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POWER AND EMISSION ESTIMATION OF PLASTIC WASTE PYROLYSIS-DERIVED FUEL BLENDS IN INTERNAL COMBUSTION ENGINES

(2024) *Eastern-European Journal of Enterprise Technologies*, 6 (10(132)), pp. 19-25.

DOI: 10.15587/1729-4061.2024.318593

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Abstract
Energy, especially from fossil fuels, is essential for everyday life, while plastic waste is an increasing environmental threat. Plastic waste disposal methods such as landfilling and burning cause pollution. Therefore, a process is needed that converts plastic waste into fuel. The object of the study is the engine performance. The problem to be solved is the relationship between the use of a mixture of fossil fuels and pyrolysis fuel on the performance of internal combustion engines. This research uses a systematic data collection process to obtain accurate and reliable results. The necessary equipment, including a dynamometer and gas analyzer, was prepared, and the engine was warmed up to a stable operating temperature of 80 °C. The motorbike is then positioned on the dynamometer with the rear tires aligned and the front tires secured to prevent movement. Data collection was carried out at engine speeds of 2000, 3000, 4000, 5000, and 6000 rpm, using three fuel mixtures: 10 % plastic pyrolysis fuel with 90 % RON 90, 20 % plastic pyrolysis fuel with 80 % 90 RON, and 30 % plastic pyrolysis fuel with 70 % RON 90. Each test was repeated three times, with the output power measured using a dynamometer and exhaust emissions (CO and HC levels) recorded using a gas analyzer. The test results show that the optimal fuel mixture to produce maximum engine power is a PE-RON 90 mixture with a ratio of 20:80, providing the best performance at medium to high engine speeds (3000–6000 rpm) with low CO emissions. The highest power output (1.05) occurs at 4000 rpm, while the PE-RON 90 30:70 alloy produces the best power performance at 6000 rpm (0.78 % CO). Additionally, the pyrolysis fuel blend significantly reduces CO and HC emissions, with the PE-RON 90 30:70 blend showing the lowest CO (0.78 % at 6000 rpm) and consistently reducing HC emissions across the rpm range

Author Keywords
exhaust gas; fuel mixture; plastic waste; power; pyrolysis; types of plastic

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Publisher: Technology Center

ISSN: 17293774
Language of Original Document: English
Abbreviated Source Title: East. Eur. J. Enterp. Technol.

2-s2.0-85215417890
Document Type: Article
Publication Stage: Final
Source: Scopus