

ABSTRACT

This study aims to design and evaluate the performance of an exhaust gas filter prototype based on stainless steel wire mesh and perforated copper plates for the GE 7FDL-8 diesel engine CC 201 locomotive. The research was motivated by the absence of exhaust emission reduction technology in CC 201 locomotives, while particulate emissions from diesel engines contribute significantly to air pollution. The prototype was designed using SolidWorks and simulated using ANSYS prior to fabrication. Performance testing was conducted at Depo Lokomotif Yogyakarta. The measured parameters included opacity, carbon monoxide (CO), carbon dioxide (CO₂), hydrocarbons (HC), and oxygen (O₂). The test results showed that the prototype was able to reduce opacity by 21.40% under idle conditions and by 23.69% under overfuel conditions. In addition, HC emissions decreased by 48.97% under idle conditions and by 5.66% under overfuel conditions. The results indicate that the combination of stainless steel wire mesh and perforated copper plates can be utilized as a filtration medium to reduce particulate matter and hydrocarbon emissions in diesel locomotive exhaust gases.

Keywords: *diesel locomotive, opacity, exhaust gas filter, stainless steel, copper*

INTISARI

Penelitian ini bertujuan untuk merancang dan menguji purwarupa filter gas buang berbasis kawat anyam *stainless steel* dan lempeng tembaga berlubang pada mesin Diesel GE 7FDL-8 Lokomotif CC 201. Latar belakang penelitian ini adalah belum diterapkannya teknologi reduksi emisi gas buang pada lokomotif CC 201, sementara emisi partikulat dari mesin diesel berkontribusi terhadap pencemaran udara. Purwarupa dirancang menggunakan perangkat lunak SolidWorks dan disimulasikan menggunakan ANSYS sebelum dilakukan fabrikasi. Pengujian dilakukan di Depo Lokomotif Yogyakarta. Parameter yang diukur meliputi nilai opasitas, karbon monoksida (CO), karbon dioksida (CO₂), hidrokarbon (HC), dan oksigen (O₂). Hasil pengujian menunjukkan bahwa purwarupa mampu menurunkan nilai opasitas sebesar 21.40% pada kondisi *idle* dan dari 23,69% pada kondisi *overfuel*. Selain itu, kadar HC menurun sebesar 48,97% pada kondisi *idle* dan 5,66% pada kondisi *overfuel*. Hasil penelitian menunjukkan bahwa kombinasi kawat anyam *stainless steel* dan lempeng tembaga berlubang dapat digunakan sebagai media filtrasi untuk mereduksi partikulat dan hidrokarbon pada gas buang lokomotif diesel.

Kata Kunci: lokomotif diesel, opasitas, filter gas buang, *stainless steel*, tembaga