

## ABSTRAK

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Judul Laporan Akhir : Rancang Bangun Alat Potong Pelat Melingkar Semi Otomatis Plasma *Cutting* Portable (Pembuatan)

**(2026: xiii + 51 Halaman, 19 Gambar, 15 Tabel + 7 Lampiran)**

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Proses pemotongan pelat logam berbentuk lingkaran merupakan salah satu kegiatan penting dalam industri manufaktur dan fabrikasi, khususnya untuk pembuatan flange, tutup tabung, dan komponen berbentuk melingkar lainnya. Penggunaan plasma cutting banyak dipilih karena mampu menghasilkan pemotongan yang cepat dan rapi. Namun, proses pemotongan secara manual masih memiliki beberapa kendala, seperti tingkat ketelitian yang rendah, hasil potongan yang kurang konsisten, serta ketergantungan yang tinggi terhadap keterampilan operator. Sementara itu, penggunaan mesin CNC mampu menghasilkan pemotongan yang presisi, tetapi memerlukan biaya investasi yang relatif tinggi sehingga kurang ekonomis bagi bengkel skala kecil dan menengah. Penelitian ini bertujuan untuk merancang dan membuat alat potong pelat melingkar semi otomatis plasma cutting portable yang dapat meningkatkan ketelitian dan efisiensi proses pemotongan. Metode penelitian yang digunakan meliputi observasi, studi literatur, pengumpulan data, perancangan, pembuatan komponen, perakitan, serta pengujian alat. Sistem alat menggunakan motor stepper sebagai penggerak utama yang dikendalikan oleh controller, microstep driver, dan power supply, serta didukung sistem transmisi pulley dan timing belt. Pengujian alat ini dilakukan dengan tebal pelat 2mm dengan variasi amper las plasma cutting 20, 25, dan 30 Amper, serta diameter potong pelat 50mm dan 100mm. Hasil pengujian menunjukkan kecepatan rata – rata potong untuk diameter 50mm 19,6 detik, dan diameter 100mm 21,6 detik. Total biaya pembuatan alat ini adalah Rp 4.252.755,00, yang dinilai ekonomis untuk skala pendidikan maupun produksi kecil. Hasil akhir menunjukkan bahwa alat pemotongan pelat ini mampu memenuhi tujuan perancangan, memberikan hasil lebih presisi dibanding metode manual.

Kata Kunci: plasma cutting, pemotongan pelat melingkar, motor stepper, semi otomatis, presisi.

## **ABSTRACT**

### ***Design and Construction of a Portable Semi-Automatic Plasma Cutting Circular Plate Cutting Machine (Manufacturing Process)***

**(2026: xiii + 51 pp. + 19 Figures + 15 Tables + 7 Attachments)**

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*The process of cutting circular metal plates is one of the important activities in the manufacturing and fabrication industry, especially for the manufacture of flanges, tube caps, and other circular components. The use of plasma cutting is widely chosen because it is able to produce fast and neat cuts. However, the manual cutting process still has several obstacles, such as a low level of accuracy, inconsistent cutting results, and a high dependence on operator skills. Meanwhile, the use of CNC machines is able to produce precise cuts, but requires a relatively high investment cost so it is less economical for small and medium-scale workshops. This study aims to design and create a portable semi-automatic plasma cutting circular plate cutting tool that can improve the accuracy and efficiency of the cutting process. The research methods used include observation, literature study, data collection, design, component manufacturing, assembly, and tool testing. The tool system uses a stepper motor as the main driver controlled by a controller, microstep driver, and power supply, and supported by a pulley and timing belt transmission system. The testing of this tool was carried out with a 2mm plate thickness with variations in plasma cutting welding amperage of 20, 25, and 30 Amperes, as well as plate cutting diameters of 50mm and 100mm. The test results showed an average cutting speed for a 50mm diameter of 19.6 seconds, and a 100mm diameter of 21.6 seconds. The total cost of manufacturing this tool is Rp 4,252,755.00, which is considered economical for educational and small-scale production. The final results show that this plate cutting tool is able to meet design objectives, providing more precise results than manual methods.*

*Keywords : plasma cutting, circular plate cutting, stepper motor, semi-automatic, precision.*