

Thesis Title	Design of Gating and Riser System for Aluminium Casting
Thesis Credits	15
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Degree of Study	Master of Engineering
Department	Materials Technology
Academic Year	2001

#### Abstract

Design of gating and riser systems for casting are traditionally based on experience and trial and error. These methods results in a lot of waste in both time and money as one needs to optimize the design by experiments with real castings until they are sound. Information from such trial and error can not be used for future reference. A casting design specialist, which is rare and hard to find, is required to do the job properly. In recent years, a number of casting simulation softwares have been developed for foundry industry. Deciding whether to use casting simulation softwares or not is a major problem for Thai foundry industry. This is because the software are generally excessively expensive and the benefits to specific firms are not clear.

The purpose of this thesis are to study the traditional method of design of gaing and riser system for aluminium casting and to apply casting simulation software for analysis and optimization of the design. The simulation software to be used is MAGMASOFT. The procedures employed were as follows: Firstly, checking thermophysical properties of materials in MAGMASOFT database using cylindrical casting as a test piece. The data were validated by temperature change during solidification and subsequent cooling and shape of shrinkage. This was followed by the analysis of real casting which was dumbbell. Good agreement between simulated and experiment results was observed. The casting alloy was aluminium A356 and the casting process was green sand casting. Simulation of commercial aluminium wheel casting, employing low pressure die casting showed that the prediction of solidification shrinkage agreed with those found in real casting. It was also found that those areas with turbulent metal flow

corresponded to the areas with high porosities in real castings. Defects could be avoided if proper modifications of the dies are made.

The results of this thesis showed that the casting simulation software and the database can be used to predict the shape of shrinkage accurately. Regions of high porosities could also be predicted. Consequently, they can be used to optimize casting design in order to reduce the defects.

It is concluded that simulation software could be used to analyze and optimize casting design correctly and quickly.

Keywords: Casting design / gating system and riser design / shrinkage cavity / aluminium casting / casting simulation / solidification simulation