Simulation on the Scheme of Casting A356 Aluminum Automobile Connecting Rod

李仁智、胡瑞峰 謝其源

E-mail: 9314778@mail.dyu.edu.tw

ABSTRACT

A356 aluminum alloy possess superior properties in the physical, chemical and mechanical aspects, and has been widely applied in the light vehicular castings. The manufacturing process of the A356 aluminum alloy automobile connecting rod regards forging, die casting and sand mold casting, etc.. If the sand mold casting was added with the computer-aided engineering (CAE) analysis, the quality of the connecting rod and the production time and cost could be improved. This research is to build up the practice for CO2 mold casting connecting rod. Because using the CAE software AFSolid 3D to design the gating, riser and chill system, the CAE can be evaluated to realize the exploitation and the credibility of the casting. The AFSolid 3D system consists of SOLIDcast、FLOWcast and OPTIcast modules. In addition, the effects of non-pressurized and pressurized gating system with different designs on the quality of the CO2 mold casting connecting rod were also studied. The results show that the material density function, FCC criterion, Niyama criterion and solidification time in the AFSolid 3D software can predict accurately the shrinkage defects of castings. Compared to the pressurized gating and riser system, the non- pressurized gating and riser system design can really promote the directional solidification and reduce the shrinkage defects if added with chill. In addition, the top riser can effectively feed the shrinkage when compared to the side riser for the connecting rod. Finally, the FLOWCast and OPTICast are used to understand the filling conditions of melt flow and the optimization of gating and riser system in order to increase the yield and reduce the cost of A356 aluminum alloy connecting rod made by CO2 sand mold.

Keywords : A356 aluminum alloy, Computer-aided Engineering Analysis (CAE), Non-pressurized, Pressurized

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