

## **ABSTRACT**

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### **PENGUKURAN TEKUKAN PIPA MENGGUNAKAN MANIPULATOR**

(xiv + 73 pages: 66 figures; 15 tables)

Pengukuran Tekukan Pipa menggunakan Manipulator is a Coordinate-measuring Machine (CMM) using button as its probe. Automotive manufactory find that it is hard to copy tube characteristics and duplicate it. This final project creates a system (a manipulator along with interactive software) which is able to copy a tube position on workspace into a computer. It is easy to use and the algorithm was developed based on Forward Kinematics Denavit-Hartenberg Model calculation. The system uses slow microcontroller and produces minimal image of the tube.

The manipulator is designed with five degrees of freedom and modeled after human arms. The software is a globally computed program which is able to handle a robot with up to 12 degrees of freedom. The system monitors and calculates every movement of the arm robot. It consists of encoders and data passing system. Data from monitoring system are sent to computer. Data that computer receives are hexadecimal form to be converted to decimal and calculate to gain its position coordinates. Lines between these coordinate are becoming the simple image of the tube.

It has been proven that using Denavit-Hartenberg Model with different reference frame results in the same tube characteristics. Hence it is not necessary to require a particular first position. Further studies may include making bending machine that uses the tube characteristics to produce duplicates, changing into faster microcontroller, changing rotary encoder's resolution into higher one.

References: 7 (1994-2009)