

## REFLECTION OF MODERN RAILWAY IN EDUCATION AND RESEARCH AT THE FME CTU

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**ABSTRACT** The paper in the introductory part points out the fact, that for the successful operation of modern railway transport it will be appropriate to increase the number of graduates of vocational secondary schools and universities dealing with the design and operation of rail vehicles. Based on the analysis of the expected modernization and electrification of railway lines in the Czech Republic, it draws attention to the possibilities of using battery-trolley rail vehicles, or the possible use of the Energy-Tender by 2nd and 3rd generation electric locomotives for traffic on non electrified regional railway lines in the Czech Republic.

The article documents that in order to solve the problem of minimizing traction energy consumption when driving rail vehicles and electric units on a real track, it is appropriate to know the efficiency maps of the partial drive components (traction transformer, traction converter, traction motor – ASM or PMSM, gearbox) when designing traction and auxiliary drives of rail vehicles. Given the increasing prices of input energy and the requirement to reduce CO<sub>2</sub> emissions from transport, the article presents a proposal for improving the efficiency of the traction drive of wheelsets in BEMU units for regional transport using two-stage axle gearboxes.

The main directions of vocational education and research in the field of development of new rail vehicles must be focused on expanding the abilities of graduates to be able to analyse in more detail, based on simulations of the digital twin of a train on a real track, the design properties of new rail vehicles and units, solutions for the transmission of traction energy and the arrangement of the traction drive of vehicles with regard to reducing vehicle weight, electrical energy consumption and other requirements of life cycle cost analysis (LCC).

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