

ABSTRAK

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Judul Laporan : Rancang Bangun Alat Bantu Pelepasan Dan Pemasangan *Shock Breaker* Mobil Tipe *Coil Spring* Dengan Beban Maksimal 3,1 Ton (Proses Pembuatan)

(2025: xxii + 80 Halaman, 27 Gambar, 11 Tabel, + 8 Lampiran)

Laporan akhir ini membahas secara menyeluruh proses perancangan dan pembuatan alat bantu pelepasan dan pemasangan shock absorber mobil tipe coil spring dengan beban maksimal hingga 3,1 ton. Alat ini dikembangkan sebagai solusi untuk meningkatkan keselamatan dan efisiensi kerja teknisi dalam proses perawatan atau penggantian suspensi kendaraan bermotor, khususnya mobil penumpang seperti MPV, SUV, dan pickup. Shock absorber tipe coil spring menyimpan energi potensial tinggi yang dapat membahayakan teknisi jika dilepas tanpa alat bantu. Oleh karena itu, alat ini dirancang dengan sistem mekanisme ulir kotak yang dapat digerakkan menggunakan impact wrench, menggantikan metode manual yang membutuhkan tenaga besar dan berisiko tinggi.

Tahapan perancangan meliputi identifikasi kebutuhan teknis, pemilihan material (SS400 dan AISI 4140), serta analisis kekuatan meliputi ulir, las, plat penahan, lengan penekan, dan sambungan. Proses pembuatan mencakup pemesinan dengan mesin bubut, mesin bor, mesin gerinda, pengelasan, serta perakitan komponen. Pengujian alat dilakukan untuk mengetahui ketahanan terhadap beban kerja maksimal, serta efektivitas dan efisiensi waktu penggunaan antara metode manual dan otomatis. Hasil pengujian menunjukkan bahwa alat mampu bekerja dengan baik tanpa deformasi atau kerusakan pada komponen. Selain itu, waktu kerja dapat ditekan secara signifikan, dan risiko cedera teknisi menurun drastis.

Dengan desain yang ergonomis dan portabel, alat ini tidak hanya mendukung keselamatan kerja, tetapi juga meningkatkan produktivitas di lingkungan bengkel otomotif.

Kata Kunci: Trecker Shock Absorber, Coil Spring, Impact Wrench, Rancang Bangun, Ulir Kotak, Alat Bantu Otomotif

ABSTRACT

DESIGN AND DEVELOPMENT OF AN AUXILIARY TOOL FOR REMOVAL AND INSTALLATION OF COIL SPRING TYPE CAR SHOCK ABSORBERS WITH A MAXIMUM LOAD CAPACITY OF 3.1 TONS (MAKING PROSESS)

(2025: xxii + 80 Pages, 27 Figures, 11 Tables, + 8 Attacchments)

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This final report comprehensively discusses the design and manufacturing process for a tool for removing and installing coil spring automotive shock absorbers with a maximum load of up to 3.1 tons. This tool was developed as a solution to improve the safety and efficiency of technicians during maintenance or replacement of motor vehicle suspensions, particularly for passenger cars such as MPVs, SUVs, and pickups. Coil spring shock absorbers contain high potential energy, which can be dangerous for technicians if removed without tools. Therefore, this tool is designed with a box-threaded mechanism that can be operated using an impact wrench, replacing manual methods that require significant force and are high risk.

The design phase included identifying technical requirements, selecting materials (SS400 and AISI 4140), and analyzing the strength of the threads, welds, retaining plates, pressure arms, and joints. The manufacturing process included machining with a lathe, drill, grinder, welding, and component assembly. Testing of the tool was conducted to determine its resistance to maximum workloads, as well as the effectiveness and time efficiency of manual and automated methods. Test results demonstrated that the tool performed satisfactorily without deformation or damage to components. Furthermore, work time can be significantly reduced, and the risk of technician injury is drastically reduced.

With its ergonomic and portable design, this tool not only supports workplace safety but also increases productivity in automotive workshops.

Keywords: Shock Absorber Puller, Coil Spring, Impact Wrench, Design and Development, Square Thread, Automotive Auxiliary Tool.