

DESING OF A NEW SENSOR FOR DETERMINING OF MIXED METAL PARTICLES IN GRAIN STORAGES AT FLOUR MILLS

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Abstract

In this study, a new electromagnetic sensor designed to detect mixed magnetic particles appear in grain storage during production process. Product passes through electromagnetic sensor and sensor observes. If there is any magnetic particle, sensor senses and give a warning and it also will give information about metal's size from LCD screen which on it and later it stops systems. We obtain very good results to determining of mixed metal particles at flour mills using designed electromagnetic sensor and results indicated that metal detecting in grain storages with that sensor provide reliable and consistent diagnosis and that they are feasible in real life.

Keywords: electromagnetic sensor, metal detector, microprocessor, all-time systems, foods.

INTRODUCTION

Foreign material in foods (glass, plastic, metal, etc.) is the biggest single source of customer complaints received by many food manufacturers, retailers and enforcement authorities. In even the best-managed processes, the accidental inclusion of unwanted items may sometimes occur [1]. The EU RASFF database has been used to provide information on trends in food notifications. The major focus of previous reports has been on either the health hazards arising from various contaminants found in foodstuff or producers of these faulty products [5]. Specially metals outgoing foods is more important cause, they can causation some health problems (neural and brain). The role of the trace elements copper, iron and zinc in diferent biological functions makes them important in nutrition and especially in infant nutrition [2].

EXPOSITION

A wide range of metal fragments is still reported from food products, despite the wide-spread use of metal detectors and magnets on food production lines. Because, existing used method (bullet magnet systems and classic metal detectors) is not enough. They overlooks a lot of metals that micron size [3]. The type of metal involved is usually an important indication of the source of the problem. In flour and bakery products products, pieces of broken sieve may be the origin, whilst in other products, the cause may be fragments of electrical wire from repairs, either in the factory. Corrosioned metal particles from machines at flour mills are considerably small

(micron dimension) and a lot of metal detectors is not detecting. Our electromagnetic sensor is comparatively sensitive and it can also detect 0,15mm size.

Metal detector has many applications in food industries, wood board plants, safety security and landmine searching [4]. But these almost metal detectors uses one coil (including PI systems) but, our system uses three coil that one of them is transmitter coil and other are receiver coils. This system knows skinny bid 'all time systems'.



Fig. 1. *Designed device*

As can be seen below, designed coil system has three coils. We send about 8 KHz sinusoidal signals for middle coil (transmitter role) and later we stand by other coils (receiver role). well, middle coin induces others. If there is any distortion at receiver coils, we can say that a metal is closing [7].

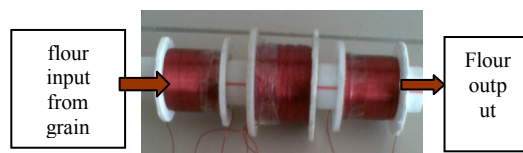


Fig. 2. *designed coil system' s prototype*

Here, the most important even is coils' location. All of coils to be at such a point that, signal is must be zero.

CONCLUSION

There is a possibility that ultra-small metallic foreign matter has been accidentally mixed with industrial products or beverages [6]. Usually it happens because of corrosion from machines. And later that metal particles mixed with flour and go forward to flour bag. Here, before from flour bag, detection is necessary certainly. Because of a lot of erosion and friction at fabric's silos, flour on silos can have undesirable foreign substance (like glass, plastic, metal, etc.). Most of these substance are harmful for human health. So, these substances must be detected.

In this study; a new sensor model and its device designed (Fig. 1.).

Product passes through electromagnetic sensor and sensor observes. If there is any magnetic particle, sensor senses and give a warning and it also will give information about metal's size from LCD screen which on it and later it stops systems.



Fig. 3. Corroded iron particles into flour (black points)

Fig. 3. shows corroded iron particle into flour that detected by our designed system. As can be seen at Fig. 3., this issue is considerably important. If we think that for infant foods, the issue is more important. So, our designed sensor is to be of the first order of importance and it must be use every flour mill, bread fabric, infant food fabric...

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