ABSTRAK

Gaya potong merupakan informasi paling penting dalam proses pemesinan untuk optimalisasi parameter pemotongan dan sistem pemantauan kondisi pahat. Penelitian ini mengembangkan dinamometer berbasis *strain gauge* untuk mengukur gaya potong 2 sumbu selama pemesinan. *Full Octagonal shaped ring* digunakan sebagai tranduser gaya untuk mengukur gaya potong yang bekerja pada ujung pahat. Pada penelitian ini akan dilakukan konfigurasi *strain gauge* pada *full octagonal shaped ring*, kalibrasi dan validasi dinamometer. Hasil konfigurasi *strain gauge* telah sesuai ditunjukan berdasarkan nilai pengukuran resistansi pada setiap wiringnya. Untuk hasil kalibrasi pada tranduser juga telah sesuai mampu membaca defleksi pada tranduser ditunjukkan oleh tren grafiknya, sedangkan hasil kalibrasi dinamometer didapatkan hasil sensitivitas yaitu untuk gaya normal sebesar 10,7 mV/N dengan nilai *cross sensitivity error* dan *linearity error* berturut – turut 10,9 % dan 0,68%. Selain itu, untuk sensitivitas gaya tangensial sebesar 16,4 mV/N dengan nilai *cross sensitivity error* dan *linearity error* berturut – turut 17,6% dan 3,7% sedangkan hasil validasi dinamometer kecepatan putar *spindle* 160 rpm didapatkan nilai gaya normal sebesar 13,6 N dan gaya tangensial 31,06 N. Pada kecepatan putar *spindle* 320 rpm didapatkan nilai gaya normal sebesar 10,9 N dan gaya tangensial 28,8 N. Sedangkan kecepatan putar *spindle* 450 rpm didapatkan nilai gaya normal sebesar 11,4 N dan gaya tangensial 26,6 N. Dengan hasil kalibrasi dan validasi tersbut dinamometer *reliable* dalam mengukur gaya potong normal dan gaya tangensial serta dapat digunakan dalam monitoring proses pemesinan.

Kata kunci: *dinamometer, gaya potong, kalibrasi, validasi.*

ABSTRACT

In the lathe process in industry, it is necessary to monitor the quality of the product. The monitoring is done on the cutting force parameter using a dynamometer. The dynamometer that is widely used is a dynamometer made by Kistler Instruments (Pte) Ltd. However, the price of the dynamometer is quite expensive. This motivated some researchers to develop an affordable dynamometer using a strain gauge and a specific form of tranducer to measure cutting forces. The working principle of the strain gauge is to measure the force that occurs on the surface of the object, where the surface of the object is deformed and then converted into a resistance value. In this research, strain gauge configuration will be carried out on a full octagonal shaped ring, calibration and validation of the dynamometer. The results of the strain gauge configuration are in accordance with the measurements by the AVO meter. For the calibration results on the tranduser, it is also appropriate to be able to read the deflection on the tranduser indicated by the graphical trend, while the dynamometer calibration results obtained sensitivity results, namely for normal force of 10.7×10^(-3) mV / N with cross sensitivity error and linearity error values of 10.9% and 0.68% respectively. In addition, for tangential force sensitivity of 16.4×10^(-3) mV / N with cross sensitivity error and linearity error values of 17.6% and 3.7% respectively and the results of the validation of the 160 rpm spindle rotational speed dynamometer obtained a normal force value of 13.6 N and a tangential force of 31.06 N. At 320 rpm spindle rotational speed, the normal force value is 10.9 N and the tangential force is 28.8 N. While the spindle rotational speed of 450 rpm, the normal force value is 11.4 N and the tangential force is 26.6 N. With the results of calibration and validation, the dynamometer is reliable in measuring normal cutting forces and tangential forces and can be used in monitoring the machining process.

Keywords: *dynamometer, cutting force, calibration, validation.*