

ABSTRAK

PT Stechoq Robotika Indonesia merupakan perusahaan R&D (*Research and Development*) yang berfokus dalam mengembangkan inovasi produk teknologi robotika dan industri IoT 4.0. PT Stechoq Robotika Indonesia memiliki mesin *sheet metal bending* merk KRASS MACHINE yang masih menggunakan *marking* manual sehingga memperlambat waktu produksi dan mengurangi kesalahan operator. Dibutuhkan penambahan *back gauge* otomatis pada mesin *sheet metal bending* merk KRASS MACHINE yang digunakan untuk meningkatkan efisiensi dan akurasi proses *bending*. Perancangan *back gauge* pada mesin *sheet metal bending* terdapat tiga komponen utama yakni perancangan *axis* sumbu y, *carriage stopper* dan komponen elektronika. Perancangan ini menggunakan *software Autodesk Inventor 2023*. Bagian rangka *axis* sumbu y dianalisis menggunakan *Finite Element Method* (FEM) sehingga dihasilkan nilai *von mises stress*, *displacement* dan *safety factor* pada pembebanan terpusat dan pembebanan terbagi merata. Hasil analisis dilakukan perbandingan dengan perhitungan manual untuk beban terpusat dan beban terbagi merata. Sehingga hasil yang didapatkan perbedaan dari hasil analisis dan hasil perhitungan manual relatif kecil dan secara keseluruhan rangka *axis* y memiliki defleksi yang rendah dan *safety factor* yang tinggi. Pengujian keakuratan dilakukan menggunakan variasi tiga jenis mata pisau yang berbeda. Pengujian dilakukan dengan *set distance back gauge* 100 mm, 200 mm dan 300 mm dengan tiga kali pengulangan untuk setiap jarak. Pengujian menunjukkan nilai deviasi antara jarak yang diinputkan pada *set distance read* hmi dan hasil aktual setelah proses *bending* masih dalam batas toleransi ± 1 mm. Hasil persentase keakuratan *set distance read* hmi yakni mata pisau tipe 1 sebesar 99,75%, mata pisau tipe 2 sebesar 99,84% dan mata pisau tipe 3 sebesar 99,62%. Sedangkan hasil persentase aktual setelah proses *bending* yakni pada mata pisau *bending* tipe 1 sebesar 99,85%, mata pisau 2 sebesar 99,54% dan mata pisau 3 sebesar 99,54%. Berdasarkan hasil tersebut dapat disimpulkan bahwa *back gauge* dapat mempertahankan akurasi dengan nilai deviasi dalam batas toleransi ± 1 mm.

Kata Kunci : *Back gauge*, *Sheet metal bending*, *Autodesk Inventor*, *Finite Element Method* (FEM), Otomasi.

ABSTRACT

PT Stechoq Robotika Indonesia is an R&D (Research and Development) company that focuses on developing innovative robotics technology products and the IoT 4.0 industry. PT Stechoq Robotika Indonesia has a sheet metal bending machine brand KRASS MACHINE which still uses manual marking so that it slows down production time and reduces operator errors. It takes the addition of an automatic back gauge on the KRASS MACHINE brand sheet metal bending machine which is used to increase the efficiency and accuracy of the bending process. The design of the back gauge on the sheet metal bending machine has three main components, namely the design of the y-axis axis, carriage stopper and electronic components. This design uses Autodesk Inventor 2023 software. The y-axis frame part is analyzed using the Finite Element Method (FEM) so that the resulting von mises stress, displacement and safety factor values in centralized loading and evenly distributed loading. The results of the analysis are compared with manual calculations for centralized loads and evenly distributed loads. So that the results obtained differences from the results of the analysis and the results of manual calculations are relatively small and overall the y axis frame has a low deflection and a high safety factor. Accuracy testing was carried out using a variation of three different blade types. Tests were conducted with a set distance back gauge of 100 mm, 200 mm and 300 mm with three repetitions for each distance. The test shows the deviation value between the distance inputted on the set distance read hmi and the actual results after the bending process is still within the tolerance limit of ± 1 mm. The results of the percentage accuracy of the set distance read hmi, namely blade type 1 of 99.75%, blade type 2 of 99.84% and blade type 3 of 99.62%. While the actual percentage results after the bending process are on the type 1 bending blade of 99.85%, blade 2 of 99.54% and blade 3 of 99.54%. Based on these results it can be concluded that the back gauge can maintain accuracy with a deviation value within the tolerance limit of ± 1 mm.

Keywords: Back gauge, Sheet metal bending, Autodesk Inventor, Finite Element Method (FEM), Automation.