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# An Experimental Investigation on Over-load Running of Diesel Engine

—The Effect of Fuel Addition to Intake Air—

Noriaki KIJIMA\*

The investigation into the effects of fuel addition to the intake air for a diesel engine arose from a programme of research into the means of reducing engine roughness, compression noise, and exhaust smoke. It was experimented and reported as early as 1941, and since then many people have gotten much knowledge with their studies and published their research works. In their researches the swirl chamber engine for the most part and direct injection engine in some quarter were used and mostly manifold introduction for some kinds of sub-fuel was used. In all these researches, a small amount of auxiliary fuel was introduced into the intake manifold with several methods. As their main results the increase of them on full and overload running was showed, and especially the increase of smoke limit power output.

In this investigation the precombustion chamber engine was used, and light oil as auxiliary fuel introduced with a carburetor and butane was introduced with the method of direct introduction. It is easy these two fuels to get in and to introduce into, and the cetane number of butane is very high and that of light oil is low. And then the author changed the main fuel injection timing and investigated its effect. When light oil is introduced about 10 %, the thermal efficiency increases and then this effect is remarkable as much overload. For butane, there is not optimum quantity, but maximum quantity is limited owing to diesel knock. In either case, the thermal efficiency and the smoke limit power output increase and the exhaust temperature and exhaust smoke decrease with introduction of the suitable quantity of sub-fuel.

Moreover the author could record the detailed indicator diagrams and analyse these diagrams thermodynamically. Therefore the author could quantitatively explain that a part of introduced fuel was already oxidized before burning of main fuel.

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