

ORNL licenses rare earth magnet recycling process

September 2 2016, by Stephanie G. Seay



An ORNL process can help recover magnets from used computer hard drives.
Credit: Oak Ridge National Laboratory

The Department of Energy's Oak Ridge National Laboratory and Momentum Technologies have signed a non-exclusive licensing agreement for an ORNL process designed to recover rare earth magnets from used computer hard drives.

The patent-pending process developed as part of DOE's Critical Materials Institute is designed to economically recover large amounts of magnets made using neodymium—a [rare earth element](#) that is mined outside the United States. The [permanent magnets](#) are the most powerful on earth, and used in everything from computer hard drives and cell phones to clean energy technologies such as electric vehicles and wind turbines.

Currently, about 35 percent of used hard drives are shredded in the U.S. due to data security concerns. Recycling those drives could result in the recovery of about 1,000 metric tons of magnet material per year, said Timothy McIntyre, project lead and program manager in ORNL's Electrical and Electronics Systems Research Division.

ORNL's highly automated process for recovering magnets employs a unique system to sort and align hard drives on a conveyor for processing. The method uses a mapping station with barcode scanning and a coordinate measuring machine to populate a database of each make of hard drive so they may be positioned for correct robotic disassembly.

The process is designed to recover the magnets, their permalloy brackets, circuit boards, aluminum, and steel, while automatically destroying data storage media to ensure security.



Rare earth magnets inside permalloy brackets (pictured) can be recycled with an

ORNL-developed process licensed by Momentum Technologies. Credit: Oak Ridge National Laboratory

The magnets may then be directly reused by hard drive manufacturers or in motor assemblies, used in other applications through resizing or reshaping, or processed back to [rare earth metal](#). The recycling method can be adapted to target other consumer goods containing [rare earth magnets](#), such as used electric motors, appliances, and heating and air conditioning systems.

Dallas-based Momentum Technologies is focused on extraction of rare earth elements and other materials from hard drives for recycling and direct reuse.

Momentum holds a separate license for ORNL's membrane extraction technology, which uses a combination of hollow fiber membranes, organic solvents and neutral extractants to selectively recover rare earth elements such as neodymium, dysprosium and praseodymium.

"Working collectively with the nation's brightest scientific minds we can now provide a solution to some of the most complex problems in the rare earth element supply chain," said Preston Bryant, Momentum's CEO.

"Bringing together these CMI technologies allows us to create a sustainable business model, something that many rare earth companies struggle to achieve."

"Hard disk drives are the second-biggest use of neodymium magnets, and they are the most readily available source for recycling," said CMI Director Alex King. "This technology overcomes one of the biggest challenges to cost-effective recovery of magnets from them, and we are delighted to be working with Momentum Technologies to commercialize

it."

Provided by Oak Ridge National Laboratory

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