Technical Note
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Metal Detector-Method for Fixing Test Pieces during Sensitivity Check

Those who use a metal detector can perform a sensitivity check by attaching a test piece on a product prior to the start of production. Detection of test pieces by the metal detector would vary depending on which position of a detection head (the tunnel where a magnetic field is generated) test pieces pass through. This paper will explain how the detection of test pieces vary and how to fix a test piece on a sample product.

【1】Sensitivity varies depending on the position of test pieces.

A tool that is used to quantitatively verify the performance and features of measuring instruments is called a reference device. To check the sensitivity of the metal detector, test pieces are used as the reference device. We check each test piece one by one with our metal detector before shipping in order to demonstrate that if the size of the metal ball embedded in a test piece is the same, then the influence of a test piece in the magnetic field is the same.

As many of you know, a test piece is placed on a product so as to pass through the place where the magnetic field is the weakest in the detection head (a magnetic tunnel). The logic is that if a test piece is detected in the area where the magnetic field is the weakest, the test piece can be detected anywhere in the detection head. Let's see how the detection sensitivity for a ferrous test piece differs between the position at which the test piece is hardly likely to be detected and the position at which the test piece is most likely to be detected.

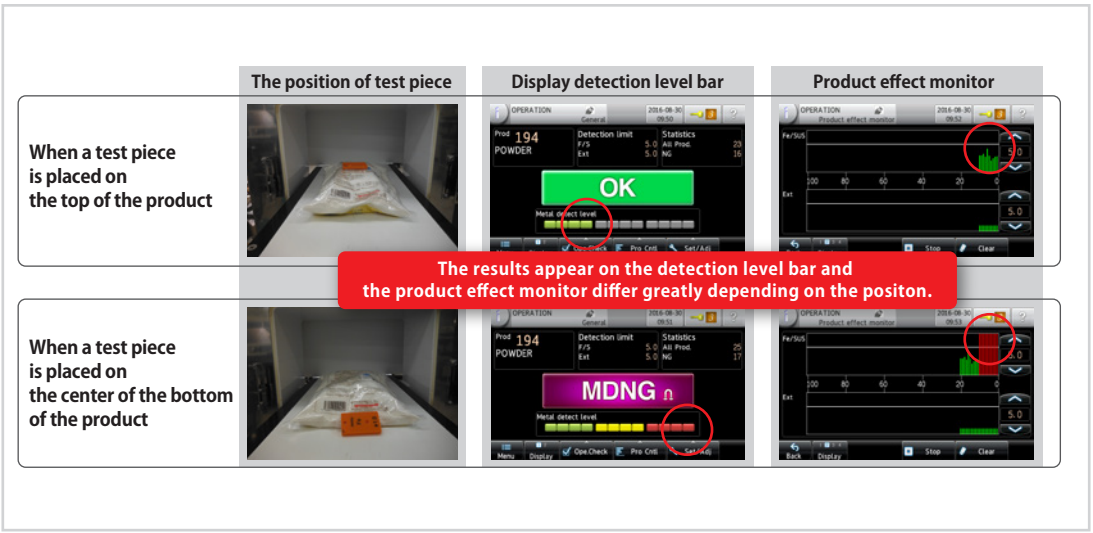

Fig.1-1 : The difference of detection sensitivity depending on the position of Fe Dia.1.0

【2】Method of attaching test pieces

If the shape of a product is stable and a test piece is fixed firmly on the product, sensitivity check can be completed smoothly. However, there are some products with rounded shapes on the top or square shapes that make test pieces hard to attach firmly. We'll show you the method of attaching test pieces effortlessly by using materials that have less effect on the magnetic fields. The same method would apply if the material of the test piece is either FE or SUS.

Technical Note

① How to put a plastic bag with a pocket on a test piece

Since vinyl materials do not affect the magnetic field, test pieces can be fixed anywhere by wrapping a product with a test piece.

Fig. 2-1: Mounting Jig for Test Pieces in Pocket Type (Note: In an actual operation, a single test piece is used.)

