Introduction of Grinding Swarf Recycling

1. Introduction

Companies like NTN who produce precision machinery use many grinding machines in their manufacturing processes. This machinery produces a lot of grinding swarf or industrial waste, most of which is dumped into landfills. Being an ISO14001-certified company, NTN thought that it was responsible for helping establish recycling technology and contributing to our recycle-based society. NTN has been working on the development of grinding swarf-recycling technology since 1999 and has succeeded in its practical use. In addition, not only is this system friendly to the environment, it also helps reduce rising disposal costs.

2. Recycling System

Fig. 1 shows a comparison between the conventional grinding swarf dumping system and the recycling system NTN developed. Briquettes obtained from this new system are delivered to steel manufactures, where the briquettes are reused as raw material in steel production. In addition, the coolant separated in the process is returned to the coolant tank to be reused again.

3. Briquette Technology and Test Results

Grinding swarf primarily contains grinding sludge (metallic components), coolant (oil-based or water-based) and a small amount of grinding powder. During the process, coolant is separated from the swarf and the metallic components are solidified into briquettes. After completed, both the coolant and the metallic components are ready to be reused again. In addition, the technology NTN developed produces briquettes from grinding swarf without the use of a binder (see Fig. 2). Fig. 3 shows a magnified view of grinding swarf. Fig. 4 shows a composition comparison between grinding swarf and a briquette. The figure shows that a large amount of coolant is squeezed out of the grinding swarf in order to create the briquettes.

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NTN has developed a system to recycle grinding swarf. Recycling has already begun. NTN has also started a new company, UNI TOP, which will supply briquetting machines and support recycling of briquettes. UNI TOP will contribute to society by reducing the environmental load of grinding swarf.

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(1) Current system

Fig. 1 Comparison of current system and new system

(2) New system

Fig. 2 Briquette method

Fig. 3 Magnified view of grinding swarf

Fig. 4 Comparison of compositions between grinding swarf and briquette

(1) Volume comparison

(2) Weight comparison
4. Examples of Practical Applications

NTN has been promoting swarf recycling using the briquette technology described earlier. Figs 5, 6 and 7 show the benefits of recycling oil-based coolant using the swarf recycling process. The examples below are result of recycling that was started in April, 2001 on a preliminary basis and was fully implemented in October, 2001.

**Fig. 5** Grinding swarf processed per month

**Fig. 6** Oil-based coolant reused per month

**Fig. 7** Monthly cost savings
5. Establishment of Unitop Corporation

Since grinding swarf briquette technology could be used for various kinds of grinding swarf, it may be difficult for machine manufacturers to assume leadership in the practical application of this technology. Unlike these manufacturers, **NTN** produces a large amount of grinding swarf and is in an advantageous position to develop briquette technology.

To further develop this technology, **NTN** established Unitop Corporation in May, 2002 with Noritake Co., Ltd., a manufacturer of grinding wheels, and Nicotec Co., Ltd., a manufacturer of machines.

Briquette machines developed by Unitop have been supplied to **NTN**, where they have made considerable achievements in reducing both cost and the toll on the environment. In the future, **NTN** plans to promote full-scale sales activities in order to supply these machines to industrial companies.

6. Conclusion

Worldwide interest in environmental conservation is growing. Today, companies not focused on reducing environmental burdens will not only find their corporate image diminished, but will also find it difficult to manufacture their products efficiently. In this sense, the grinding swarf recycling technology that **NTN** has invented and put into practical use is very important because it can help many companies reduce their environmental burdens on the environment.

To solve issues regarding the disposal of industrial waste, **NTN** would like to help preserve the global environment by providing the know-how gained through work on grinding swarf briquette technology.

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**Photo of the author**

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