Optimasi unjuk kerja dan emisi mesin otto satu silinder berbahan bakar campuran bensin ron 92 dan fuel grade bioethanol = Performance and emission optimization of otto engine one cylinder using fuel mixture ron 92 gasoline and fuel grade bioethanol.

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Abstrak

Dilatarbelakangi oleh ketergantungan masyarakat akan BBM ditengah menurunnya persediaan cadangan minyak di Indonesia, membutuhkan solusi berupa pemakaian bahan bakar terbarukan seperti fuel grade bioethanol. Tujuan penelitian yang akan dicapai adalah data unjuk kerja mesin (torsi, daya, dan specific fuel consumption) serta emisi yang dihasilkan (HC, CO2, dan CO) dari penggunaan bahan bakar RON 92 dengan campuran berkadar 40% (E40), 50% (E50), dan 60% (E60), dimana pada masing-masing campuran, akan ada variabel bebas berupa pengaturanÃÂ ignition timing dan injection duration. Dari data tersebut, dicarilah pengaturan serta campuran bahan bakar yang optimal untuk setiap kategori unjuk kerja mesin dan emisinya. Pengambilan data diawali dengan melakukan uji karakterisasi Research Octane Number (RON) dan densitas berdasarkan standar ASTM D 2699 dan ASTM D 4052. Pengujian unjuk kerja dalam penelitian menggunakan alat AVL Engine Dynamometer untuk mendapatkan besarnya torsi, daya, dan Specific Fuel Consumption. Pengujian lain yang diambil adalah emisi dengan memakai AVL Compact Diagnostic. Dari hasil penelitian ditarik kesimpulan pada data pertama dan kedua, bahwa torsi dan daya terbesar didapat sebesar 39,72 Nm dan 10,4 kW, didapat pada campuran bahan bakar E50 dengan pengaturan ignition timing +8 ^obTDC dan injection duration -10%. Data ketiga yang didapat yaitu Specific Fuel Consumption terhemat didapat pada campuran bahan bakar E60, dengan pengaturan pengaturan ignition timing +6 ^obTDC dan injection duration -10%, yaitu sebesar 329,15 g/kWh. Data keempat yang didapat adalah emisi HC dimana diperoleh emisi terkecil diproduksi pada bahan bakar campuran E40 dengan pengaturan ignition timing +8 ^obTDC dan injection duration -10%, yaitu sebesar 79,75 ppm. Data kelima yang didapat adalah emisi CO₂dimana produksi terkecil didapat saat bahan bakar campuran E40 dengan pengaturan ignition timing kondisi base dan injection duration kondisi base, yaitu 11,72%. Data keenam yang didapat adalah emisi CO dimana produksi terkecil didapat saat bahan bakar campuran E60 dengan pengaturan ignition timing +8 ^obTDC dan injection duration -15%, yaitu sebesar 0,13. Data terakhir yang didapat adalah NO_xdengan produksi terkecil didapat pada bahan bakar campuran E40 dengan pengaturan ignition timing kondisi base dan injection duration kondisi base, yaitu sebesar 488,77 ppm.
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Against a backdrop of public dependence on fuel in the midst of declining oil reserves in Indonesia, requiring solutions in the form of the use of renewable fuels such as fuel grade bioethanol. The research was conducted with the intention of helping to reduce people's dependence on non-renewable fuels, by using fuel grade bioethanol as a mixture, so that the use of non-renewable fuels can be suppressed. The research

objectives to be achieved are engine performance data (torque, power, and specific fuel consumption) and the resulting emissions (HC, CO2, and CO) from the use of RON 92 fuel with a mixture of 40% (E40), 50% (E50)), and 60% (E60), where in each mixture, there will be an independent variable in the form of ignition timing and injection duration settings. From these data, the optimum fuel mix and fuel settings are searched for each engine performance and emissions category. The research begin with conducting a characterization test, such as Research Octane Number (RON) and density based on ASTM D 2699 and ASTM D 4052. The performance result achieved ÃÂ in this study by using AVL Engine Dynamometer to get the amount of torque, power, and Specific Fuel Consumption. Another test taken is emission by using AVL Compact Diagnostic. From the results of this study concluded that on the first and second obtained data, ÃÂ the greatest torque and power obtained by 39.72 Nm and 10.4 kW, obtained in the E50 fuel mixture with ignition timing settings +8 ^obTDC and injection duration -10%, and prove that the setting caused combustion timing happens when piston near to Top Dead Center (TDC) condition. The third obtained data are the Specific Fuel Consumption saved in the E60 fuel mixture, with ignition timing settings +6 ^obTDC and injection duration -10%, which is 329.15 g/kWh. The ÃÂ fourth obtained data is the HC emission which is the smallest emission produced on the E40 mixture fuel with ignition timing +8 ^obTDC and injection duration of -10%, which is 79.75 ppm. The fifth obtained data is CO2 emissions where the smallest production is obtained when the E40 fuel mixture with ignition timing base and injection duration base settings, which is 11.72%, proves that this setting produces more incomplete combustion. The sixth obtained data is CO emission where the smallest production is obtained when the E60 mixture fuel with ignition timing +8 ^obTDC and injection duration -15%, which is equal to 0.13%, proves that this setting produces more complete combustion. The last obtained data is NOx with the smallest production obtained on the E40 mixture fuel with ignition timing conditions in base condition and injection duration in ÃÂ base conditions, which is 488.77 ppm.