② How to Attach a Test Piece with a Rubber Band

Using a rubber band is another useful method for attaching a test piece since rubber does not affect the magnetic fields. The product effect monitor screen in Fig. 2-2 shows a rubber band has no effect on the magnetic fields.

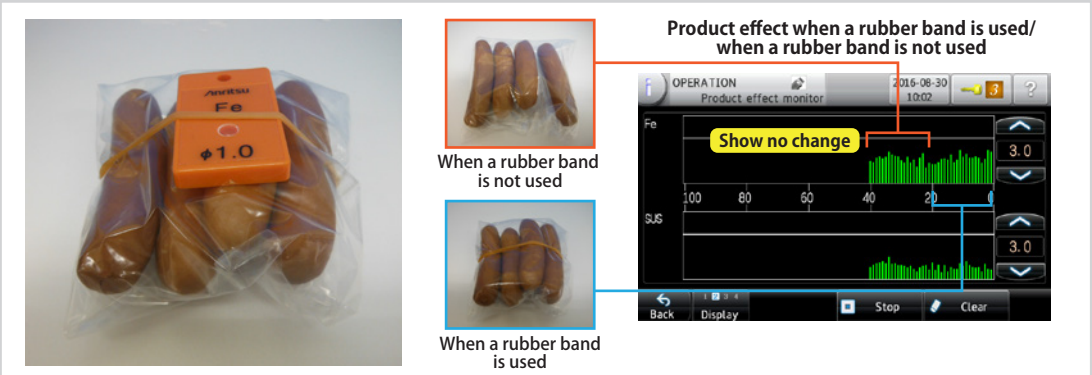

Fig. 2-2: When attaching a test piece with a rubber band

③ Using a resin basket

Using a plastic basket made of resin is another useful method for attaching a test piece since resin does not effect the magnetic field. As shown in Fig. 2-3, products such as shiitake mushroom which is soft and fragile since its shape is uneven can be put in a plastic basket.

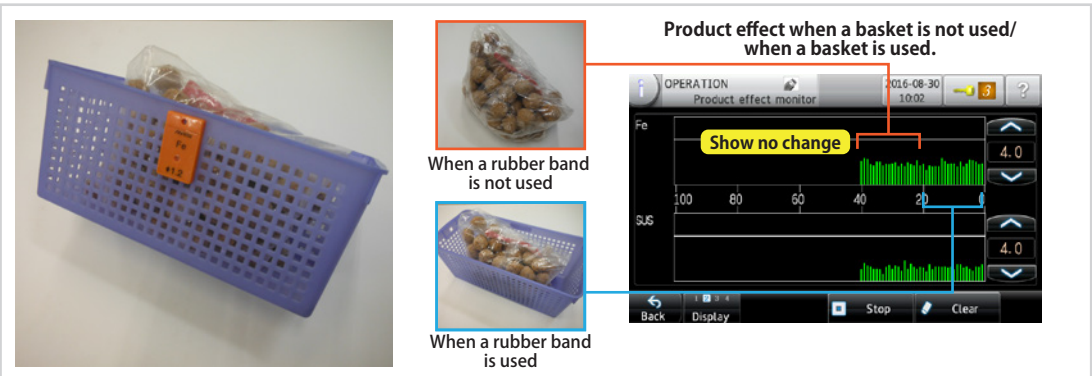

Fig. 2-3 : When the product is put in a basket made of resin.

④ Using a specialized jig

This is the example of another method using a specialized jig made of resin in order to prevent products in standing pouches from falling over. Sensitivity check for products in standing pouches can be performed easily by attaching a test piece on the jig.

