

—Equipment and Products—

MAGNETIC SHOES

A Chinese patent (CN1113817A) has recently been obtained for magnetic shoes. Ten pieces of NdFeB permanent magnets are installed on the inner sole of each sole, their position corresponding to the acupuncture points. In addition, a spring is placed between the sole and each piece of magnet to produce variable stress on the sole of a foot during walking.

A NEW PROCESS FOR NdFeB

Baotou Research Institute of Rare Earths in China has recently developed a new industrial process to improve magnetic properties of NdFeB magnets in commercial production. The process is called oxygen-free process, with the content of oxygen in NdFeB blocks as low as 800 to 1500 ppm. Magnetic properties of blocks 40x25x50 mm are: energy product 40 to 46 MGOe, $jH_c = 10$ to 17 kOe, while for blocks 15x15x15 mm the energy product is 48 to 49 MGOe and jH_c over 8 kOe.

Nd-BASED SUPERCONDUCTOR

A new neodymium-based oxide high-temperature superconducting single crystal features the ability to carry a current density of 70 000 A/cm². This high current density can be maintained in a magnetic field of 1 T at -196°C. The new crystal contains neodymium, barium, copper and oxygen and is produced by using the travelling solvent floating zone process while under low oxygen pressure. The high current density may be due to a two-phase mixture in which a neodymium-substituted barium phase is distributed throughout the stoichiometric crystal, serving as flux pinning centres.

MAGNETIC URANIUM SUPERCONDUCTOR

Japan Atomic Energy Research Institute has fabricated a uranium superconductor which is antiferromagnetic. The Institute claims that 5f electrons generate superconductivity. The onset temperature of the superconductor is 7.2 K for selenium/ruthenium, 0.55 K for platinum/uranium system, and 2 K for uranium/palladium,aluminium system. The Pt/U superconductor shows weak antiferromagnetism at 5 K, while the Pa/Al system shows strong antiferromagnetism at 14.5 K.

ROLL MAGNETIC SEPARATOR REDESIGNED

Eriez Magnetics redesigned their three-stage roll permanent magnetic separator. This new design includes a cantilever design and 1500 mm processing width. The feed ranges from 13 mm to fine material and the separator provides three stages of purification and concentration of materials in mining, pharmaceutical and plastics industries.

NEW HIGH-TEMPERATURE PERMANENT MAGNET

Sumitomo Specialty Metals Co. has developed a permanent magnet which can withstand temperatures by 20% higher than conventional magnets. This high level of preservation of the coercive force and of the magnetic flux density was achieved by introducing a new technology of pulverising the material and melting and thus controlling the crystal growth at the time of sintering. The new product does exhibit deterioration in its magnetic characteristics at temperatures as high as 240 C.

A NEW EDDY CURRENT SEPARATOR

Lindenmann GmbH (Germany) has developed a new non-ferrous metal separator and which is claimed to be able to separate fine grained non-ferrous metals as well as mixtures of materials such as lead/non-metals, which cannot be done with traditional eddy current separators. Lindenmann also claim that it is possible to achieve a significantly improved separation rate with mixtures normally difficult to separate, such as copper/aluminium or brass/aluminium. The separator can process between 8 and 22 m³ of material per hour, depending on the size of the machine and the composition of the material, with energy consumption of 6 to 7 kWh.

HIGH T_c SUPERCONDUCTING SEPARATOR

Eriez Magnetics are reported to be developing a high-temperature superconducting magnetic separator. American Superconductor Co. developed and built the high-temperature superconducting magnet (Bi-Sr-Ca-Cu-oxide) and Los Alamos National Laboratory provided the basic technology. A bench-top model (o.d. 180 mm, i.d. 50 mm, 155 mm high) produced 2 Tesla. The separator will be tested for kaolin purification. Eriez Magnetics are seeking a patent on the high-T_c superconductor/magnetic separator combination.
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