

## **Amorphous Soft Magnetic Materials Market Report and Forecast 2025-2034**

Market Report | 2025-07-28 | 170 pages | EMR Inc.

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### **Report description:**

The global amorphous soft magnetic materials market is expected to grow at a CAGR of 4.83% during the period 2025-2034.

The Amorphous Soft Magnetic Materials Market Likely to be Driven by Applications in Multiple Sectors Including Automobiles, Electronics and Electric Devices

The global market for amorphous soft magnetic materials is expected to be driven by applications in sectors such as automobiles, electronics and electrical equipment (such as electric motors, transformers generators, etc.). North America, Europe and Asia are expected to be key markets.

Soft magnetic alloys are materials that can be easily magnetised and demagnetised. Thus, soft magnetic materials are generally characterized by intrinsic coercivity less than 1000 Am<sup>-1</sup>. These are employed primarily to improve and/or direct the flux generated by an electric current. Relative permeability ( $\mu_r$ , where  $\mu_r = B/\mu_0 H$ ) is the key parameter for soft magnetic materials; it measures the readiness with which the material reacts to the applied magnetic field. Other significant parameters include coercivity, saturation magnetisation, magneto-resistivity eddy current structure and losses (as a function of sample dimensions), heat conductivity and electrical conductivity.

Soft magnetic material applications broadly fall into alternating current (AC) and direct current (DC) applications. In DC soft magnetic applications, the material is magnetised for the performance of a particular task, and then demagnetised once the task has been carried out. For example, switchable electromagnets.

In AC applications, the soft magnetic material is continually cycled, usually at high frequencies, being magnetised from one direction to the other, through the whole duration of the operation, for example, a power supply transformer. For each type of application, high permeability is a requisite, however, the significance of other properties may vary.

For DC applications, the key consideration behind selection of material selection is usually permeability, such as in shielding

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applications where the flux is to be directed through the material. If the material is employed to create a magnetic field or to generate a force, then saturation magnetisation may assume significance.

For AC applications, energy loss in the system is a significant consideration as the material is permanently and at high frequencies cycled around its hysteresis loop. Loss of energy may occur from three different sources:

Hysteresis loss - Associated with the area contained within the hysteresis loop. Eddy current loss - Linked to the creation of electric currents in the magnetic material and relative resistive losses. Anomalous loss - Associated with magnetic domain wall movement (Bloch walls) within the material.

Hysteresis losses may be minimized by reducing intrinsic coercivity, with a subsequent reduction in the area within the hysteresis loop. Eddy current losses may be decreased by reducing the electrical conductivity, and laminating the material. Anomalous losses may be minimized by employing a completely homogeneous material within which there is no impediment to domain wall movement.

Amorphous and nano-crystalline soft magnetic alloys may be produced in the form of a tape, for example, by melt-spinning or other rapid cooling methods. Amorphous and nanocrystalline soft magnetic alloys may usually contain iron, nickel and/or cobalt ; one or more elements among boron, carbon, phosphorous and silicon may also be present. These have very low coercivity and an order of magnitude below standard Fe-Si, with lower hysteresis losses. Due to relatively less magnetisation, these are not suited to high current applications. However, these may be employed in low current applications and specialised small devices.

Due to properties such as relatively high resistivity, low anisotropy and good mechanical strength, nano-crystalline soft magnetic alloys have garnered much attention. Soft magnetic alloys are being employed in electrical motors that need to function in mechanically stressful environments, such as in hybrid vehicles. Fe-based amorphous/nanocrystalline soft magnetic alloys are extensively employed in high-tech fields such as communications and computers owing to the advantages they offer, such as high saturation magnetic induction, magnetic permeability, resistivity, low coercivity, and iron core loss.

**Demand to Cut CO2 Emissions and Necessities to Comply with Regulatory Standards to Encourage Development of Metal Core Materials with Lower Core Loss**

In recent years, regulations have become more stringent, emphasizing reduction in CO2 emissions. This has also led to a need to devise ways to conserve energy. Regulations with respect to distribution transformers are becoming stricter in several nations, which has underscored the need to develop metal core materials with lower core loss. Companies have been engaged in devising suitable solutions to these issues. For example, Hitachi Metals has developed MaDC-A, a new product with significantly reduced core loss. The product uses Metglas, the Fe-based amorphous alloy ("Amorphous Alloy") employing magnetic domain control technology. MaDC-A has high flux density and nearly 25% lower core loss than conventional solutions, which enables greater efficiency of distribution transformers.

**Amorphous Soft Magnetic Materials Market Segmentation**

The EMR's report titled "Amorphous Soft Magnetic Market Report and Forecast 2025-2034" offers a detailed analysis of the market based on the following segments:

By type, the market is classified into:

- Iron-based
- Fe-Ni-based

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- Cobalt-based
- Others

By application, the market is divided into:

- Flexible Antenna
- Transformers
- Magnetic Sensors
- Magnetic Shielding
- Electronic Article Surveillance
- Others

By region, the market is classified into:

- North America
- Europe
- Asia Pacific
- Latin America
- Middle East and Africa

#### Key Industry Players in the Amorphous Soft Magnetic Materials Market

The report presents a detailed analysis of the following key players in the market, looking into their capacity, and latest developments like capacity expansions, plant turnarounds, and mergers and acquisitions:

- Toshiba Materials Co., Ltd.
- VACUUMSCHMELZE GmbH & Co. KG
- Hitachi Metals, Ltd.
- Bomatec AG
- Advanced Technology & Materials Co., Ltd.
- MK Magnetics, Inc.
- Others

The EMR report gives an in-depth insight into the industry by providing a SWOT analysis as well as an analysis of Porter's Five Forces model.

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