Technical Note

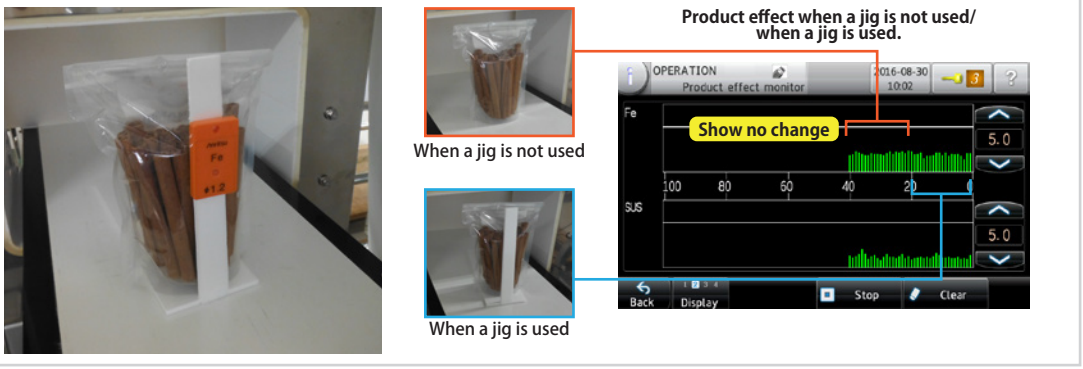

Fig. 2-4 : When a jig is used to attach a test piece.

【3】Does the metal detector sustain its detection performance?

The detection head of the metal detector has a structure in which a transmitter coil and receiver coils are entirely enclosed by an insulator. It is rare for coils and an insulator to deteriorate in a short period. However, we occasionally receive inquiries from some customers about gradual degradation of detection performance of their metal detectors in use. We will show you how to check if the performance of your machine is maintained.

① Record sensitivity of the reference test piece.

Immediately after Anritsu sales engineer has installed a metal detector in your facility, or right after Anritsu sales engineer has completed the maintenance check of your metal detector in use, please feed the reference test piece for sensitivity check. Before feeding the test piece, make sure to change the product number registered for the reference test piece. Keep a record of the scale that lights up on the bar graph as well as the effect value indicated on a screen.

② Record sensitivity of the reference test piece periodically for comparison.

Take a record of the effect value when test pieces in the same size are fed alone on a regular basis. If there is no variation in the scale that lights up on the bar graph and the effect value, the performance of your metal detector is maintained. If the effect value on the records is gradually decreasing, the metal detector is having the degradation of sensitivity for some reason. If this is the case, please contact us so that we can examine the cause of the degradation in detection sensitivity.

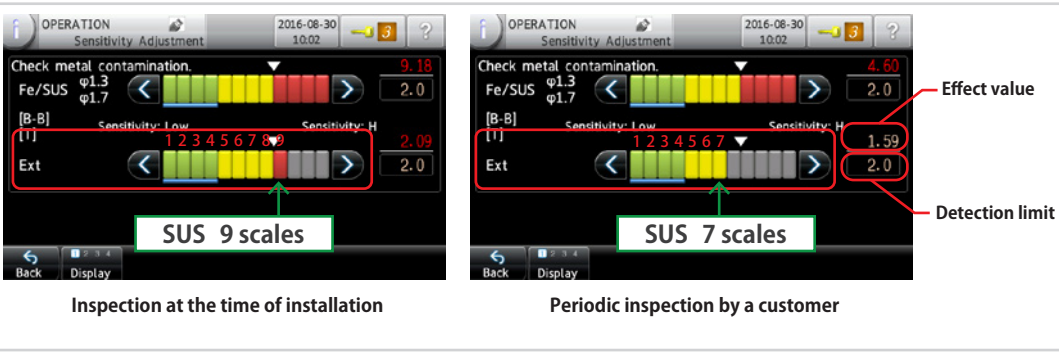

Fig. 3-1 : Record the scale on the bar graph and the effect value periodically

Technical Note

【4】 Conclusion

In metal contamination inspection as HACCP, the detection of contaminants is performed by the metal detector; however, the only way to validate the accuracy of the machine's performance is through sensitivity check using test pieces performed by an operator.

Test pieces have very simple structure, and yet they are very important reference tools just like a weight for a scale. You do not need to be nervous about handling of test pieces; however, they should be kept away from water and shock as it can cause the plastic case and metal sphere to deteriorate faster than normal.

We'll explain how to select and position test pieces for x-ray inspection in the next issue.