# ABSTRAK


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| Jurusan | : | Teknik Mesin |
| Program Studi | : | Diploma Tiga Teknik Mesin |
| Judul Laporan Akhir | : | Rancang Bangun *CNC Water Jett Cutting Mahcine* Sebagai Penunjang Pembelajaran di Jurusan Teknik Mesin ( Proses Pemograman ) |



**(2025: xii + 67 Halaman, 29 Gambar, 3 Tabel + 7 Lampiran)**



Perkembangan teknologi manufaktur modern menuntut penggunaan mesin yang mampu mendukung proses produksi dengan tingkat presisi, efisiensi, dan otomatisasi yang baik. Salah satu teknologi yang berkembang adalah *Computer Numerical Control (CNC)* yang dapat mengendalikan pergerakan mesin secara otomatis berdasarkan program yang telah dibuat. *Water Jet Cutting Machine* merupakan teknologi pemotongan yang menggunakan aliran air bertekanan tinggi sehingga proses pemotongan tidak menghasilkan daerah terpengaruh panas (*Heat Affected Zone*). Laporan akhir ini bertujuan untuk merancang dan membangun *CNC Water Jet Cutting Machine* skala laboratorium sebagai penunjang pembelajaran di Jurusan Teknik Mesin. Metode yang digunakan meliputi perancangan, persiapan bahan dan komponen, proses pembuatan, perakitan, serta pengujian alat. Mesin yang dibuat menggunakan sistem *CNC* dua sumbu, yaitu sumbu X dan Y, dengan komponen utama berupa rangka, bak penampung air, *aluminium profile X2020 Vslot*, motor *stepper*, *timing belt GT2*, *pulley GT2*, *V-wheel POM*, *driver A4988*, *Arduino Uno* berbasis *firmware GRBL*, pompa air bertekanan tinggi, selang, dan *nozzle*. Pengendalian pergerakan *nozzle* dilakukan melalui program *G-Code* yang dikirim dari komputer menuju sistem kontrol sehingga *nozzle* dapat bergerak mengikuti lintasan yang telah ditentukan. Proses pembuatan meliputi pembuatan rangka, pembuatan bak penampung air, pemasangan sistem gerak *CNC*, pemasangan sistem aliran air, serta penyatuan seluruh komponen. Hasil rancang bangun menunjukkan bahwa *CNC Water Jet Cutting Machine* berhasil dibuat dan dapat beroperasi sesuai fungsi yang direncanakan. Alat ini diharapkan dapat membantu mahasiswa memahami sistem mekanik, sistem kendali *CNC*, serta prinsip kerja teknologi *water jet cutting* dalam mendukung pembelajaran manufaktur modern.



**Kata Kunci**: *CNC*, *Water Jet Cutting Machine*, Rancang Bangun, Pembelajaran Teknik Mesin, *GRBL*.

## ABSTRACT

***Design and Construction of a Used Oil Burner for The Steel Forging Process in The Welding Workshop of The Mechanical Engineering Department (Programming Process)***

***(2025: xii + 67 pp. + 29 Figures + 3 Tables + 7 Attachments)***

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*The development of modern manufacturing technology requires machines capable of supporting production processes with high levels of precision, efficiency, and automation. One of the technologies that continues to develop is Computer Numerical Control (CNC), which enables automatic machine movement based on programmed instructions. Water Jet Cutting Machine is a cutting technology that uses a high-pressure water stream, allowing the cutting process to be performed without producing a Heat Affected Zone (HAZ). This final report aims to design and build a laboratory-scale CNC Water Jet Cutting Machine as a learning support facility in the Mechanical Engineering Department. The methods used include design, preparation of materials and components, manufacturing, assembly, and machine testing. The developed machine uses a two-axis CNC system, consisting of the X and Y axes, with main components including a frame, water collection tank, 2020 V-slot aluminium profile, stepper motors, GT2 timing belts, GT2 pulleys, POM V-wheels, A4988 drivers, an Arduino Uno with GRBL firmware, a high-pressure water pump, hose, and nozzle. The nozzle movement is controlled using G-Code transmitted from a computer to the control system, allowing the nozzle to follow a predetermined cutting path. The manufacturing process includes frame fabrication, water collection tank fabrication, installation of the CNC motion system, installation of the water flow system, and integration of all components. The results show that the CNC Water Jet Cutting Machine was successfully constructed and operated according to its intended function. The machine is expected to assist students in understanding mechanical systems, CNC control systems, and the working principles of water jet cutting technology in supporting modern manufacturing education.*



***Keywords :*** *CNC, Water Jet Cutting Machine, Design and Construction, Mechanical Engineering Learning, GRBL.*