

ABSTRAK

Nama : M Imam Baladi
NPM : 062330200402
Jurusan : Teknik Mesin
Program Studi : Diploma Tiga Teknik Mesin
Judul Laporan Akhir : Rancang Bangun Alat Pembersih *Air cleaner* Pada
Unit Hino 500 Uero 4

(2026:xiii + 41 Halaman, 19 Gambar, 15 Tabel + 7 Lampiran)

Air cleaner merupakan komponen pada sistem pemasukan udara mesin diesel yang berfungsi menyaring debu dan partikel sebelum udara masuk ke ruang pembakaran. Pada unit Hino 500 Euro 4 yang beroperasi di lingkungan berdebu tinggi, pembersihan air cleaner perlu dilakukan secara berkala untuk menjaga kinerja mesin. Namun, metode pembersihan manual masih memiliki kelemahan, seperti membutuhkan waktu lama, menyebabkan debu beterbangan, dan berisiko terhadap kesehatan operator. Oleh karena itu, penelitian ini bertujuan untuk merancang dan membangun alat pembersih air cleaner otomatis guna meningkatkan efektivitas, efisiensi, dan keselamatan kerja.

Metode penelitian meliputi identifikasi kebutuhan, perancangan, pembuatan komponen, perakitan, dan pengujian kinerja alat. Sistem pembersihan menggunakan udara bertekanan dari kompresor yang dialirkan melalui nozzle dengan pergerakan otomatis menggunakan motor stepper NEMA 23, lead screw T8, dan controller ZK-SMC01. Debu yang terlepas selama proses pembersihan kemudian dihisap menggunakan vacuum blower untuk mengurangi penyebaran debu. Pengujian dilakukan sebanyak tiga kali dengan parameter fungsi alat, waktu pembersihan, dan perubahan massa air cleaner sebelum serta sesudah proses pembersihan.

Hasil pengujian menunjukkan bahwa alat dapat bekerja sesuai rancangan. Rata-rata waktu pembersihan yang diperoleh sebesar 4,66 menit. Massa air cleaner setelah pembersihan pada setiap pengujian mencapai massa awal sebesar 1980 gram, sehingga menunjukkan bahwa debu yang menempel berhasil dibersihkan. Berdasarkan hasil pengujian, alat pembersih air cleaner otomatis mampu meningkatkan efisiensi proses pembersihan serta mendukung keselamatan operator dibandingkan metode manual.

Kata Kunci: *air cleaner, Hino 500 Euro 4, rancang bangun, motor stepper, vacuum blower.*

ABSTRACT
Design and Construction of an Air Cleaner Cleaning Device for the Hino 500
Euro 4 Unit
(testing process)

(2026: xiii + 41 pp. + 19 Figures + 15 Tables + 7 Attachments)

M Imam Baladi

NPM.062330200402

DIPLOMA–III MECHANICAL ENGINEERING STUDY PROGRAM

MECHANICAL ENGINEERING DEPARTMENT

STATE POLYTECHNIC OF SRIWIJAYA

An air cleaner is a component of a diesel engine air intake system that functions to filter dust and particles before air enters the combustion chamber. In the Hino 500 Euro 4 unit operating in a high-dust environment, regular air cleaner cleaning is required to maintain engine performance. However, the manual cleaning method has several disadvantages, such as requiring a long time, causing dust dispersion, and potentially affecting operator health. Therefore, this research aims to design and develop an automatic air cleaner cleaning device to improve the effectiveness, efficiency, and occupational safety during the maintenance process.

The research methods include requirement identification, tool design, component manufacturing, assembly, and performance testing. The designed system uses compressed air from a compressor delivered through a nozzle, with automatic nozzle movement controlled by a NEMA 23 stepper motor, T8 lead screw, and ZK-SMC01 controller. Dust released during the cleaning process is collected using a vacuum blower to minimize dust distribution into the surrounding environment. The testing was conducted three times with parameters including tool functionality, cleaning time, and changes in air cleaner mass before and after the cleaning process.

The test results show that the device operates according to the design specifications. The average cleaning time obtained was 4.66 minutes. After the cleaning process, the air cleaner mass in each test reached the initial mass of 1980 grams, indicating that the attached dust was successfully removed. Based on the test results, the automatic air cleaner cleaning device is capable of improving cleaning efficiency and supporting operator safety compared to the manual cleaning method.

Keywords : *air cleaner, Hino 500 Euro 4, design and development, stepper motor, vacuum blower.*