

DEVELOPMENT OF LOW COST BLOCK MOLD FOR COPPER ALLOY CASTING

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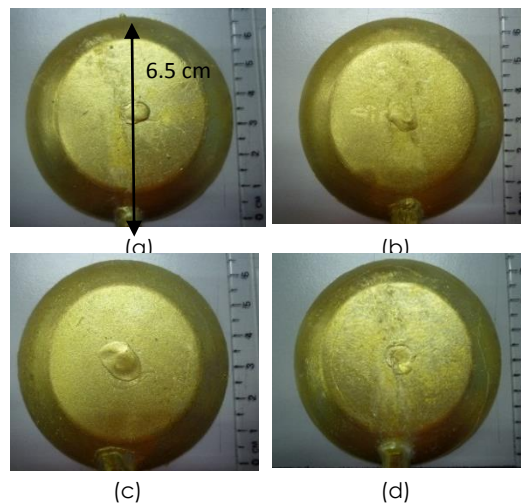
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Graphical abstract



Abstract

Suitable block mold formulations for copper alloy casting have been developed and the formulations used were 25% plaster of paris (POP), 75% silica sand and 31-37% water. Silica sand with a grain size of 106-212 μm was added into dilute suspension of POP and the mixing process was continued until a thick slurry (mixture) was obtained. It has been found that the mixing time of molding materials was highly depended on the type of plaster and optimum slurry viscosity around the diameter of 7.7 – 9.6 cm (slump test) was essential to ensure that the wax pattern could be fully invested. In the dewaxing process, the mold was subjected to the temperature of 170°C for 3 hours and burnout process was effectively achieved by heating the molds at 750°C for 5 hours. The pouring process was successfully carried out without any leakage and it was found that all molds can be easily broken under a force of a hammer. The developed mold also able to produce fully formed of casting without any major defects such as misrun, fin or flash and rat tail, which can be associated with inadequate mold temperature, mold cracks and the separation of mold's material respectively.

Keywords: Silica sand, block mold, wax pattern, copper alloy casting

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1.0 INTRODUCTION

Investment casting method is regarded as precise fabrication processes for component having intricate shape, excellent surface finish and dimensional accuracy [1]. This method is currently selected for casting thin wall components from a very wide

variety of alloys including super alloys, stainless steel, aluminum and copper based alloys. The processes which include ceramic shell molding and block mold process have been used for decades in jewelry, artworks and dental application. The block or solid investment casting process is still retained in some applications, as for dental and jewelry casting [2].