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Energy saving electric motor drive

***Abstract**: This paper presents results of a simulation study of an internal permanent magnet synchronous reluctance machine for use in electric motorbike. The selected control system components do not use the manufacturer's engine and the maximal torque is available from the start. tential of the machine, however, this will result in a lower engine temperature*

Keywords: electrical machines, electric motorbike, permanent magnet synchronous reluctance machine

Energy saving electric motor drive system components

The goal of the described project was to achieve a similar maximum power as the factory version of the motorcycle while taking into account the achievement of high efficiency of the drivetrain. For this purpose, an Internal Permanent Magnets Synchronous Reluctance Machine (IPMSynRM) with permanent magnets inside the rotor was designed. In addition, the entire motor is housed in a dedicated cooling body.
The control system is built with commercial power electronic components, including a Sevcon Gen4 S6 72-80V 550A SIN/COS UVW-ACI motor controller, an NMC 24S 84V 300A BMS power management module, a Raspberry Pi 5 4GB microcomputer, an LCD display, and 24S18P battery packs built with SAMSUNG INR18650-30Q 3.6V 3000 mAh battery cells. All of the Li-Ion batteries will be placed in the fuel tank. The assumptions of the batteries packages are: batteries topology: 24S18P, nominal voltage: 86,4 V, maximal package voltage: 100,8 V, total capacity of the battery bank: 52,2 Ah, continuous current: 270 A, nominal package power: 4,5 kWh.

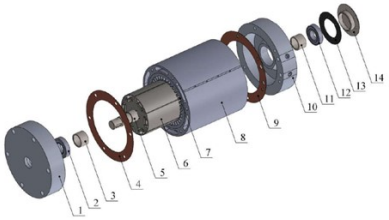

Fig.1. IPMSynRM electrical machine made in Solidworks. 1. front hub. 2. bearing. 3. centering ring. 4. shaft. 5. seal. 6. rotor. 7. stator. 8. cooling body. 9. gasket. 10. centering ring. 11. bearing. 12. rear hub. 13. gasket. 14. pressure pad.

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