



**DEVELOPMENT OF AUTOMOTIVE SAND CASTING PRODUCT (CAST IRON)
WITH CAE / CASTING SIMULATION ASSIST**

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ABSTRACT

Sand casting, the most widely used casting process, utilizes expendable sand molds to form complex metal parts that can be made of nearly any alloy. Because the sand mold must be destroyed in order to remove the part, called the casting, sand casting process typically has a low production rate. Commercial simulation software was required to determine the behavior of the flow and solidification of molten metal inside the mold cavity. For this project, software MagmaSoft® MAGMASolid version 4.0 (c) MAGMA GmbH (1989 – 1999) Magma were used in giving clear picture of the molten metal behaviors it is also the most effective way in optimizing the gating system rather than conventional trial and error method. In this project, two parts of simulation model were developed that which the first, using pattern with ingate at the front side of the product and the other, using pattern with ingate at the center of the product. In order to compare between these two gating system, three results from the simulation were taken, that was porosity, hotspot, and liquid to solid. As the result, the simulation predicted porosity coincided with the performed experiments, demonstrating the flow rate of the molten metal inside the cavity, and the solidification behavior of the molten metal. As changing the gating system, the results from the simulation for the final products were in the acceptable range of specification. The processes making of the pattern, follow board, and mold were done by follow the second gating system because of the easier to produce and more effective. After the pouring process, the result obtained from the simulation and poured products were nearly the same. The simulation assist proved to be the best way to reduce the defect of the casting product at early stage.

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