

ABSTRAK

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Judul Laporan : Optimalisasi Alat Uji Kelelahan / *Fatigue* Tipe
Rotary Bending (Pengujian)

(2025: xiii + 75 Halaman, 36 Gambar, 12 Tabel, + Lampiran)

Laporan ini membahas optimalisasi alat uji kelelahan (fatigue) tipe *rotary bending* yang sebelumnya belum berfungsi secara optimal di Bengkel Maintenance & Repair, Jurusan Teknik Mesin, Politeknik Negeri Sriwijaya. Optimalisasi dilakukan sebagai upaya memulihkan dan meningkatkan kinerja alat agar dapat digunakan secara efektif untuk kegiatan praktikum mahasiswa. Proses perbaikan meliputi identifikasi kerusakan, penggantian atau perbaikan komponen penting seperti tachometer, *digital counter*, panel kontrol, serta penataan ulang sistem kelistrikan. Selain itu, sistem otomatisasi ditambahkan untuk meningkatkan keamanan dan efisiensi operasional. Tahapan pekerjaan meliputi observasi awal, diagnosa kerusakan, perencanaan perbaikan, rekondisi komponen, hingga pengujian awal (*pre-commissioning*) dan akhir (*final commissioning*). Pengujian dilakukan menggunakan spesimen aluminium standar ASTM E8 dengan variasi beban 7,5 kg, 10 kg, dan 12,5 kg. Hasil uji menunjukkan bahwa alat mampu merekam jumlah siklus dan waktu patah spesimen secara akurat sesuai standar pengujian kelelahan. Optimalisasi ini memberikan manfaat signifikan, antara lain mendukung kegiatan praktikum secara lebih aman dan efisien, meningkatkan pemahaman mahasiswa mengenai perilaku material terhadap beban berulang, serta memperpanjang umur pakai alat. Dari sisi akademis, proyek ini menjadi penerapan nyata ilmu teknik mesin, khususnya pada bidang perawatan, rekondisi, dan pengujian material. Keberhasilan proyek ini diharapkan dapat menjadi referensi bagi pengembangan alat praktikum serupa di masa mendatang, sekaligus meningkatkan kualitas pembelajaran berbasis laboratorium di lingkungan kampus.

Kata kunci: kata kunci: optimalisasi, fatigue, rotary bending, pengujian material, kelelahan.

ABSTRACT
Optimization of Rotary Bending Fatigue Testing Machine
(Testing Process)

(2025: xiii + 75 pp + 36 Figures + 12 Tables + Attachments)

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This report discusses the optimization of a rotary bending fatigue testing device that was previously not functioning optimally at the Maintenance & Repair Workshop, Department of Mechanical Engineering, Sriwijaya State Polytechnic. The optimization was carried out as an effort to restore and improve the performance of the device so that it could be used effectively for student practical activities. The repair process involved identifying damage, replacing or repairing critical components such as the tachometer, digital counter, control panel, and re-configuring the electrical system. Additionally, an automation system was added to enhance operational safety and efficiency. The work stages include initial observation, damage diagnosis, repair planning, component reconditioning, and pre-commissioning and final commissioning tests. Testing was conducted using standard ASTM E8 aluminum specimens with load variations of 7.5 kg, 10 kg, and 12.5 kg. Test results showed that the device could accurately record the number of cycles and specimen fracture time in accordance with fatigue testing standards. This optimization provides significant benefits, including supporting laboratory activities in a safer and more efficient manner, enhancing students' understanding of material behavior under repeated loads, and extending the tool's service life. From an academic perspective, this project serves as a practical application of mechanical engineering knowledge, particularly in the fields of maintenance, reconditioning, and material testing. The success of this project is expected to.

Keywords: optimization, fatigue, rotary bending, material testing, fatigue failure.