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A Review on Gain Optimization for Cutting Tests on CNC Machine Using the Ballbar Method with CMM Machine Measurements

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ABSTRACT

Optimization is one of the main keys to the success of the optimization process in CNC machines in the industrial field and provides information gain optimization control to improve product quality. A few benefits that can be received from optimization are pace and accuracy in product design and production techniques. Within the production gadget, a test of the preferred quality is done. This protection case, use the method with the useful resource of developing or reducing the advantage adjustment on the CNC milling device input panel. This paintings became adjusting to find benefit optimization settings the usage of techniques, especially the Ballbar and the CMM size, to diagnose the CNC milling device. Ballbar dimension to analyze the effects of servo mismatch and circularity without trimming load, on the equal time as CMM measurement to length thru products produced on Fanuc CNC milling gadget, the stop result is a style of image blunders ensuing in circularity errors effects. Accuracy of finished test portions commonly on CNC machines inside the adjustment loop gain parameter.

1 Introduction

The electrical electricity may be without delay converted to the mechanical energy of linear automobiles. Because of the absence of transmission mechanisms, linear cars have many splendid benefits, along with rapid response, immoderate velocity, and immoderate positioning accuracy. Therefore, a linear motor servo device has acquired increasingly interest from educational and business fields in latest years. The development of technology, especially laptop era, today makes an critical position within the indust rial area

. In conjunction with modern technological advances inside the development of computers, digital technology, automation, precision machining technology, and the development of CNC generation. The technology of CNC within the concern of enterprise took detail and has skilled super

progress. In present day years there had been some associated technologies, which include reducing gadget gadget, spindle servo, excessive-speed slicing device technology, and mechanical necessities to get the preferred optimization rate. Optimization is one of the most vital keys to the success of the optimization way in CNC machines inside the business location and offers statistics to operators inside the manage machine to decorate product pleasant. Some benefits that may be received from Optimization are speed and accuracy in product format and manufacturing strategies. In the production process, a test of the preferred pleasant is completed. Inside the international ISO regulations machine gear mainly, CNC milling machines the usage of global popular ISO

2 CMM (Coordinate Measurement Machine)

CMM or can also be referred to as Coordinate Measurement Tool is a tool used to degree three dimensions or (three-D), the dimensions required are rooms which have length, width, and peak, which can be amassed into Cartesian coordinates inside the X, Y and Z systems. Then coordinate statistics decided with the aid of CMM at the location, diameter, distance, angle, and so on. In this study using CCM kind Brown & Sharpe GLOBAL Silver Coordinate Measuring Machines (CMM) from the Hexagon Metrology organization. The following figure from Brown & Sharpe GLOBAL Silver Coordinate Measuring Machines (CMM) as follows:

Figure 5: Brown & Sharpe GLOBAL Silver Coordinate Measuring Machines (CMM)

Results of Adjustments Loop Gain Parameter on the X, Y-Axis Servo System in Ballbar Measurements

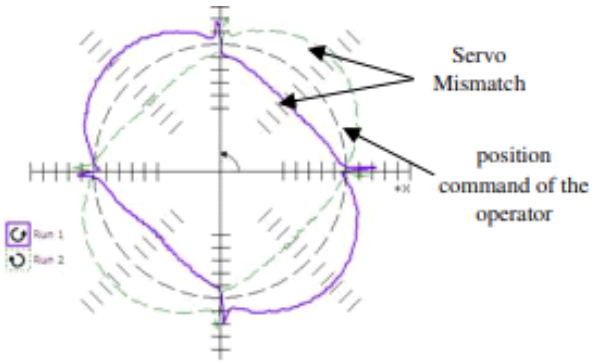
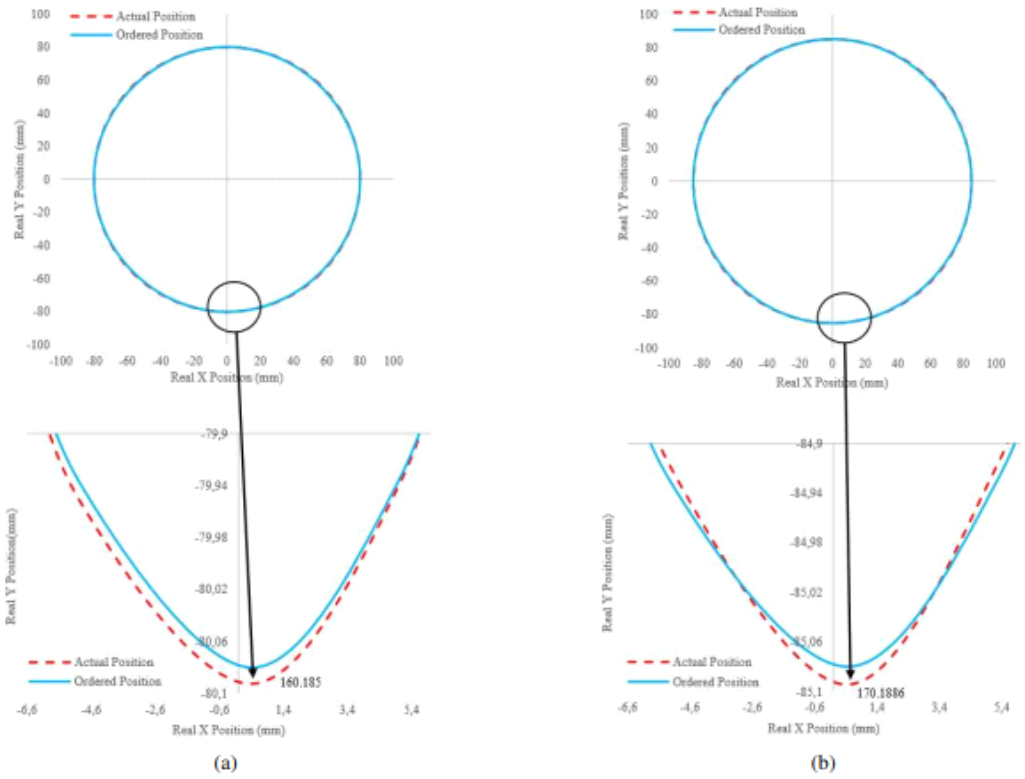


Figure 6: Graph of Servo Mismatch [10]

The Setting parameter adjustments at the Fanuc CNC Machine, there are three axes at the Fanuc CNC system servo. Namely the X-axis, Y-axis, and Z-axis. In the changed research the alternate in parameter adjustment is at the Y-axis servo, even as the parameters on the X-axis servo and Z-axis are steady. Especially within the adjustment loop advantage parameter, the loop advantage will be improved. Following is the table for the servo adjustment X-axis and Z-axis parameter that are made constant:



Conclusion

This maintenance case, use the method by increasing or decreasing the gain adjustment on the CNC milling machine input panel. This work was adjusting to find gain optimization settings using two methods, namely the ballbar measurement and the CMM measurement, to diagnose the CNC milling machine. Ballbar measurement to analyze the results of servo mismatch and circularity without trimming load, while CMM measurement is the measurement through products produced on The Fanuc CNC milling machine, the result is a trend of graphic error resulting in circularity error results. As shown in Figure 10, System I which has a circularity value of 24.6 µm at 160.16 mm measurement, while at 170.16 mm measurement has a circularity value of 28.6 µm. The conclusions of System II and V are better than the System I from Ballbar measurements and CMM measurements, this is because it has circularity values below 25 µm at International Standard ISO 10791-7: 2014 test condition for machining centres – Part 7: Accuracy of finished test pieces as a rule on CNC machines in the adjustment loop gain parameter.

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