

## Studi emisi smoke dan heat release pada mesin diesel IDI berbahan bakar ganda : Dual-fueled

Riyadi, author

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### Abstrak

Mesin diesel IDI berbahan bakar ganda (dual fueled) adalah mesin diesel IDI dengan menggunakan bahan bakar CNG dan solar. Pada sistem dual fueled ini, campuran udara dan CNG sebagai gas karburasi masuk ke dalam intake manifold, kemudian bahan bakar solar disemprotkan ke dalam campuran udara dan CNG kompresi untuk memulai pembakaran. Sistem ini relatif sederhana, hanya menambahkan mixer di saluran masuk (intake manifold). Tujuan dari penelitian ini adalah untuk mengetahui informasi/gambaran proses pembakaran yang terjadi pada mesin diesel IDI dual fueled melalui studi emisi smoke dan heat release. Dalam penelitian ini, pengujian dilakukan pada Engine Test Cell I dengan mesin riset hydra 450 cc di BTMP-BPPT Serpong. Pengujian dilakukan pada putaran 1000, 1500, 2000, 2500 dan 3000 rpm dengan komposisi bahan bakar 100% solar, % CNG rendah dan % CNG tinggi. Data yang diambil adalah tekanan silinder, daya dan emisi gas buang.

Daya yang dihasilkan oleh dual fueled lebih tinggi dibandingkan dengan 100% solar dan emisi smoke hasil pembakarannya lebih rendah. Phase pembakaran late combustion dual fueled pada putaran dibawah 2500 rpm mempunyai durasi pembakaran yang panjang, Emisi smoke dual fueled putaran mesin dibawah 2500 rpm lebih rendah dibanding dengan 100% solar. Total heat release dual fueled putaran mesin diatas 1000 rpm mempunyai nilai lebih rendah dibandingkan 100% solar. Pembakaran dual fueled didominasi oleh phase late combustion, sedangkan phase premixed combustion cenderung cepat. Pada phase mixing controlled combustion, mesin diesel IDI dual fueled ini berlangsung sangat cepat/pendek bila dibandingkan dengan 100% solar.

Dual fueled IDI diesel engine is IDI diesel engine operated with CNG and diesel fuel. In this dual fueled system, the mixture of air and CNG as carbureting gas flow into the intake manifold, then the diesel fuel is sprayed into the mixture of compressed air and CNG to ignite the fire. This system is relatively simple, only by adding the mixer in the intake manifold. The purpose of this research is to collect the information about the ignition process in dual-fueled IDI diesel engines by studying the emission of smoke and heat release.

In this research, the test is conducted on Engine Test Cell I with test engine hydra 450 cc at the BTMP-BPPT at Serpong. The test were carried out at 1000, 1500, 2000, 2500 and 3000 RPM using fuel composition of 100% diesel fuel, with low percentage and with high percentage of CNG. Data collected are pressure of the cylinder, and energy and emission of the exhaust.

The energy created by dual fueled is higher than that of 100% diesel fuel and smoke emission of the combustion is fewer. Firing phase of late combustion dual fueled at less than 2500 RPM has a longer duration, dual-fueled smoke emission at less than 2500 RPM is fewer than that of 100% diesel fuel. Total heat release of dual fueled engine run at more than 1000 RPM is lower than 100% diesel fuel. The combustion of dual fueled is dominated by late combustion phase, while premixed combustion phase is most likely fast. At mixing controlled combustion phase, this dual fueled IDI diesel engine went on very

quick/short compared to that with 100% diesel fuel.</i>