

**APPLICATION OF FOURQUADRANT FREQUENCY CONVERTER TO UPGRADE
PERFORMANCE OF MACHINE ELECTRICAL DRIVES**

Annotation

The automated control systems of electric drives of metal-cutting machines enhance their performance because the processing of metal occurs at the maximum allowable power modes and extends the operation of the cutting tool.

One of the trends of the automated electric drives of metal-cutting machines is the use of controlled AC electric drives for head movement gear using modern frequency converters (FC) with microprocessor control. In particular, TWERD company is developing the option for machine electric drive in the system of PLC (Programmable Logic Controller), which will lead to simplification of the problem-solving related to automation of metal-cutting machines, namely: software for drive control, regulation of metal processing technological parameters. In addition, TWERD company is doing research aimed at reducing FC impact on power supply system.

High coefficient of current distortion as well as unidirectional energy flow, that is, inability to bring energy back into the network in brake modes, are the main disadvantages of modern FC associated with diode rectifiers which the inverters are powered by.

An alternative of power supply of FC metal-cutting machine electric drive is a three-phase rectifier with IGBT with modulated impulse width (MSI "converter") to the DC lines of which inverters for speed control of electric mechanisms of one machine, or, for example, the main motion electric drives of several machines in one process line are connected.

These test results make it possible to conclude that MSI VF – DTC converter is a valuable alternative for the frequency controllers with uncontrolled rectifier (DC link) in machine electric drives and has the following advantages: it provides energy recovery into the network in brake modes, which saves braking time and increases efficiency coefficient, has high degree of protection against errors in the control algorithms, provides good dynamic performance and a low total harmonic distortion (THD).