

# Technical Note

ANRITSU INDUSTRIAL SOLUTIONS

2011 Vol.3

August, 2011

## Tips for Effective Use of Metal Detectors - Countermeasures Against False Detection -

Metal detectors are the most commonly used equipment for contaminant detection. Yet many users face "false detection".

In this issue we explain the causes and solutions of "false detection".



### 【1】 Metal detector and false detection

Wires, nails and bolts are the most hazardous materials among contaminants. A metal detector is an essential tool to eliminate them reliably. However, there are various cases where false detection occurs, such as, "Products are rejected frequently in the afternoon," "Rejection increases at a certain time every day." False detection is caused not only by product factors (product effect), but also by external factors relating to an operating environment. Let's look at what the external factors, which may be hidden in your facility, are all about.

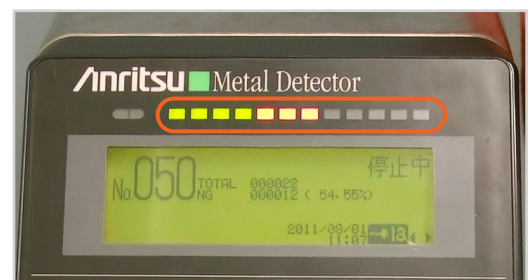
### 【2】 What are external factors ?

The major cause of false detection is vibration and electrical noise that destabilizes the magnetic fields in detection heads. Metal detectors detect contaminants by catching the changes of the magnetic fields when products pass through detection heads. Because of this, if magnetic fields become unstable, metal detectors cannot catch the product effect accurately. This may cause not only false rejection, but also false acceptance of contaminated products, and the latter could lead to critical accidents.

Because noise is invisible, it seems difficult to identify. However it can be easily checked via the indicator on the operation panel. Do you see the lights all flashing back and forth from the greens to the reds when the conveyor is off ? This shows the magnetic field being unstable (Pic.2.1, Pic.2.2). The fluctuation of the magnetic field is shown on the indicator.



Pic.2.1: Magnetic field fluctuation is small



Pic.2.2: Magnetic field fluctuation is large

### 【3】 Causes of and countermeasures against external factors

The main external factors are "vibration" and "electrical noise". Vibration can come from heavy duty vehicles such as trucks passing by near the facilities, or from the movements of workers and equipment. In order to avoid this, please do not install metal detectors near doorways with a lot of traffic.

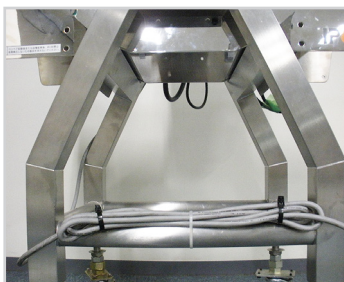
Next, let's look at the main sources of electrical noise listed in Table 3.1. When a metal moves or vibrates, electrical noise can be generated, even if it is a small object like a screw. Coiling an power cable is another source of noise (Pic.3.1). In this case you can put a cable through a metallic pipe to prevent noise (Pic.3.3). If this is difficult for your site, folding a cable back and tying each side is also effective (Pic.3.2).

Loose components
Peripheral devices (e.g. inverter)
Coiled power cable

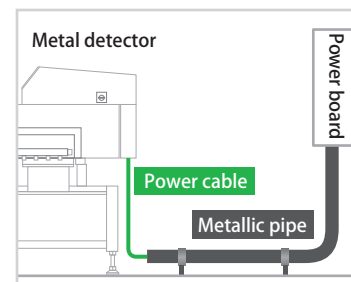
**Table3.1:** Sources of noise



**Pic.3.1:** Coiled power cable



**Pic.3.2:** Folded power cable



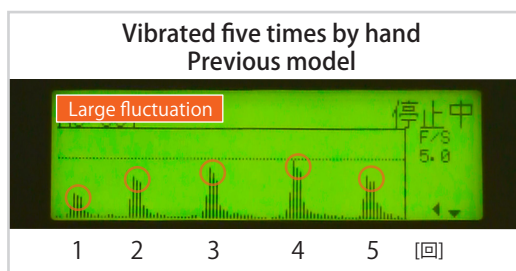
**Pic.3.3:** Put through an metallic pipe

For precise contaminant detection, it is important to stabilize the magnetic fields by determining the external factors that generate vibration and noise and eliminating them. This contributes immensely to the improvement of detection sensitivity.

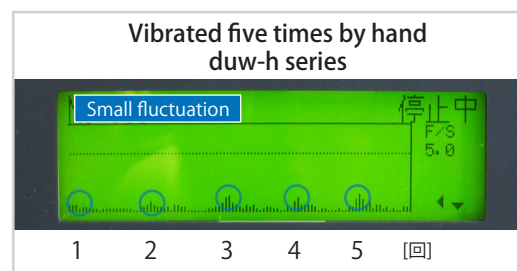
#### [4] Vibration/noise resistant duw-h series metal detectors

Nevertheless, as various machinery and equipment are being installed and replaced continually at the actual sites, the complete elimination of all external factors is difficult. Thus here we introduce duw-h series metal detectors that are highly resistant to vibration/noise.

With a rounded head designed to stabilize magnetic fields, the duw-h series achieved higher vibration/noise resistance. Moreover, it obtains higher detection sensitivity by strengthening the magnetic fields. The below pictures show the changes of magnetic fields when metal detectors were shaken intentionally. The magnetic field of the conventional metal detector is largely affected (Pic.4.1). In contrast, the duw-h series resulted in small changes (Pic.4.2). This comparison shows the duw-h series is designed to be high vibration/noise resistance.



**Pic.4.1:** Magnetic field changes when vibrated (previous model)



**Pic.4.2:** Magnetic field changes when vibrated (duw-h series)

#### [5] Closing remarks

Various external factors of false detection were mentioned above. Metal detectors are not complex machine. With the review of your operating environment, you can use metal detectors effectively. Another cause of false detection, "product effect", will be featured in the next issue.