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SYNCHRONOUS AC MOTOR

The purpose of the work is to analyze the structure and the advantages of using synchronous motors in energy-intensive enterprises.

The synchronous AC motor consists of stator with three phase winding and multipolar rotor. A magnetic core which is assembled from stamped plates of electrical steel is pressed into the stator, a three-phase winding is laid in the slots of the magnetic core, the axes of which are shifted in space at an angle of 120 degrees. Its armature winding (stator) is connected to a three-phase alternating current source, and a direct current from an external source is fed into the field winding (rotor). Due to the interaction of the rotating magnetic field created by the three-phase winding of the armature, and the field created by the excitation winding, an electromagnetic momentum arises, causing the rotor to rotate.

Starting a synchronous motor directly into the network is impossible, since the rotor, due to its considerable inertia, cannot be immediately attracted to the rotating field of the stator, the rotational speed of which is set instantly. As a result, a stable magnetic coupling between the stator and the rotor does not occur. To start a synchronous motor special methods are used. Asynchronous start-up is usually used, in which the engine is supplied with a special short-circuited starting winding made of a squirrel-cage type. After the acceleration of the rotor to a rotational speed close to synchronous, the direct current passing through the field winding creates a synchronizing moment, which draws the rotor into synchronism.

In a conclusion we can say that most synchronous motors are used where precise constant speed is required. In high-horsepower industrial sizes, the synchronous motor provides two important functions, which are its advantages in comparison with asynchronous induction motor. First, it is a highly efficient means of converting AC energy to work. Second, it can operate at leading or unity power factor and thereby provide power-factor correction.

As the disadvantage is the initial cost of a synchronous motor. It is more than that of a conventional AC induction motor. These initial costs are often off-set because Synchronous motors have speed / torque characteristics which are ideally suited for direct drive of large horsepower, low-rpm loads such as reciprocating compressors.