ANALYSIS OF AUTO POUR IN SAND CASTING METHOD

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Abstract

Metal casting is a process of metallurgical forming by liquidize of material up to certain high temperature to achieve better chemical reaction and better product quality. Auto pour means pouring the metal liquid into the mould not by manual operation but more than automatically done by a set of machine without any human intervention. In this analysis, the main aim is to describe the process of automation for brake drums where several parameters are compare with manual process. The standard time, cycle time, rejection rate, dimension, chemical composition and product quality have been analyzed. The other parameters are the same for either manual or automatic pouring process. The conclusion of this research is that the auto pour provides better results in term of productivity and quality [1], [2].

Keywords: casting, sand, auto pour, manufacturing, metallurgy, temperature

Introduction

In a sand casting process, a pattern is typically made of wood or metal (aluminum alloy, iron alloy, steel alloy) . Mold consists of cope and drag which are upper and lower half of mold. Where the cope and drag separate is known as the parting line. Both solid and split patterns can have cores inserted to complete the final part shape. When making a pattern, it is necessary to taper the edges so the pattern can be removed without breaking the mold. The pattern is housed in a box called the flask, and then packed with sand. A binder helps harden the sand into a semi-permanent shape. Once the sand mold is cured, the pattern is removed [3], [4]. This leaves a hollow space in the sand in the shape of the desired part. Two-piece molds are clamped together. Molten metal is poured into a pouring cup where it will then travel down a sprue and into the gating system. Vent holes are created to allow hot gases to escape during the pour. Ideally, the pouring temperature of the molten metal is a few hundred degrees higher than the melting point, assuring good fluidity. The temperature difference also prevents premature cooling and resulting voids and porosity. After the metal cools, the sand mold is removed and the metal part is ready for additional operations, such as cutoff and grinding. Fiq.1. shows the sand casting process flow [5]. The Auto Pouring process is basically operated by PLC (Programmable Logic Controller) installed to the control system. The movement and detection of the instruments are arranged with sequences at the panel control where the parameters are also set up such as temperature, position and timer. Molten

metal is poured into the sand mold trough a channel or sprue which is controlled by a stopper rod as shown in Fiq.4.This rod moves up and down or open and close to allow and stop the molten metal get into the mould. The molten metal itself moves out by gas pressure in the chamber. Laser is utilized to detect the empty or full space in the mold, empty space allows the rod moves up after Laser detection, visa versa. Full space means mold filled fully detects by Laser and allow the rod to close the channel means next sequence runs for the next mould. This synchronic movement consequently involves the movement of molds [6], [7].

Result and Conclusion

Through the analyzation, we conclude that the utilization of Auto Pour in casting contributes significant effect to the company. Excluded the economic factor technically the automation system results lower cycle time means higher production which is 67%, lower rejection rate 41 % means more efficient of materials and increase production rate, and better strength of product. Those parameters indicate that the system with pouring automation contributes significant advantages.

References