

ABSTRAK

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Judul Laporan : Rancang Bangun Alat Bantu Pemotongan Pelat
Dengan *Cutting Torch* Gerak Horizontal (Biaya
Produksi)

(2025: xiii + 62 Halaman, 23 Gambar, 16 Tabel, + 8 Lampiran)

Proses pemotongan pelat pada mata kuliah kerja praktik di Jurusan Teknik Mesin, Politeknik Negeri Sriwijaya, hingga saat ini masih banyak dilakukan dengan teknik cutting torch manual secara konvensional. Metode tersebut sering menghasilkan potongan yang kurang presisi, tidak rata, serta memerlukan waktu dan tenaga yang lebih besar. Kondisi ini menjadi latar belakang dilakukannya perancangan dan pembuatan alat bantu pemotongan pelat dengan cutting torch gerak horizontal. Tujuan dari alat ini adalah meningkatkan ketelitian pemotongan, efisiensi kerja, dan keamanan, sekaligus menjadi sarana pembelajaran praktis bagi mahasiswa saat melaksanakan praktikum pemotongan pelat di bengkel. Sistem penggerak alat menggunakan motor stepper yang terhubung dengan poros ballscrew, sehingga mampu menghasilkan gerakan linear maju–mundur secara akurat dan terkontrol. Bracket khusus dibuat untuk memegang cutting torch agar posisinya stabil selama proses pemotongan. Proses perancangan meliputi tahap desain, pemilihan material seperti pelat baja, ball screw, dan linear actuator guide, serta perakitan komponen mekanik dan elektrik, termasuk microstep driver, controller, dan power supply. Pengujian dilakukan pada pelat baja tebal 10 mm dengan variasi kecepatan putar motor 5, 6, dan 7 RPM, serta tekanan gas oksigen dan LPG masing-masing 50 psi. Hasil pengujian menunjukkan kecepatan potong sebesar 50, 60, dan 70 mm/menit, dengan hasil potongan lurus, halus, dan terak yang minim. Total biaya pembuatan alat adalah Rp 3.378.447, yang dinilai ekonomis untuk skala pendidikan maupun produksi kecil. Hasil akhir menunjukkan bahwa alat bantu pemotongan pelat ini mampu memenuhi tujuan perancangan, memberikan hasil lebih presisi, mengurangi beban kerja operator, serta mempercepat proses dibanding metode manual.

Kata kunci: cutting torch, motor stepper, ballscrew, pemotongan pelat, presisi.

ABSTRACT
Design And Build Pelate Cutting Aids With Horizontal Motion Cutting Torch
(Production Cost)

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The plate cutting process in the workshop practical course of the Mechanical Engineering Department, State Polytechnic of Sriwijaya, is still largely carried out using conventional manual cutting torch techniques. This method often produces cuts that lack precision, have uneven edges, and require more time and operator effort. These limitations became the basis for designing and developing a plate cutting aid with a horizontal motion cutting torch. The aim of this tool is to improve cutting accuracy, efficiency, and safety, while also serving as a practical learning medium for students during plate cutting practice in the workshop. The tool's drive system utilizes a stepper motor connected to a ballscrew shaft, enabling accurate forward–reverse linear movement. A specially fabricated bracket firmly holds the cutting torch to maintain a stable position during the cutting process. The design and fabrication process included the planning stage, selection of materials such as steel plates, ball screw, and linear actuator guide, as well as the assembly of both mechanical and electrical components, including a microstep driver, controller, and power supply. Testing was performed on 10 mm thick steel plates at motor rotation speeds of 5, 6, and 7 RPM, using oxygen and LPG gases at 50 psi each. The results showed cutting speeds of 50, 60, and 70 mm/min, producing straight, smooth cuts with minimal slag formation. The total manufacturing cost was calculated at IDR 3,378,447, making it economical for educational purposes and small-scale production. Overall, the developed plate cutting aid successfully met the design objectives, providing higher precision, reduced operator workload, and faster processing times compared to the manual cutting method.

Keywords: cutting torch, stepper motor, ballscrew, plate cutting, precision.