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A Review on Modification of Furnace

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ABSTRACT: Furnace is a device use for heating or it is a equipment to heat material to change their shapes like rolling and forging or to change the properties of the material. mostly furnace is used for melting metal for casting. In a core-less induction furnace, electromagnetic stirring of the molten metal bath occurs when power is applied to the furnace. Bath motion is present throughout the bath, ensuring good mixing action and uniform dispersion of alloys. This paper reviews all the significant attributes of stir casting process such as furnace design and reinforcement materials as well as process parameters and additives, which makes the review novel.

KEYWORDS: Furnace Design, Stirring Rod, Parameters.

I. INTRODUCTION

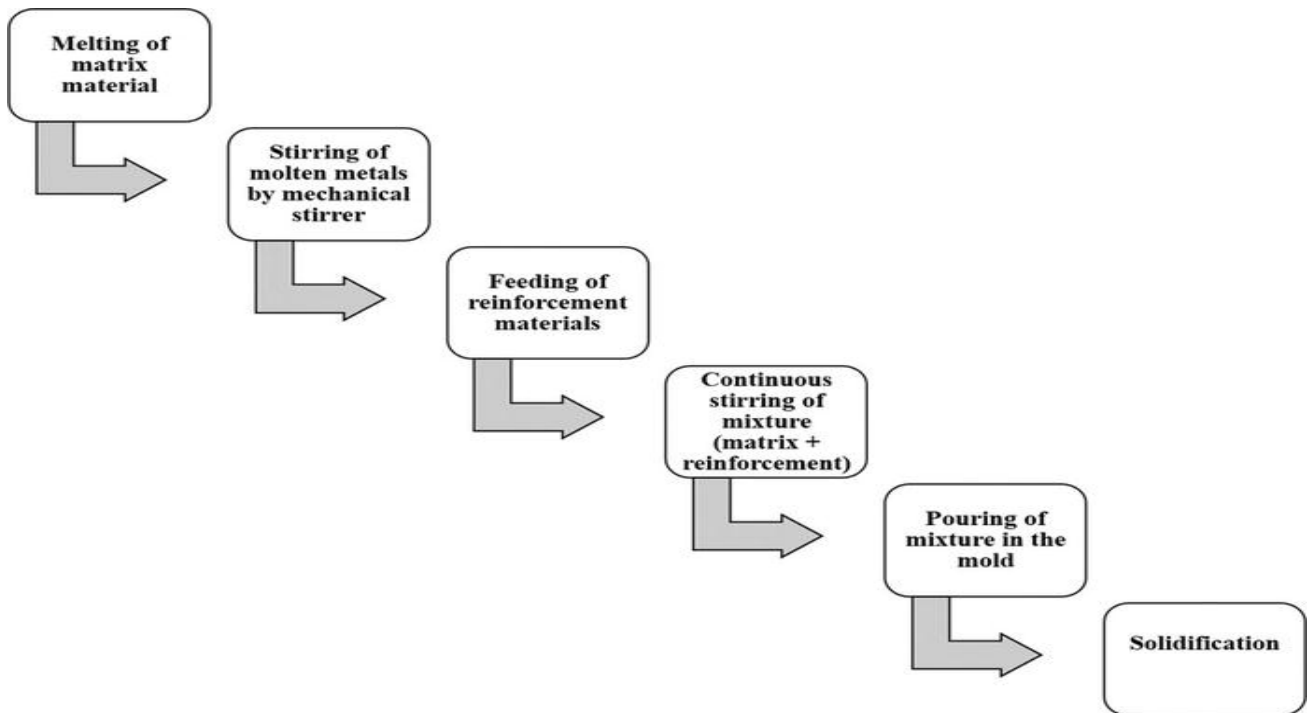
Melting furnaces are used to overheat solid materials until they liquefy. Often, thermal processing equipment is used to alter the surface or internal characteristics of materials by carefully elevating their temperature. melting furnace is usually made up of a vertical heating chamber in a shaft-like arrangement, which is packed with layers of combustible matter such as limestone and coke. An alloy is created by mixing metal with another component, either another metal or a nonmetal substance. Metal alloys are generally made by melting the substances, mixing them together, and then letting them cool to room temperature, resulting in a solid material. while heating in the furnace the materials do not get completely mix so to overcome through this problem the electronic stirrer is installed in the furnace which will mix the two different materials and the perfect new materials is formed. Stir casting is a type of casting process in which a mechanical stirrer is introduced to form vortex to mix reinforcement in the matrix material. ... The mechanical stirrer is used to form the vortex which leads the mixing of the reinforcement material which are introduced in the melt. Therefore selection of stirring parameters plays major role in stir casting process. Stirring speed, stirring time, impeller blade angle, size of impeller and position of impeller are major parameters, affecting the distribution of the reinforcements in the matrix. Many authors attempted to find effect and the optimal values of stirring parameters. Hashim et used finite element analysis to simulate the fluid flow and investigated optimal values of stirring speed, and impeller position to achieve effective flow patterns to distribute the solid particles in the melt homogeneously. Naher et al. Performed Scaled-up stirring experiments with liquids having similar characteristics of aluminum melt and used SiC particles as reinforcements.

