



Reconditioning and Testing of the 1984 Toyota Rino Diesel Engine

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Abstract

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The purpose of this research is to get a clear picture of the process of reconditioning and testing the 1984 Toyota Rino diesel engine. And to find out which components must be renovated for excellent engine performance. This research was conducted at the Piksi Ganesha Polytechnic Laboratory of Indonesia. The research method used is qualitative. The result of the reconditioning process is that several diesel engine components must be replaced in gaskets, air, and fuel filters. The results of testing the diesel engine Toyota Rino 1984 are: 1) Injector test, all injectors' functions should run when tested using a pressure nozzle test; namely, the manometer shows 3000 psi when the lever is pressed, the nozzle can spray fuel tightly, and the nozzle does not leak; 2) Compression test, all cylinders are still in good condition when tested using a cylinder pressure tester, namely the manometer shows the number 30 kg/cm².

Keywords: Diesel engine, Testing, Recondition

Abstrak

Tujuan penelitian ini yaitu untuk mendapatkan gambaran secara jelas tentang proses rekondisi dan pengujian mesin diesel toyota rino tahun 1984 dan mengetahui komponen yang harus direkondisi untuk mendapatkan performa mesin yang prima. Penelitian ini dilakukan di Laboratorium Politeknik Piksi Ganesha Indonesia. Metode penelitian yang digunakan adalah metode penelitian kualitatif. Hasil dari proses rekondisi adalah beberapa komponen mesin diesel harus diganti berupa gasket, filter udara, filter bahan bakar. Hasil dari pengujian mesin diesel toyota rino 1984 yaitu: 1) Tes Injector, semua injector berfungsi dengan baik ketika di tes menggunakan alat preasur nozel test yaitu maonometer menunjukkan angka 3000 psi ketika tuas ditekan, nozel dapat menyembrotkan bahan bakar dengan kencang dan nozel tidak bocor; 2) Tes Kompresi, semua cylinder masih dalam keadaan bagus ketika dites menggunakan alat cylinder preasur tester yaitu dengan manomter menunjukkan angka 30 kg/cm².

Kata-kata kunci: Mesin diesel, Pengujian, Rekondisi



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1. Introduction

The car engine is a working system contained in the vehicle components and used to drive it. The car engine is not just one whole object but also several parts [1]. The function of the engine is to produce rotary power from the combustion process of the air and fuel mixture [2]. Combustion can occur in the engine if it meets several requirements, namely, high compression pressure and an appropriate mixture of air and fuel.

In this study, the authors will perform reconditioning and testing on diesel engines [3]. The diesel engine is an internal combustion engine that uses the heat of compression to create ignition and burn the fuel injected into the combustion chamber [4]. Although less popular than other engines, diesel engines are very tough machines compared to other engines. It can be seen from diesel engines' use in vehicles with large engine capacities and are also powerful [5].

Students, especially automotive engine students, need knowledge of diesel engines. Knowledge of diesel engines must be learned by doing practicums so that students understand more about the components and how diesel engines work [6]. In the Piksi Ganesha Indonesia Polytechnic laboratory, there is a 1984 Toyota diesel rino diesel engine that has not been used for a long time. The author will recondition the diesel engine so it can be reused as a learning medium for the Piksi Ganesha Indonesia Polytechnic students, especially the automotive engine study program [7].

In addition to reconditioning, the author will also conduct engine testing, which aims to determine the performance of diesel engines after a long period of non-use [8]. Remodeling of the 1984 Toyota Rino diesel engine was carried out to get the best performance from the 1984 Rino diesel engine after a long period of disuse. After the diesel engine returns to normal and can start, the diesel engine can use as learning media for automotive engine students at the Piksi Ganesha Indonesia Polytechnic.

2. Method

a. Material

Equipment and components replaced for the reconditioning and testing of the 1984 Toyota Rino diesel engine, among others [9] tools used for work clothes, boots, T-wrench, screwdriver, sandpaper, paint, ring wrench, pliers, Toyota Rino diesel trainer 1984. The components replaced

were valve seals, cylinder cup gaskets, intake Manfield gaskets, fuel filters, engine cover gaskets, reservoir tanks, exhaust gaskets, air filters, and LED lights (indicators).

b. Method

This study used qualitative research methods [10]. The following is a diagram of the qualitative research method presented in **Figure 1**.

