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Competitive steam locomotive is not a mere utopia

Title of the dissertation  UTOPIA OR OPPORTUNITY? Predicted performance of 21st Century Steam Locomotives

Contents of the dissertation  The aim of the study has been configuring a biofuel burning steam locomotive with energy efficiency and operating properties comparable with those of diesel-electric locomotives. A piston steam engine has been considered as the prime mover. A virtual pattern locomotive has been designed, assessing of its properties being based on calculational methods. The superstructure of the locomotive deviates from the traditional one and includes several innovations. These are based on proven technology at least on the component level. Pyrolysis oil made of forest residue has been selected for fuel as the carbon dioxide released in its combustion will return to the natural circulation. The results of the study predict a maximum efficiency of up to 35 %, i.e., the level of diesel-electric locomotives, in assignments involving frequent braking and acceleration. Shunting duties on track yards are an example of such assignments.

Field of the dissertation, key words  Energy Technology
piston steam engine, locomotive, biofuels, efficiency, electric transmission, regenerative braking

Doctoral candidate  Iiro Hirvensalo, M.Sc. (Tech.), born 4th June 1942 in Rauma, Finland

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Opponents  Professor Esa Vakkilainen, University of Lappeenranta, Finland
Assistant Professor Tatiana Minav, University of Tampere, Finland

Supervisor  Professor Martti Larmi, School of Engineering, Aalto University, Finland

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Doctoral candidate’s contact information  Iiro Hirvensalo, Aalto University, hirvensaloiro@gmail.com, phone +358 40 7511057...