Potential of Series Hybrid Drive Systems to Reduce Fuel Use and Emissions in Domestic Vehicles

A thesis presented in partial fulfillment of the requirements for the degree of

Master of Technology
in
Energy Management

at Massey University, Palmerston North,
New Zealand.

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2005

SUMMARY

Hybrid vehicles use both an internal combustion engine and an electric motor to provide propulsion resulting in reduced fuel consumption and emissions when compared to the conventional approach. In this study computer modelling was employed to assess the potential of series hybrid drive systems to reduce fuel use and emissions in domestic vehicle transport. Selected reference vehicles equipped with conventional drive systems were compared with those same vehicles equipped with a selected range of series hybrid drive system options to assess their potential for fuel use and emissions reduction during two standard drive cycles simulating urban and aggressive driving patterns respectively. The modelling emphasis was placed on efficient drive systems, component downsizing, efficient combustion cycles and control strategies. The computer simulations indicated the potential for significant reductions in fuel use and emissions by domestic vehicles equipped with series hybrid drive systems when compared to domestic vehicles equipped with conventional drive systems. Series hybrid drive systems equipped with a Diesel cycle engine as the internal combustion component of the on-board power source showed the greatest overall reductions. Computer simulations also accounted for the input from the main electrical grid network (for on-board battery recharging) and its effect on fuel use and emissions and found potential for even further reductions particularly in regions where the source of grid electricity has a low environmental impact.

ACKNOWLEDGEMENTS

I would like to thank Professor Ralph Sims and the Massey University Institute of Technology and Engineering for allowing me to undertake this thesis. Ralph has also been an immense help during the thesis process.

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