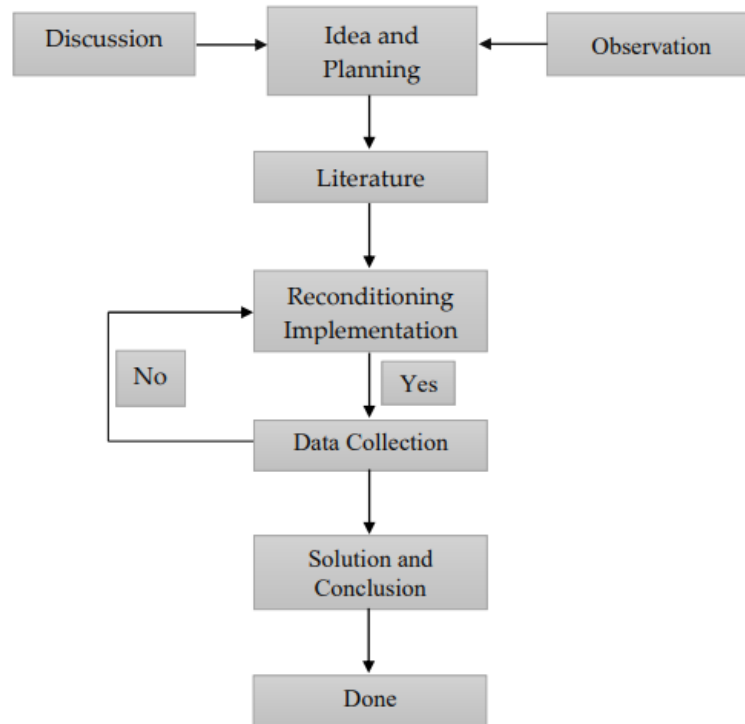


Figure 1. Qualitative Research Methods

3. Results and Discussion

The Toyota Rino 1984 diesel engine trainer test results before reconditioning, i.e. injector testing using nozzle tester pressures, are presented in **Table 1**.

Table 1. Injector Testing

Injector	Before the Lever is Pressed	After the Lever is Pressed	Information
1	1500 Psi	3000 Psi	Working Injectors
2	1600 Psi	3300 Psi	Working Injectors
3	1500 Psi	3100 Psi	Working Injectors
4	1500 Psi	3200 Psi	Working Injectors

Based on **Table 1** Injector testing using a nozzle pressure tester, all injectors are still functioning. The graph of injector testing using a pressure tester nozzle is presented in **Figure 2**.

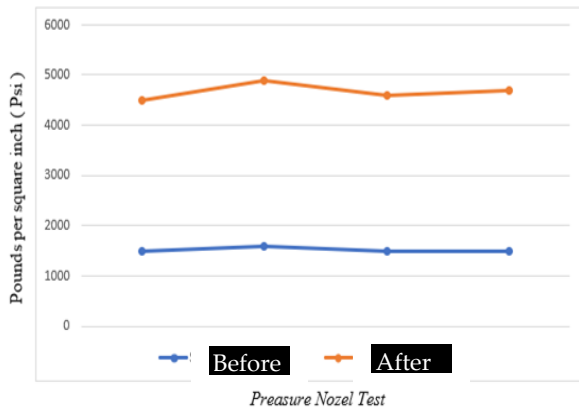


Figure 2. Graph of Injector Testing using Pressure Tester Nozel

Based on **Figure 2** above, the nozzle is still in good condition, with the manometer showing the number 3000 psi and above when the lever is pressed, and when the lever is not pressed, the manometer shows the number 1500 psi, which means the nozzle has no leaks.

The Toyota Rino 1984 diesel engine trainer test results after reconditioning, namely the compression test using a Cylinder Pressure tester, are presented in **Table 2**.

Table 2. Compression test using a Cylinder Pressure tester

Cylinder	Compression Test Results	Information
1	30 kg/cm ²	Good
2	29 kg/cm ²	Good
3	28.5 kg/cm ²	Good
4	30 kg/cm ²	Good

Based on **Table 2**, it shows that the compression in diesel engines is still in good condition by showing the lowest figure, which is 29 kg/cm² and the highest, which is 30 kg/cm². A graph of compression testing using a cylinder pressure tester is presented in **Figure 3**.

