The restrictive gauge conditions imposed by the place where the motor is assembled are also considered when the optimum constructive solution is established. The optimization study has been made by the customer's criterion – minimum starting current – by using twelve variables: current loading, air-gap magnetic induction, stator and rotor winding current densities, stator and rotor yoke magnetic induction, machine diameter, air-gap, shape factors for the stator and rotor slots, rotor slot isthmus dimensions. The optimized motor has a starting current $I_p=2{,}85*I_N$ (lower by 12,2% in comparison with the limit value imposed by customer) and the total cost (of fabrication and exploitation) is lower by 3,5 % in comparison with the real existing motor of the excavator.