An Investigation on the Casting Design of Brake Pump Simulated by CAE

張啟旻、胡瑞峰，劉勝安

E-mail: 9314506@mail.dyu.edu.tw

ABSTRACT

This research aimed at casting the A356 aluminum alloy brake pump with the CO2 sand mold methed, and adopting the CAE simulation software AFS Solidification(3D) to evaluate the influence of designs of the gating and riser system upon the A356 aluminum alloy brake pump . The index built in the SOLIDCast module of the software, including the Niyama criterion, the hot spots criterion and the material density function were used to estimate the designs, the position of possible defects and shrinkage occurred on the brake pump. The section modulus of brake pump is 50mm, according to the Chvorinov rule, the modulus of riser is 1.2 times of that of the casting, namely, the modulus of riser is 60mm to in order feed the defect the of casting enough. By the hot spot criterion of software, the most suitable set position of riser was found. In addition, in order to promote the casting yield, the optimal riser sizes were determined by the simulation of OPTICast module. The results show ed that the riser sizes and the yield can be really improved to be the best values and practically cast. Next, the simulation of different ingate positions revealed that the defects of casting can be avoided by changing position of ingate with the MDF

Keywords : A356 aluminum alloy, Computer-aided, Brake pump Engineering(CAE), Flow, Solidification, CO2 sand mold, AFS Solidification(3D), Riser, Gating, Hot spot, Chvorinov, Yield.

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