



Fortress Metal Detectors



METAL DETECTION - THE BASICS
PRODUCT EFFECT AND METAL FREE AREA

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METAL DETECTION - THE BASIC PRINCIPLES

Product Effect and Phasing

The control electronics actually split the received signal into two separate channels: magnetic and conductive. This means there are effectively two balanced scales within the detector (figure 3). These scales continuously measure the magnetic and conductive signal component of every disturbance. Products that are being inspected can also have one or both of these characteristics.

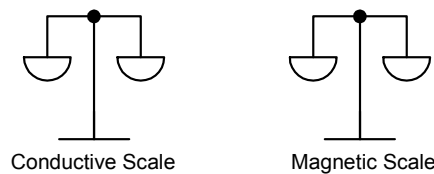


Figure 3

Product Effect

Metal detectors detect metal based on measuring electrical conductivity and magnetic permeability. Many products to be inspected inherently have one or both of these characteristics within their makeup. For example, any product that is iron enriched such as cereals, create a large magnetic signal that the detector must overcome in order to detect small pieces of metal. These are referred to as “dry” products. Conversely, products with high moisture and salt content such as bread, meat, cheese, etc. are electrically conductive and produce a conductive error signal. These are referred to as “wet” products. The table below shows typical product error signals and categorises them as wet or dry.

The detector must remove or reduce this "product effect" in order to identify a metal contaminant. Most modern detectors will have some form of automatic calibration to do this - it is often referred to a *phasing*.

Typical ‘Wet’ Products	Typical ‘Dry’ Products
<p><u>Food:</u> Meat, Cheese, Bread and Bakery Products, Fish, Dairy Products, Salads</p> <p><u>Packaging:</u> Metalized Films</p> <p><u>Other:</u> Plastic and Rubber products with high carbon black content</p>	<p><u>Food:</u> Cereal, Crackers, Flour, Tablets Powders, Biscuits, Frozen Food Products (< -1.0 Degrees C), Peanut Butter and Margarine (Vegetable oil is not conductive)</p> <p><u>Other:</u> Wood Products, Plastics and Rubber (Products with high carbon black content may be considered ‘wet’), Textiles, Paper Products</p>

Metal Free Area

The Electro-magnetic field is trapped inside the detector's enclosure (shield). However, some field escapes out of the aperture on both sides and forms the metal free area or MFA.

Generally, the size of the practical leakage is about 1.5 times the (smaller) aperture dimension and no metal should be allowed in this area. Large moving metal should be kept 2 x away.

Where applications demand a smaller MFA, special detectors are available which can substantially reduce the total area required.

