Thesis Title	The Study of Processing and Properties of Compacted Graphite Iron
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Abstract

Compacted Graphite Iron (CGI), the latest cast iron, was classified as one type of cast irons in 1965 according to the American Society for Testing and Materials (ASTM) A-247. Throughout the development of ductile iron, CGI was initially found by adding insufficient magnesium into the melt. Because it was difficult to consistant manufacture CGI in the early period, it did not get much attention from foundry industry. However, CGI reenters to the consideration of the automobile part manufacturer after many researchers studied and found that CGI performs good properties in between those of gray iron and those of ductile iron.

ASTM A 842-85 determines that an acceptable graphite formation in microscope of CGI shall not have flake graphite and must contain 80% minimun compacted graphite. This is the reason why the production procedure still be know-how. The most of CGI castings are made in the countries which have high technology of cast iron production. In the present, no foundries in Thailand have enough knowledge to cast CGI for sale. Thus this research focused on the study of processing data to support Thai foundry industry in the future.

This research determined the magnesium range for satisfactory CGI that produced using only ferrosilicon magnesium by sandwich method and studied the effect of tapping and pouring temperature to the graphite shape morphology. For in-mold treatment, the effect of pouring rate on microstructure was studied. The experimental results show an optimum magnesium range in between 0.011-0.023%wt. When tapping temperature was increased, more magnesium fading,

spheroidal graphite particles were effectively reduced. The chance of flake graphite formation was increased when the residual Mg level was not enough. Too high or too low pouring temperature result in flake formation at 0.011%wt residual magnesium and over 20% nodularity at 0.023%wt, respectively.

Too low pouring rate not only increases the nodularity of casting but also increases the opportunity of flake graphite formation in the later. With in-mold treatment, a range for producing compacted graphite iron using FeSi4.6% is in between 0.3-0.5% bulk weight.

Keywords : compacted graphite iron/ in-mold treatment