Details of Technology

Name of Technology	Friction pressure joining technology between cast iron and heterogeneous materials	Metal
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Key words	cast iron, heterogeneous material, friction pressure joining	

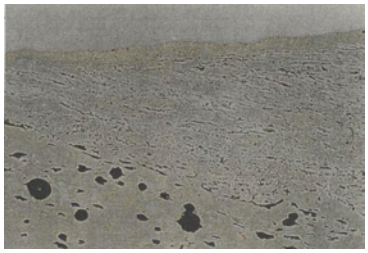
What kind of technology is this?

Outline

With the friction pressure joining method, it becomes possible to join cast iron to heterogeneous materials, which was difficult to achieve. The features are as follows:
***No graphite deformation layer**
***No formation of chill structure**
***Joining between fractured part and base material becomes possible.**

In the automobile industry, demands for energy saving, high performance and weight reduction have been growing stronger. In particular, demands for the reduction in the wall thickness and weight of cast iron components are high. For this reason, it is necessary to join cast iron to heterogeneous materials to form composite components.

In this study, using the friction pressure joining method among solid-phase joining methods, the development of a joining method between nodular graphite cast iron and heterogeneous metals in which no brittle chill structure was formed was attempted. In general, when spheroidal graphite cast iron is joined by friction pressure joining, a graphite deformation layer (Fig. 1) that is formed by the deformation of spheroidal graphite by friction force is built up and remains near the center of joined section, significantly lowering the strength of the joined section. To avoid this from occurring, in this newly developed friction pressure joining method, the groove shape of spheroidal graphite cast iron and heterogeneous metal and pressure joining conditions were carefully adjusted. As a result, joining was achieved without developing any graphite deformation layer.



← Graphite deformation layer

Fig.1 Graphite deformation layer

What are its applications?

The manufacturing of composite components for automobiles by the joining between cast iron and heterogeneous material such as steel becomes possible. No flanges to be tightened with bolts are required, contributing to the reduction of fuel consumption due to lighter weight and lowering the environmental burden.

Related patents	Japanese patent No. 3685381
Related materials	Journal of Japan Foundry Engineering Society. Vol. 73, No. 3, 167-172 (2001) Journal of Japan Foundry Engineering Society. Vol. 72, No. 8, 535-540 (2000) Journal of Japan Friction Joining Association. Vol .6, No. 3, 57-63 (2000)

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