

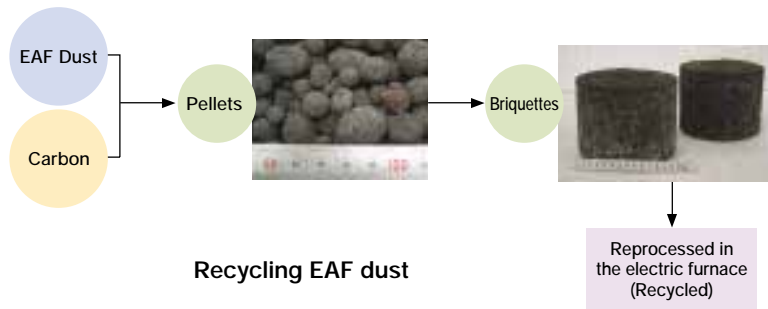
# Creating a Recycling Society

## Development of eco-conscious products

### Seeking new possibilities from the reuse of Electric Arc Furnace (EAF) dust

During the steelmaking process, a metal dust called "EAF dust" is generated. Every year, 500,000 tons of EAF dust is created as a byproduct from electric furnaces in Japan. Until now, methods for dealing with EAF dust have included disposal in landfills as industrial waste or reprocessing along with carbon powder in an

EAF. Recycling this material, however, led to generation of a great deal of dust which had a significant negative effect on the working environment. To prevent this dust from being generated, a solidifying material (binder) can be added, but there are cost issues in adding this binder. Thus, there is high demand for a method to recycle EAF dust that is both friendly to the work environment and inexpensive.



Recycling EAF dust

### Solidification technology meets pelletization technology

NTN has a history of reducing and recycling waste products. In particular, NTN pioneered the "grinding swarf briquetting machine" in 2001, which takes grinding sludge (metal waste) that is generated in the bearing manufacturing process and solidifies it for reprocessing in the steelmaking process. It has received accolades from the market and is being used at many manufacturing sites.

NTN decided to take on the challenge of recycling EAF dust by leveraging the technology that was developed for this swarf briquetting machine. By mixing EAF and carbon powder, pellets can be solidified into cylindrical briquettes and reprocessed in electric furnaces, resolving the dust problem in the work environment. This process does not use binder, but requires only an appro-

priate amount of moisture, resulting in cost savings. Completing the picture was combining a pelletizing technology, one in which stable pellet strength can be obtained after solidification, with NTN's briquetting technology. Daiwa Steel Corp. was chosen as our partner and after joint development, the "EAF dust briquetter" was completed.



EAF dust briquetter

## What our R&D Partners have to Say



Engineering Dept. Manager and QA Dept. Manager, Mizushima Works, Daiwa Steel Corp.

Norio Misaki

The problem of recycling EAF dust, which is generated in great quantities, is a problem that any engineer would want to tackle. What we've completed here is something that combines NTN's briquetting technology with our pelletizing technology, and is something that the world has never seen before. We expect it to be an ace in the hole for effectively using resources and reducing waste at the same time. We will continue testing with the aim of increasing its eventual popularity.

### Contributing to "zero emissions"

The "EAF dust briquetter" is the world's first solidification method that does not require any binder. Because no binder is used, the advantages are not limited to cost, the additional burden on the environment from the use of the binder is also prevented - this is an extremely important point.

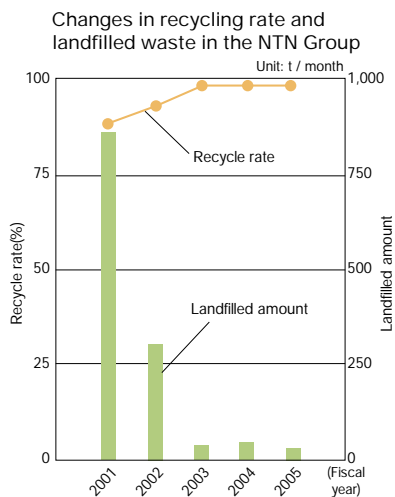
Developing this new way to recycle EAF dust in a low-cost, environmentally friendly way is another chapter in the history of NTN's recycling technology.

## Reducing waste products

### Promoting the effective use of waste sand and waste slag

The NTN Group has a target to achieve “a recycle rate of 98% or more” across the entire company, and we are working toward zero emissions (zero landfilled waste). The recycle rate during fiscal 2005 across the entire company was 99.2%. A challenge remains in raising the recycle rate for the waste sand and waste slag generated by the manufacturing process at NTN Casting Corp. (Izumo City, Shimane Prefecture). (The recycle rate for fiscal 2005 was 68%, and the target for fiscal 2006 is 85%).

