

Stanislav Shykhov

A. O. Syomin research supervisor

O. V. Khazova language adviser

State HEI “National Mining University” Dnipro (Ukraine)

Specific features of asynchronous three-phase motor

The modern level of scientific and technological development puts electric motor systems on the leading position among the other ones because they provide persistent and reliable functioning of machines in many manufacturing and technological processes. These motors are used on almost all production stages. Today more than a half of the generated electrical power is consumed by AC induction motors and converted into mechanical energy.

To operate the motor successfully, it is necessary to understand its specific features. This paper presents the structure of an asynchronous three-phase electric drive, its common problems and their solutions.

The principle of induction is the basis of asynchronous motor operation. There are two types of induction motors: squirrel cage induction motors, that are widely used in motor and drive applications, and slip ring induction motors. The basic construction of induction drives has almost not changed for the last fifty years. In general, an asynchronous drive consists of a stator (a stationary part) and a rotor (a rotating part) but a wound rotor type is used in a slip ring motor and a squirrel cage rotor is suitable for a squirrel cage motor.

However, these types of motors have several drawbacks. The first problem of asynchronous drives is their efficiency. Nowadays the asynchronous motor consumes large amount of electric power, so the increase of the driver efficiency will decrease the electric power consumption, and, as a result, decrease the cost. For instance, a modified stator winding arrangement improves the efficiency by 7%.

The next disadvantage is that the three phase induction motors have poor starting torque. There is a common misconception that high locked rotor torque (LRT) will ensure successful starting of the motor and its driven equipment. However, successful starting depends on having adequate torque at a point where the load torque becomes significant and approaches the output capability of the motor.

And last, but not least disadvantage of induction motors is that it is difficult to control the speed of induction motors. The best solution is vector control of frequency-regulated asynchronous motors, which is connected with the change of frequency and current values of asynchronous motor variables.

As the induction motor are widely used due to its simplicity, reliability and low cost, it is quite important to know the disadvantages of AC induction motors and ways how to improve them.