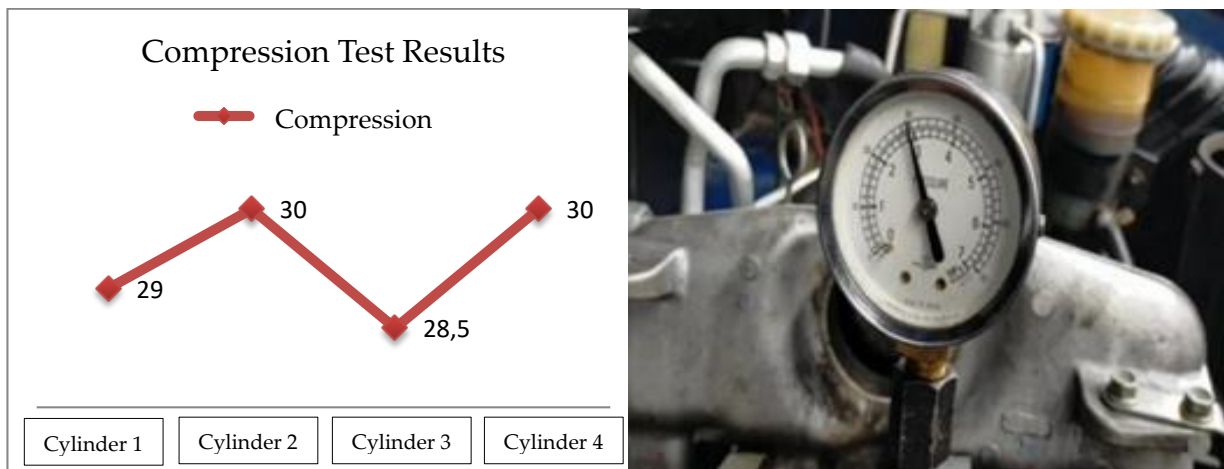


Figure 3. Graph of testing using the tool cylinder pressure tester

Based on **Figure 3** above, compression testing using a Cylinder Pressure Tester on each cylinder of the manometer shows the number 28 kg/cm² and above, which means that the cylinder compression is still in good condition.

4. Conclusion

All the reconditioning and testing processes show that the diesel engine is still in good condition in terms of components and every component function. The pre-and post-reconditioning tests, namely the nozzle test and the compression test, were still in good condition.

References

- [1] D. A. N. C. Mengatasinya, Trouble Shooting Sistem Injeksi Mesin Diesel Mitsubishi L300», zenb. 09, [Sarean]. Available at: <https://media.neliti.com/media/publications/220495-none.pdf>.
- [2] H. Eka et al. J. Mukono, Hubungan Kadar Timbal Dalam Darah Dengan Hipertensi Pekerja Pengecatan Mobil Di Surabaya, J. Kesehat. Lingkung., libk. 9 No.1, or. 66–74, 2017.
- [3] A. S. Ginting, M. Hazwi, D. T. Mesin, F. Teknik, et al. U. S. Utara, Analisa Performansi Pada Mobil Toyota Fortuner Mesin Diesel Tipe 2Kd-Ftv Vn Turbo Intercooler, zenb. 2, or. 91–100, 2014.
- [4] F. Ferdiansyah, Perawatan Sistem Pelumas pada Mesin Diesel Dump Truck Hio 500 FM 260 TI PT. Envitec Multi Indonesia, 2021.
- [5] Ariwibowo, Laporan Tugas Akhir Perhitungan Ulang Kinerja Mesin Diesel 4 Langkah 1 Silinder Berpendingin Radiator, or. 1–20, 2018.
- [6] T. Tjahjono, Analisis Keausan Pada Dinding Silinder Mesin Diesel», Media Mesin Maj. Tek. Mesin, libk. 6, zenb. 2, or. 78–83, 2015, doi: 10.23917/mesin.v6i2.2894.
- [7] I. Aziz, Uji Performance Mesin Diesel Menggunakan Biodiesel Dari Minyak Goreng Bekas», J. Kim. Val., libk. 1, zenb. 6, 2010, doi: 10.15408/jkv.v1i6.241.
- [8] W. Wibowo, N. Astriawati, et al. Jamaluddin, Optimalisasi Perawatan Sistem Pendingin Tertutup Pada Mesin Diesel Tipe MAK 8M32 Pada KM LIT ENTERPRISE, J. Polimesin, libk. 19, or. 28–34, 2021.
- [9] S. Huda, D. Widjanarko, S. Artikel, K. Kunci, S. Penerangan, et al. H. Belajar, Journal of Mechanical Engineering a I N F O ARTIKEL, Jmel, libk. 9, zenb. 1, or. 1–7, 2020, [Sarean]. Available at: <https://journal.unnes.ac.id/sju/index.php/jmel/article/view/40441>.
- [10] D. W. Sroyer, M. Zaki, L. Abrori, S. D. P. Sidhi, P. Kelautan, et al. P. Sorong, Perawatan Fresh Water Cooler Pada Sistem Pendinginan Mesin Diesel Penggerak Generator Listrik Di Kapal Navigasi Milik Distrik Navigasi Kelas I Ambon Maintenance of Freshwater Cooler in the Cooling System of Diesel Engine As a Electric Generator Driver in, Aurelia J. (Authentic Res. Glob. Fish. Appl. J., libk. 1, zenb. 1, or. 1–11, 2019.