

## **Analysis of CI engine performance with waste polypropylene derived fuel blended with diesel**

Rohan E.P., Sumith B.\* and Srimal L.K.T.

*Department of Mechanical and Manufacturing Engineering, University of Ruhuna,  
Hapugala, Galle, Sri Lanka*

Feasibility of using hydrocarbon fuel extracted from pyrolysis of waste polypropylene (PP) as an alternative fuel blended with diesel in a compression ignition (CI) engine was investigated. A semi-batch reactor plant built at the department was used to extract samples of waste polypropylene derived fuel. The extracted liquid fuel was blended with diesel and used in the analysis of engine performance of a CI engine. The blending of waste PP derived fuel with diesel varied from 10% to 70% by volume. The variation of brake power (BP), brake specific fuel consumption (BSFC) and brake thermal efficiency (BTE) at different loading (varies from 0 W to 5000 W by steps of 1000 W) for pure diesel and the blends were investigated. For the blended fuel mixtures, the brake specific fuel consumption was found to vary in the range 0.208 ml/kJ - 0.315 ml/kJ at low load (1000 W) and 0.107 ml/kJ - 0.122 ml/kJ at high load (5000 W). The brake power was observed to vary between 960 W and 920 W at low load and between 4347 W and 3400 W at high load. The calculated brake thermal efficiency varied between 8.87% and 13.02% at low load and between 22.08% and 25.38% at high load. Engine performance of 10/B/PP/D to 50/B/PP/D is almost same or slightly higher than that of diesel. Therefore, it can be concluded that use of 10/B/PP/D to 50/B/PP/D blends in diesel engines may perform similar to use of diesel. However, cleanliness of waste PP derived fuel has to be improved to use this alternative fuel in commercial vehicles.

**Keywords:** Waste polypropylene derived fuel, Diesel engine, Brake power, Brake specific fuel consumption, Brake thermal efficiency

\*Corresponding Author: [sumithb@mme.ruh.ac.lk](mailto:sumithb@mme.ruh.ac.lk)