



### **WHAT CAN MAGNETS CATCH ?**

Only three common elements are magnetically attractive - iron, nickel and cobalt. Iron and nickel are regularly found in food and beverage facilities. Nickel is used to plate cast iron parts typically used as machinery bases, allowing them to meet sanitary standards. If the nickel plating chips or peels, magnets can capture these particles. Typically, more than 90% of metal contaminants in processed products are magnetic.

### **IS STAINLESS STEEL MAGNETIC ?**

Yes and No. Type 300 series stainless steel is the most common type of stainless found in food plants. Types 304 and 316 stainless steels contain about 70% iron and can be magnetic, but typically are non-magnetic. However, if they are work-hardened they become magnetic. Work hardening occurs when 300 series stainless is sheared, cut, torn or abraded. While regular stainless nuts and bolts will pass a magnetic separator, should they be sheared or abraded, the particles or slivers thus generated can be removed with the super-strong rare earth magnets. 400 Series stainless steel is also found in food plants. It is a hardenable grade of stainless typically used for knife and cutter blades, utensils, machinery shafts, sheet metal panels and other applications requiring its specific attributes and is fully magnetic.

### **PERMANENT MAGNETIC MATERIALS**

There are four types of magnetic material used in magnetic separators:

**ALNICO**, the oldest of the permanent magnet materials. It contains cobalt, now considered a strategic material.

**CERAMIC**, also called Ferrite, has replaced Alnico in most applications and does not contain strategic material.

**NEODYMIUM-IRON-BORON**, also called Rare Earth because it contains elements listed as "Rare Earths" on the Periodic Chart of Elements. It is the strongest commercially available magnetic material.

**SAMARIUM COBALT**, another Rare Earth, is capable of working at higher temperatures than Neodymium. While not as strong as Neodymium, it is stronger than Ceramic or Alnico. It too contains Cobalt.

These are considered permanent magnetic materials because they lose their magnetism at the rate of about 0.5% every 100 years, or 25% of their original strength every 5000 years. It should be noted that elevated temperatures, breakage, and, in the case of rare earth magnets, exposure to oxygen can shorten their useful life. That is why it is important to totally seal the magnetic enclosure by welding.

To capture run-of-the-mill ferrous contaminants of all sizes, ceramic magnets are recommended. If work hardened stainless and microscopic iron particles need to be removed, then rare earth magnets, because of their greatly increased magnetic strength, should be used.

### **HOW STRONG ARE THE MAGNETS ?**

This is typically one of the first questions asked. There is no adequate response to this question because there are so many variables. We think the customer is really asking—How effective will this magnetic separator be on my products?

Magnetic separation efficiency depends on the size, shape and magnetic composition of the offending particle, the particle's distance from the magnet, its time within the magnetic field, the strength gradient of the magnetic field and the viscosity of the product through which the particle is being pulled. These all act as variables and affect a magnet's ability to extract unwanted trash. We can give you a formula that can determine your application's separation efficiency.

### **HOW DO I MEASURE A MAGNET'S STRENGTH?**

A magnet's strength can be checked or verified by using either a gauss meter or a spring scale. The gauss meter provides a reading in "gauss" which is the number of magnetic lines of force per square centimeter. The spring scale, or pull tester, indicates the tension needed to pull a steel item from the magnet's surface. Either method can be used to establish a "base line number" with which subsequent tests may be compared to determine if a magnet has lost any strength. For its simplicity, we prefer the gauss meter. See the Gaussmeter flyer on our website, or call us.