DETECTION OF METALLIC CONTAMINANT IN ALUMINIUM SODA CAN USING TMR SENSOR

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Abstract. The contaminant is one of the big concerns in food processing industry and metallic objects can be one of the contaminant factors since most of the food processing equipment and tools are composed of metallic parts. Metal detector is used because these materials might cause injury to the consumers. Moreover, even the smallest particle of metals can cause to machinery failure. We have developed an inspection system for detecting the magnetic remanence of the contaminants. The system utilizes a Mag3110 magnetometer. Arduino operating software was developed for Mag3110 tuning, data acquisition, and identification of the presence of the contaminant. The system performance was evaluated using stainless steel balls. The developed system could detect a stainless steel ball having diameter as small as 0.1 cm. In order to optimize the position of the sensor, we performed a simulation of magnetic moment dipole. The signal will be sent to the control panel and it will give the results whether the metal object is presence or not. Besides, the simulation of this system is improved to enhance detection sensitivity. The magnetic response with respect to position of the sensor, different size of metal objects, and also the types of metal contaminant is studied as well.

Keywords: Metal detector, magnetometer, magnetic remanence.

1   Introduction

Canned foods are one of the processed foods that popular in this age. Due to this, to ensure the safety of the consumers finding a detector that can detect any foreign bodies in canned products before they are being distributed to market is important. A mixture of metallic contaminants to food is a serious problem not only for the user; it also can affect the mechanism and operation of the machine in the food processing line which can cause the high cost to repair the machine.

Metal detection is the most popular detection system method that has been used in food industries. This method can identify large metallic objects and work well in bulk containers of raw materials but it hard to detect metals such as stainless steel. Jae-Sung Kwan et al. proposed about detecting foreign object using x-ray in dry food