CHAPTER I

PRELIMENARY

1.1 Background

Industrial needs lots of measuring devices to determine various physical changes. The use of digital measuring devices is more and more replacing various conventional or analog devices because it has many advantages such as on theaccuracy, ease to use, recording data, and also have better display. One characteristic of the digital measuring device is the use of sensor to detect changes.

Measurement of displacement typically using calipers that has good accuracy up to 0.05 mm. The reading of measurement is very depending on the skill of users and the precision measuring tool itself as well. Several types of caliper is equipped with a small digital display that can show the measurement directly without seeing the grid on calipers.

For measuring displacement, accuracy is the main issue to obtain precise data. The use of sensor is one of the solutions to make digitized. One idea for using compression springs and the load cell which is expected to be implemented as a new method for narrow distance measuring device. The spring is connected to load cell to detect the magnitude of changes in the dimensions of distance caused by a force element when the load placed on the spring. The changes appear on the spring resulting in pressure on the load cell and then converted into electrical signals which processed and displayed bya microcontroller system.

This research conducted in observations of the distance changes on the compression spring that is placed on load cell. The value will be measured and recorded to determine whether the configuration of compression spring and load cell can be developed as a good displacement measuring tool.

1.2 Research Questions

Based on the background, the problem in this final project could be mention as follows:

1. How does the change in distance on the pressure spring against the load cell can be digitally recorded ?
2. How the changes on the compression spring can be sense by load cell and then measured by arduino-based system ?

1.3 Problem Limitations

In order to achieve the desired goals and objectives, there are some following restrictions given:

1. The sensor used is a load cell with a maximum load of 1 kg.
2. The application use Arduino system as a processor and the output to the LCD 2x16.
3. Using some kind of spring as the comparison on measurement.
4. This displacement measurement was taken at a perpendicularposition to the horizontal plane.
5. The measured distance range is 0 cm – 9 cm only.

1.4 Research Objectives

The objectives of this research are:

1. To observe the influence of the distance changes of the compression spring against the load cell which can be digitally displayed.
2. To design the device that can measure distance of the compression spring on the load cell by Arduino-base system.

1.5 Benefits Research

The benefits of this research are as follows:

1. As a reference for the other design of distance measurement that use the sense configuration of spring and load cell.
2. As an alternative to the limited distance measuring device.
3. Being a research study in related topic.

1.6 Methods

a. Literature

   Study on existing references, derived from books and scientific papers related to the writing of this study.

b. The data collection
   1. Collect the datasheet of each component.
   2. Collect software data (Arduino).
   3. Collect the data from other research.

c. Tools design
   1. Mechanic tool design.
   2. Electronic tool design.
   3. Create the program.

d. Device Making
   1. Make mechanical and mechanism.
   2. Manufacture of electronic circuits.
   3. Assembling all of the components and programming tools.

e. Testing
   1. Repeated testing tool to assess the success of the system.
   2. Testing tools, in Electrical Engineering Laboratory UMS, conducted by chief Laboratory and electrical engineering student.

f. Data Analysis

   Data analysis was conducted on the system test.

g. Conclusion

   The conclusions will take from the results of the system testing.

1.7 Writing Methods

This study consists of five chapters as follows.

CHAPTER I PRELIMINARY

In this chapter described the background of the problem formulation of the problem, limitation problem, purposes of the research, benefits of the research, research methods, and systematic writing.

CHAPTER II BASIC OF TEORY

Discusses the basics of the theory that is used along with a general description of the parts of the system.

CHAPTER III DESIGN AND IMPLEMENTATION

Contains the description and explanation of the draft, either mechanical, electronic, and programs, as well as an explanation of the flow chart and the algorithm of the system tools.

CHAPTER IV TESTING AND ANALYSIS

Contains the results and analysis of the testing device, either mechanically, electronically, and algorithms program.

CHAPTER V CLOSING

Contains the conclusions obtained from the design, manufacture, testing tools, and advice for the tool development.