

# Reducing the Harmful Exhaust Emissions from the Diesel Engine of the Tractor CASE JX75T by using the EFWP Filter at Different Engine Speeds

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**Abstract.** In this investigation, the influence of using the EFWP filter on the tractor exhaust emissions was determined. A Water and paper filter is a filter designed to operate as a filter for the exhaust for the reduction of the harmful gas (CO, CO<sub>2</sub>, NO<sub>x</sub>, and HC) emission from the engine of the tractor. Emissions experiments were carried out on CASE JX75T tractor at different engine speeds are 750, 1000, 1250, 1500, 1750, 2000, and 2250 rpm. All engine speed of the tractor underwent experimentation before the installation of the EFWP filter and after installation it. The noises and Bsfec also were measured when the two cases. Each engine speed was tested for approximately 20 minutes in two cases. The results showed a significant ( $P \leq 0.05$ ) decreasing in carbon monoxide CO (51.40%), carbon dioxide CO<sub>2</sub> (25%), nitrogen oxides NO<sub>x</sub> (43.43%) and hydrocarbons HC (60.98%) emissions and also, the noises reduced by 25.38% and there was no significant increase in the BSFC (5.34% only) after the EFWP filter was put in the tractor exhaust. The results also showed that increasing the engine speed from 750 to 2250 rpm led to significant increases in CO<sub>2</sub>, NO<sub>x</sub>, and HC emissions, while decreased the CO emission. Also, the increased by a percentage of 155.88 and 159.38 % in the case using the EFWP filter and without using it (the ordinary case) respectively. Using the EFWP filter reduced the noises not overridden internationally permitted standards (65 dB).

**Keywords.** CO, CO<sub>2</sub>, NO<sub>x</sub> and HC emissions, EFWP filter, Noisy, BSFC, Engine speed.

## 1. Introduction

Tractors are the major power machines in fields agricultural which energy its comes from the fossil fuel burned internal in their engine. As the gross amount of powerful tractors, vehicles, and other agricultural machinery is increasing, more and more different pollutants are released into the environment. Farmers to achieve extreme productivity must reduce fuel consumption and keeping yield at satisfactory limits thereby reducing the adverse gas emission effect on the environment (toxic emissions [1]. The diesel engine is one of the sources of air pollution due to harmful gas emission with its exhaust such as carbon monoxide CO, Carbon dioxide CO<sub>2</sub>, nitrogen oxides NO<sub>x</sub>, hydrocarbons HC, etc [2]. Many studies were interested in engine exhaust gases emissions surveillance and take measures for the decreasing of the gases emission harmful in the atmosphere and [3-6]. Most of the data for fuel consumption and environmental influence evaluating today are acquired according to experimental data when the mode of the engine is a constant while, during different field operating,



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