

# Energy-Efficient Variable-Speed Motors: Problems and Their Solutions

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## *Abstract*

In the presentation, issues of the optimal design of the energy-effective synchronous reluctance motors (SynRM) without permanent magnets and permanent magnet assisted synchronous reluctance motors (PMSynRM) are considered. SynRMs and PMSynRMs are compared to induction motors and synchronous motors with rare-earth magnets. The issues of energy saving are discussed, as well as the IEC standards for the energy-efficiency classes for variable speed drives.

Also, the type of gearless multipole motors with magnets on the stator called flux reversal motors (FRM) is described and compared to synchronous motors (SM) with magnets on the rotor. The FRM principle is explained and the reasons of high efficiency of FRM and its low cost compared to SM are revealed.

Besides, several types of high-speed electric motors are considered and compared to each other.