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Technology development for a highly efficient compact motor without using rare metals 5% increase in efficiency using amorphous metal

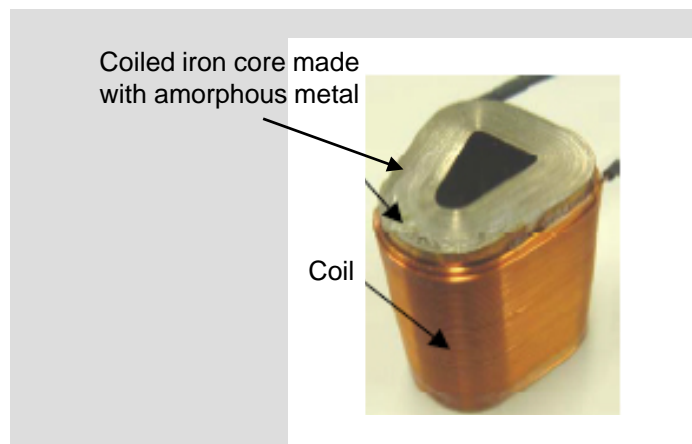


Figure 1. Magnetic core made with the amorphous metal

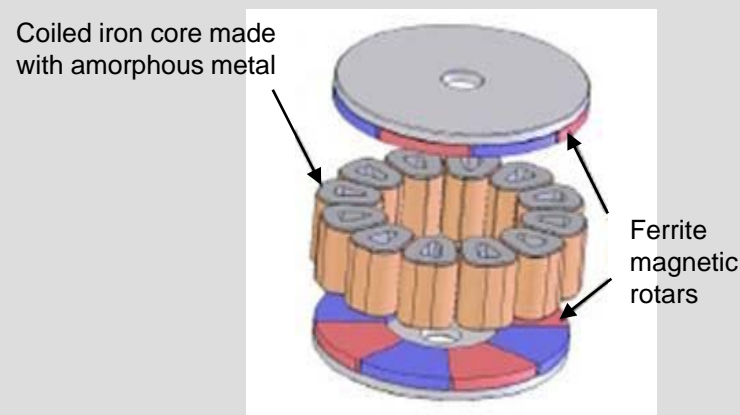


Figure 2. Structure of the motor using the core developed

Hitachi, Ltd. and Hitachi Industrial Equipment Systems Co., Ltd. have co-developed technology to increase motor efficiency by employing an amorphous metal, known to have low energy loss, in the coiled iron core without using a magnetic material containing rare metals such as neodymium (Nd) or dysprosium (Dy) used in conventional motors.

Amorphous metals are characterized by an irregular crystal lattice and low energy loss which make it an ideal metal for increasing motor efficiency however until now this was impractical due to its hardness which made it a difficult machine process. Hitachi and Hitachi Industrial Systems overcame this problem by developing a coiled iron core technique to form the core by coiling (wrapping?) the amorphous metal thus making it unnecessary to machine cut or shave the metal. As a result, a motor which does not require the rare metals conventionally used in the magnet, was achieved. Further, 3-dimensional magnetic field analysis technique was developed to optimize the high magnetic permeability and low saturation magnetization characteristics of the amorphous metal, resulting in a 5% increase in motor efficiency. This technology will facilitate power conservation in a wide range of products which use compact motors such as industrial equipment, consumer appliances and motor vehicles, as well as contribute to resource conservation of rare metals.

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This technology will be presented at the technical meeting on rotary machinery sponsored by the Institute of Electrical Engineers of Japan (IEEJ) from 12th -13th November 2008 at the Nagoya campus of Chubu University in Nagoya-shi, Japan.