

The Technology and Market Issues of Magnetic Materials

Abstract: Proper selection and optimized utilization of permanent and soft magnetic materials requires an understanding of their magnetic and physical properties, how each material reacts to temperature and the environment and what the application requires regarding a full set of magnetic and physical properties under either or both DC and AC applied field conditions. This tutorial is designed to introduce the fundamental principles of magnetism, explore a full range of magnetic materials and learn how to interpret manufacturer's specifications. Also covered, the market for magnetic materials, sources, supply security, and forecast for material availability.

Outline:

- * Introduction to magnetism
 - Source of the magnetic field
 - Units of magnetism (CGS and SI)
 - Unit conversion
 - The hysteresis loop
 - Definitions of soft, semi-hard and permanent materials
 - Key parameters for soft and hard magnetic materials
 - Key characteristics of each material and how they relate to performance

- * Permanent Magnetic materials
 - Introduction
 - Explanation of Isotropic, Anisotropic; oriented and un-oriented
 - Properties, advantages, disadvantages of each
 - Manufacturing processes
 - Supply and cost issues

- * Measurement and Testing of Permanent Magnets
 - Magnetic and physical properties
 - Magnetizing
 - Permeameters, fluxmeters, gaussmeters, search coils, etc
 - Calibration and Stabilization
 - Interpreting manufacturer's specifications

- * Soft Magnetic Materials
 - Magnetic and physical properties
 - Properties, advantages, disadvantages of each
 - Manufacturing processes
 - Supply and cost issues

- * Permanent magnet global market
 - Production and consumption of permanent magnet materials

- * International standards related to magnetic materials

Speaker Biography

Steve Constantinides is Director of Technology at Arnold Magnetic Technologies Corporation, a global manufacturer of magnets, magnetic materials and precision magnetic assemblies.

Steve is a ceramic scientist whose experience includes 12 years with Corning Inc. involved with glass ceramics, passive electronic components, combustion systems design and manufacturing management systems. After Corning, he joined tungsten carbide manufacturer GTE Valenite and was responsible for modernization and operation of over 40 vacuum and atmosphere furnaces. In 1988 he joined Crucible Magnetics as Manager of Technology and Quality Assurance for Neo, Samarium Cobalt and Alnico magnets. For the last 22 years, Steve has performed process and product development, manufacturing engineering and project management for Arnold Magnetic Technologies.