II. METHODOLOGY

Furnaces employing combustion produce a hot gas which transfers heat to the material by radiation and convection solids are heated by direct contact, but fluids are usually by direct contact, but fluids are usually heated indirectly, being carried pipes within the furnace.

The work of the furnace is to melt the metal. Which we Can easily casting process.

In the furnace modification, we will add a rod and motor to the furnace and will melt the two metals together inside the furnace and with the help of the rod, both the melt materials will be mixed inside the furnace stir casting process, the mechanical stirrer is coupled with the varying speed motor to control the speed of the stirrer. There are various stages of impeller stirrer i.e. single stage, double stage and multistage impeller. Double stage and multi stage stirrer are mainly used in Figure 1.



Stirring time is a significant process parameter in stir casting process. Lower stirring time may lead to clustering of particle reinforcements and results non-homogeneous distribution of reinforcement particles. Whereas, higher stirring time may lead to the deformation of the stainless steel stirrer impeller blade at very high working temperature. The working temperature of some reinforcement such as boron carbide with aluminum matrix are very high.



III. APPLICATIONS

[1]Furnace is used for heating purpose in various industrial production processes. Furnace are used where more accurate temperature control is required.[2]Furnace are mostly used as a major component of a central heating system. [3]The name derives from Latin word which means oven. Furnace are permanently installed to provided heat to an interior space intermediary fluid movement, which may be air, steam, or hot



water.[4]This furnace is used for melting non ferrous metals like brass, zinc, tin, bronze, copper, etc.[5]The furnace is operated from the normal supply frequency. And provide the high efficiency and low operating cost.

IV. OUTCOMES

A low-cost metal melting furnace for melting aluminium and its alloys is designed and fabricated. Both mechanical and electrical parameters were considered in designing the furnace.

This furnace heating suitable for melting and holding small quantities of whose melting points are less than 10000 like Al, Zn, and their alloys for laboratory and research purposes.

The efficiency of the furnace can be computed by measuring the amount of fuel consumed per unit weight of material produced from the furnace.

Similar to the method of evaluating boiler efficiency by indirect method, furnace efficiency can also be calculated by indirect method.

V. CONCLUSION

The present discussion discovers the importance of the selection of the stirring parameters over the properties of the stir casted composite desired for current demand of the industries. This review has investigated the effect and optimization of stirring parameters. The range of stirring speed may vary depending upon the properties of the reinforcements and matrix material, wettability and chemical properties from 200 to 1000 rpm. For multistage impeller stirring 1000 rpm has suggested as optimal value. But in case of single stage impeller stirring 550 rpm gives an optimal speed of stirring, as higher speed causes excessive tabulation. Also it is concluded that Impeller Blade angle at 30 angle gives optimal value, which will provides suitable combination axial flow and shearing action with lower power consumption. Position of the impeller should be kept at more the 25–30% of the height of the liquid from bottom the crucible. Optimal stirring time of 10 min is suggested. Diameter of the impeller should in the range of 50–55% of the diameter of the crucible and reinforcement federate, as in the range of 0.8–1.5 g/s to avoid the accumulation of reinforcement particles. This study also reveals that the fabrication of HAMCs and AMCs by stir casting route by optimal selection of parameters provides high strength, low cost and light weight composites. The present discussion discovers the importance of the selection of the stirring parameters over the properties of the stir casted composite desired for current demand of the industries. This review has investigated the effect and optimization of stirring parameters.

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