This company is cooperating with a local construction association, Tatenui Construction Cooperative to recycle the sand and slag as construction material and to promote the effective reuse of waste sand and waste slag. (Tatenui is the old name for Izumo)



### What our R&D Partners have to Say



Director, Tatenui Construction Cooperative  
President, Yamaguchi Kensetsu  
Wataru Yamaguchi

Izumo City is one of leading areas for the domestic casting industry, but the amount of waste products (waste sand and waste slag) generated by local casting processes is ranked 7th in Japan. Activities promoting the “3Rs” (Reduce, Reuse, Recycle) are being promoted in Shimane Prefecture according to a basic environmental plan. In cooperation with local casting plants including NTN Casting, our cooperative is working to effectively reuse casting waste with original technology. Including our “Super Eco Patch”, a product that includes waste sand and is certified as a “Shimane Green Product”, we have a record of bringing unique new products to market. We will work together with the casting industry to use original technology to effectively reuse waste products.

### Recycling process for casting slag



### An original local product

Asphalt containing waste sand is currently being sold under the name “Super Eco Patch” as a pavement repair material. It is receiving attention as a unique product that uses waste products from the casting industry, the local industry in Shimane Prefecture.

The day that NTN Casting will achieve zero emissions may not be that far off.



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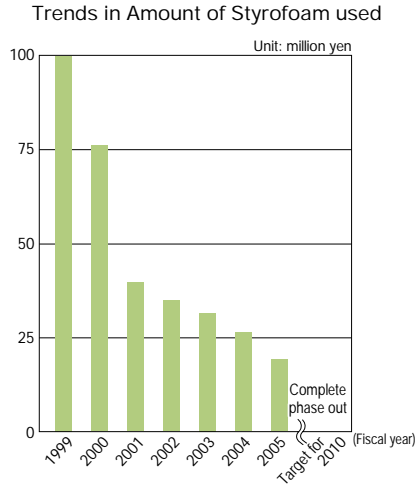
## Promoting Activities to Protect Resources

### Reduction of the use of Styrofoam

At NTN Engineering Plastics (Inabe-gun, Mie Prefecture), we have switched the material used in our trays for shipping molded plastic products for office machines from Styrofoam (which carries a large environmental burden), to PET (polyethylene tetrathalate), which has excellent recyclability. These PET trays are molded at the company according to the shape of the product. Lighter and more compact than the previous material, they save transportation fuel costs.



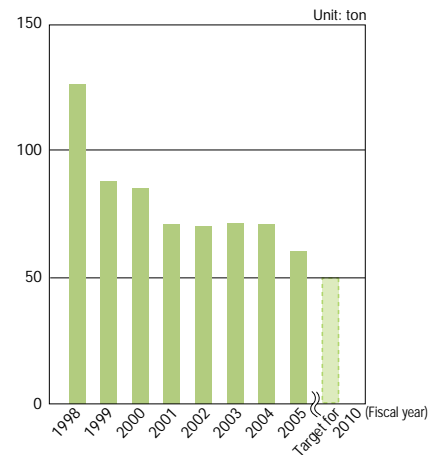
PET tray



### Reduced paper consumption

To reduce the amount of paper we consume, we regularly make double-sided photocopies, and use the backs of used copy paper. We are promoting a paperless office through the use of e-mail inside the company to disseminate information. The result has been a 29% reduction in paper use compared to 1998 levels (beating our target of 28%).

### Annual trends in paper consumption



## Activities to Reduce Environmental Impact of Transportation

### Responding to the amended Energy Conservation Law

In April 2006, the "Law Regarding the Rationalization of Energy Use" (called the Energy Conservation Law below) was amended, and shippers became required to work toward energy conservation. Japan's energy consumption continues to grow, particularly in the shipping field.

In this amendment, companies with more than 30 million ton-km in annual shipments are "Designated Shippers". Starting in April 2007, the logistics departments of these companies are required to report annually to the government about energy conservation plans and equipment investment, and their expected results. Because of this, in fiscal 2006,

our company started investigating the amount we ship, and we are investigating whether or not we fall under the category of "Designated Shippers".

In the past, NTN has actively promoted energy conservation during shipping, bolstering the Ministry of the Environment's conservation initiatives by, for instance, acting to eliminate vehicle idling during stops. To fulfill our responsibilities as a shipper under this latest amendment, we will have a complete structure in place by holding meetings on the amended Energy Conservation Law with shipping companies to gain their understanding and cooperation.

\*Shipped load (ton-km) = Transported weight (ton) X transported distance (km)



Meeting with shipping company



Manual for shippers on how to comply with the revised Energy Conservation Law