

Name of Technology	Manufacturing technology of thin-wall high-strength cast iron	Metal
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Key words	thin wall, light weight, spheroidal graphite cast iron, rare earth element (RE)	

What kind of technology is this?

Outline

We have succeeded in developing a thin-wall high-strength nodular graphite cast iron without developing chill structure (brittle) by increasing the number of graphite particles in spheroidal graphite cast iron.

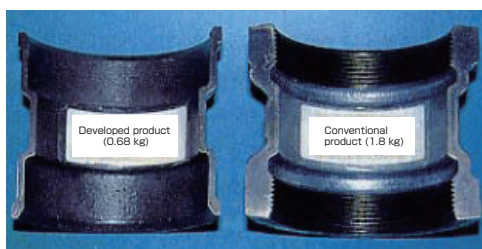
In Japan, the amount of cast iron produced annually is 5.50 million tons. It is used widely as important structural material for the engines and underbody components of automobiles, various components of industrial machines, various components for water supply and sewerage systems, and others. However, its heavy weight is a disadvantage. To overcome this problem, if cast iron is cast to form a thin-wall product, the crystallization of carbide occurs in its solidifying process, making the product very brittle. For this reason, in the past it was difficult to produce cast iron products having a wall thickness of 10 mm or less.

If the wall thickness of a cast iron product is reduced for weight reduction, its microstructure tends to become brittle due to the chill phenomenon, lowering its strength. This trend is stronger in spheroidal graphite cast iron compared with gray cast iron. To prepare thin-wall spheroidal graphite cast iron without developing a chill phenomenon, it is effective to increase the number of graphite particles in spheroidal graphite cast iron. That became possible through the addition of rare earth elements (RE) whose amount stoichiometrically corresponded to the amount of sulfur (S) contained in molten cast iron.

A high-strength spheroidal graphite cast iron was successfully developed. Even a 3-mm thick plate-shape test piece made of this cast iron developed no chill phenomenon. Even if it is bent by 180 degrees, no crack was formed.



No crack was formed even in 180-degree bending test.



Ferrules for conduit pipes
(Reduced from 1.8 kg to 0.68 kg)

What are its applications?

The development of the thin-wall high-strength spheroidal graphite cast iron made it possible to reduce the weight of cast iron products. As a result, expectation is high for its application to ferrules used for conduit pipes and the manufacturing of various important security components of automobiles.

Related patents	Japanese Patent No. 1734338 "Manufacturing method of thin-wall spheroidal graphite cast iron from molten iron containing high sulfur"
Related materials	CAST METALS, Vol. 1, No. 2, 90-97 (1988) Imono (in Japanese), Vol. 58, No. 1, 21-25 (1986)