

# Analisa kinerja motor bakar empat langkah menggunakan sequential dual ignition dengan variasi jeda &dash;3 sampai +3 derajat = Performance analysis of four stroke engine using dual ignition with delay variations &dash;3 to +3 degrees

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## Abstrak

Ignition merupakan salah satu faktor agar motor bakar mempunyai efisiensi yang tinggi. Ignition yang baik diberikan pada timing yang tepat agar pembakaran campuran bahan bakar dan udara di ruang bakar berlangsung sempurna. Penelitian ini memberikan salah satu solusi peningkatan efisiensi motor bakar dengan menerapkan sequential dual ignition pada satu ruang bakar. Ignition timing dua buah busi diatur secara mandiri untuk dibandingkan hasil pembakarannya. Busi primer dipertahankan pada ignition timing 16o sebelum TMA, sementara busi sekunder divariasikan pada ignition timing 13 o,14 o,15 o,16 o,17 o,18 o,19 o sebelum TMA yang nantinya akan disebut sebagai variasi 1 hingga 7.

Variasi ini menghasilkan kadar emisi sebagai berikut : 1,67%, 1,86%, 1,99%, 2%, 2%, 2%, 2%, 1,56% CO, 2,16%, 2,13%, 2,36%, 2,25%, 2,46%, 2,57%, 2,61% CO<sub>2</sub>, 260 ppm, 235 ppm, 317 ppm, 246 ppm, 264 ppm, 241 ppm, 184 ppm HC, serta 16,58%, 16,37%, 16,43%, 16,26%, 16,2%, 16,1%, 16,25% O<sub>2</sub>. Jika dibandingkan dengan emisi busi tunggal yang berkadar 1,65% CO, 2,1% CO<sub>2</sub>, 178 ppm HC, dan 16,5% O<sub>2</sub>, maka sequential dual ignition menghasilkan pembakaran yang lebih sempurna karena menghasilkan CO<sub>2</sub> yang lebih banyak dan O<sub>2</sub> yang lebih sedikit. Sementara perubahan power kendaraan jika dibandingkan busi tunggal adalah sebagai berikut : -0,41%, -0,43 %, -0,41%, 0%, -0,84%, +0,37%, 0%. Maka disimpulkan kinerja motor bakar empat langkah yang diberikan sequential dual ignition menjadi lebih baik dalam segi emisi dan power serta mencapai optimal pada pengaturan 16o sebelum TMA pada busi primer dan 18o sebelum TMA pada busi kanan.

.....Ignition is one factor that has a combustion efficiency. Ignition timing is good given the right to burn the fuel and air mixture in the combustion chamber is complete. This study provides one solution to increase combustion efficiency by implementing a dual sequential ignition in a combustion chamber. Ignition timing is set two plugs independently to compare the results of combustion. The primary spark plug ignition timing is maintained at 16o before TDC, while the secondary spark ignition timing was varied at 13 o, 14 o, 15 o, 16 o, 17 o, 18 o, 19 o before TDC which will be referred to as a variation of 1 to 7.

These variations result in emission levels as follows: 1.67%, 1.86%, 1.99%, 2%, 2%, 2%, 2%, 1.56% CO, 2.16%, 2.13% , 2.36%, 2.25%, 2.46%, 2.57%, 2.61% CO<sub>2</sub>, 260 ppm, 235 ppm, 317 ppm, 246 ppm, 264 ppm, 241 ppm, 184 ppm HC, and 16.58%, 16.37%, 16.43%, 16.26%, 16.2%, 16.1%, 16.25% O<sub>2</sub>. When compared with single spark emission yield of 1.65% CO, 2.1% CO<sub>2</sub>, 178 ppm HC, and 16.5% O<sub>2</sub>, then the dual sequential ignition combustion is more complete because it produces more CO<sub>2</sub> and more O<sub>2</sub> slightly. While the change in vehicle power when compared to a single spark plug is as follows: -0.41%, -0.43%, -0.41%, 0%, -0.84%, +0.37%, 0%. Performance of four stroke internal combustion engine, we conclude that given sequential dual ignition for the better in terms of emissions and achieve the optimal power settings and 16o before TDC on the primary spark plugs and spark plug 18o before TDC on the right.