

THE EFFECTS OF THE POWER SUPPLY AND THE INDUCTION MACHINE SIZES ON THE ENERGY EFFICIENCY

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Abstract

In industry of every country a pivotal role is played by induction machine and there is a strong demand for their reliable and safe operation. The three – phase induction machine is a very robust and reliable machine that finds the industrial application within a wide of electrical drive. The increased use of power electronics to supply the induction machine, extend this range more and more into the field of sometimes highly dynamical – adjustable speed drives. So, the energy consumption from asynchronous motors is around 70 % of the total energy consumption at the developed countries. Therefore it is very important that the induction machine to operate with high efficiencies. In order to provide a high efficiency of induction machine during operation firstly, the power supply which fed him must be perfectly balanced and secondly for the purpose loaded must be selected the proper induction machine sizes. But sometimes the induction machine cannot be done under conditions of perfectly balanced supply voltage operated. This asymmetry induces negative-sequence current which in its turn produces a backward rotating field in addition to the forward rotating field produced by the positive sequence one. The interaction of these fields produces pulsating electromagnetic torque and velocity disturbances resulting in increasing the power losses in the machine and. In this paper, we have study the effects on energy efficiency of the induction machine during operation by selected of sizes of the machine and power supplying. Operated of induction machine under rated load or supplying by asymmetric three phase voltage mode, the power loses increase and the energy efficiency decrease. For this purpose we have experimentation an induction machine at different load at laboratory of the “Electrical Machine”. Also, we have experimentation of the induction machine feed by an asymmetric three voltage phases. The experimental data are measurement by “Fluke 435 Power Quality Analyzer” equipment. The obtained theoretical and experimental results are in very good agreement.

Keywords: *Induction machine, efficiency, asymmetric power supply, energy consumption.*