SCOPE OF FOUNDARY IN THE FIELD OF INDUSTRY

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Abstract

Foundry is the process by which solid phased metal work can undergo changes by applying compressive forces as required to be performed and the forging is classified as HOT,WORM,COLD etc. The machinery used for the purpose of squeezing and for the deformation of material parts. In the process of forging different types like Drop forging machine, forging hammers, screw presses used for the purpose of axial and incremental forging process. The drop forging machines are used for translation motion, mechanical and hydraulic presses and for the purpose of rotational movement, longitudinal and radial rolling machine are used and the combination of pressure machines are also used. For casting purpose molten pour material is used. The purpose of forging is to improve the mechanical properties of the material by refining its grain structure improving grain flow and making more tougher and stronger which can be used without any problem. In forging like eye bolt and pick mattock are made and as all bars are annealed before forged. Hot forged manufacturing process is performed at 1150 degree centigrade for steel, 360 to 520 degree for aluminum alloys, and 700 to 800 degree centigrade for copper alloys, necessary to avoid strain hardening of metal. For the purpose of optimization of cost factors are taken which effects in the process and for this purpose installment of multi stage heating system is required.

Key Words:-Furnace, Foundry, Heating, Chamber, Presses, Grain flow

Introduction: In metal working process the forging is very oldest method used for the purpose of converting shape of heated metal in to the desired shape as per the requirement of industry this process is performed by smith by using hammer and anvil from earlier days. As in this process which is known as smithy process or forged process running from centuries and comes under the engineering process and part of production machinery, raw material and considered as tool the products manufactured as the part of modern type industry. As in the present current scenario the production is done either by using heavy presses or with hammers of high weight used by power means power operated by compressed air, steam generation and by machinery operated by hydraulic system. The weight of the hammers is high and the other types of hammers having lesser weight known as power hammers around 300-400 kg or less reciprocating weight. The other hammers are also used which is operated by steam which is still in use. At present due to various processes to generate electricity mostly power presses and hammers are used for getting more output in lessor time. By forging the strong piece is made as compared to other cast or machined part in process. During heating at high temperature the metal internal structure changes and the grains deformation occurs which helps in process due to which improvement in the shape comes and strength also increases. The cost of casting and fabrication is more than forging only due to this reason forging is given more weightage in the field of industry. Iron and steel are always hot forged but some metals needs cold forge. Aluminum and titanium alloys can be forged hot and in this the production requires more funding for the purchase of tools and other facilities. As in the forging very hot metals are required to make changes and for this purpose heavy hammers are required to beat the metal in desired shape therefore risk involved for the technicians while doing the operation and due to this reason separate place is required as more heated metal may strike by mistake, therefore proper cover is made. In case of forge drop operation the arrangements are made to see that the shock generated and vibrations generated due to strike to be absorbed because it generates by hammers striking on the work piece. In case of metal forming dies more force acts and for proper heat treatment dies must be machined properly.

Problem and findings:-Objective is to get the proper method to get material as desired for the industrial production use or other purpose.

Methodology:--Different foundry operations are involved in production process and decided the operation just by knowing the metal temperature is above or below the recrystallization temperature and if the temperature is above the recrystallization temperature then hot forging process is done. It's very important to know the material properties before starting forging processes there may be some metals which may react adversely. If the temperature is below the recrystallization temperature and on absolute scale the warm forging is done. In drop forging hammer moves up and down and its dropped only when metal conversion to be done on work piece and it deforms in the desired shape and size. There are two types of drop forging.

1-Open Die Forging

2-Closed Die Forging

The difference in Open Die and Close Die is in first case the work is done on open space and in second case forging is done in covered case.

Figure:-1

In open die forging hammer strikes on the work piece which is kept on anvil and the deformation takes place. The surfaces are not in contact with each other means the melted metal flows freely
unless covered with dies.

Figure:-2

How the meted metal at high temperature kept on Foundry Machine

In closed die forging the melted work piece is kept in enclosure as shown in picture.

At present the more modern industries are developed with various techniques to avoid any kind of miss happening and by using supply chain management seven drivers helping industry in growth.

Process of Metal work casting:-In this process first the metal is heated in a big crucible which is kept on open furnace and heated at a high temperature for at least one or two hours depending on the metal scrap to be melted and once metal is melted then its poured in mold of whatever design and size required which contains a hollow cavity of the desired shape and allowing it to solidify for some time and once it solidify its taken out side by using mechanical tools by taking proper care and its important to note that before pouring melted metal in mold to be cleaned properly and powder is splashed in side so that it should not stick on it. The solidified part is known as casting. This process is used when the complicated shapes are required and when not possible to make by other process.

Melting metal in a crucible for casting

Figure:-3

Figure:-4

How the meted metal pouring is done by using big size crucible with precaution

By using different methods of casting the melted metal scrap is poured in different design as desired for industrial use. The best way to check the property of material used like melting of scrap of copper aluminum or zinc etc. Whenever metal is melted it should be melted at higher temperature for creating purity of metal to get good finish.

Different types of presses are used like

Screw press in which the ram is driven up and down by screw movement, this machine can be moved by hand or driving wheel. The weights are attached at the corner of the handle for balancing. The other press which is used for metal working which is a machine tool utilized for changing the shape and deforming the metal with die. For example whenever we want to punch hole on sheet metal with in one operation we make it. Other type of press is

Fly press is also used for the same purpose in this machine both side of the handles weight is attached run by screw system only.

Conclusion;-

In the process of forging if proper care is taken during production while placing metal piece on dies and applying pressure by using hammer of heavy weight and if proper casing is developed by using different types of mechanical arrangement the quality can be insured. Further study to be done as in the process heavy weight metal piece are moved in hot conditions which is very dangerous during lifting and placing on platform where the process of deformation takes place.

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