Technical Note

ANRITSU INDUSTRIAL SOLUTIONS

Anritsu

Vol.4

January 2012

Tips for Effective Use of Metal Detectors
— Countermeasures Against False Detection Vol.2 —

Last time we introduced factors in external environment that affect metal detector performance. This time we feature another factor, *product effect*.

【1】 False detection caused by product effect

Metal detectors detect contaminants by catching the changes of magnetic fields in detection heads. The magnetic fields change by the effect of not only metals but also products themselves. This effect of products on magnetic field is called product effect. Its strength varies depending on the product characteristics such as temperature and salinity, regardless of physical appearance.

When the characteristics of a product greatly varies, false detection can occur because a metal detector sets the limit value based on the product effect of non-defective products. The product effect can be visualized on the product effect screen of the metal detectors (Fig. 1).

Product effect screen

Fig. 1: Product effect screen

Let's take a look at an experiment with water in container to see how much product temperature and salinity affect detection sensitivity.

【2】 Effect of product temperature

First, look at the product effect of temperature. Fig. 2.1. and 2.2 show that when water temperature rises 10 degrees C, product effect becomes double and detection sensitivity becomes lower. For instance, when you leave products to be inspected out of refrigerator or freezer for long hours, the product temperature will have changed at the time of inspection.

If your facility's temperature is affected largely by seasonal climate changes, you should be careful in handling your products.
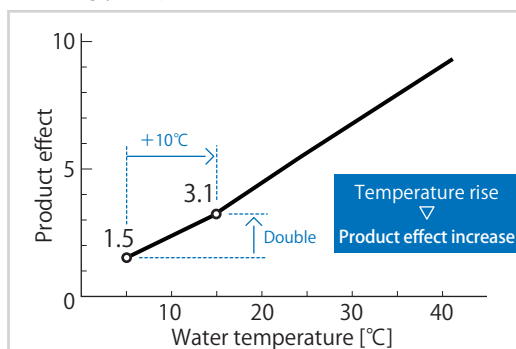

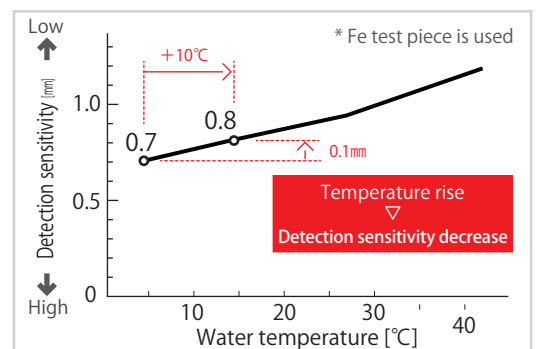**Fig. 2.1**: The relationship between water temperature and product effect

Fig. 2.2: The relationship between water temperature and detection sensitivity

【3】 Effect of salt content

Next, we take a look at salinity effect. A pinch of salt, generally used in cooking, is around 6 grams. If you put 6 grams of salt in 100 ml of water, the salinity level increases by 0.6%. You can see how this works with product effect and detection sensitivity in Fig. 3.1 and 3.2. When salinity level becomes 0.6% higher,
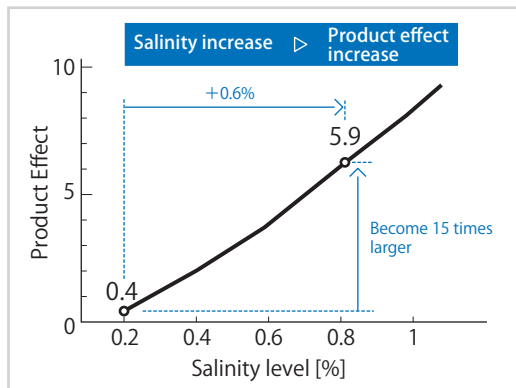
Technical
Note

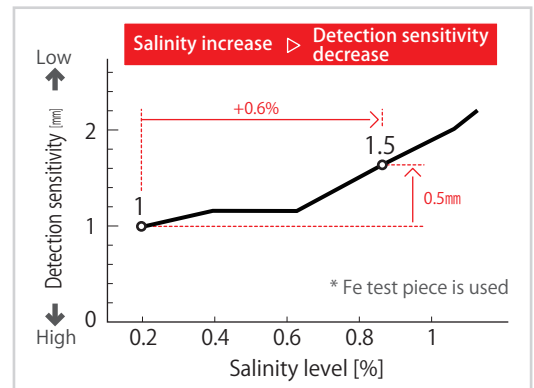**Fig. 3.1**: The relationship between salinity level and product effect

Fig. 3.2: The relationship between salinity level and detection sensitivity

product effect significantly increases and detection sensitivity decreases, which can lead to false detection.

This experiment was conducted under the extreme conditions for explanation purposes; however, please be aware that changing or adjusting seasonings can significantly affect the detection performance of metal detectors.

【4】 Solutions for product condition change and variability

As mentioned above, temperature and salinity of products greatly contribute to detection sensitivity. In order to prevent false detection, you can take following measures.

A To perform auto-settings with the same product condition as when fed into inspection

B To perform auto-settings with a product having larger product effect (e.g. deliberately raise product temperature or salinity level)

When you change the ingredients or amount of seasonings, perform (A) each time so that your metal detector remains stable. When temperature and salinity level can vary and difficult to control, (B) is effective. However, it's important to check detection sensitivity after changing the settings because setting product effect larger than actual one can reduce detection sensitivity.

【5】 duw-h series overcome product characteristic variation

Let us introduce Anritsu duw-h series metal detector featuring "auto-tracking function". The left graph in Fig .4 shows that the peak of the detection signal has shifted to the right as product temperature has risen. At the timing of the vertical dashed line, where the metal detector measures the effect of a product that may include metal contaminants, the evaluation value falls below the limit value. This causes the overlooking of defective products.
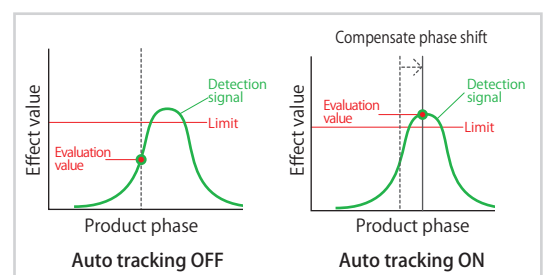

Fig. 4: Auto-tracking function

The right graph in Fig. 4 shows the auto-tracking function senses the amount of shift and adjusts the timing to measure the product effect. As a result, the evaluation value goes beyond the limit, which means the metal detector successfully detects contaminants.

With this automatic compensation capabilities, the duw-h series ensure stable detection performance at all times even in facilities where product temperature tend to change during production.

【6】 Conclusion

As we have learned in the last and this issues, metal detector is simple in mechanism but susceptible to external factors and product effects. Why don't you take this opportunities to review your metal detector operation?

For further information, visit   **http://www.anritsu-industry.com/en/**
Contact us   **https://www.anritsu-industry.com/en/inquiry/**