Impact Factor (SJIF): 3.632

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 3, Issue 4, April-2016

A Review: WEIGHT OPTIMIZATION FOR BEARING (STEERING RACE) ON FORGING PROCESS IN ORDER TO REDUCE WASTAGE MATERIAL

Bar Darshan B[1], , Dave Shivam G[2],

Parmar Sachin R[3], Patel Sanil G[4],

[1]*Department of Mechanical Engineering, Shree Pandit Nathulalji Vyas Technical Campus, Surendranagar, Gujarat - 363030, India*

[2]*Department of Mechanical Engineering, Shree Pandit Nathulalji Vyas Technical Campus, Surendranagar, Gujarat - 363030, India*

[3]*Department of Mechanical Engineering, Shree Pandit Nathulalji Vyas Technical Campus, Surendranagar, Gujarat - 363030, India*

[4]*Department of Mechanical Engineering, Shree Pandit Nathulalji Vyas Technical Campus, Surendranagar, Gujarat - 363030, India*

[5]*Department of Mechanical Engineering, Shree Pandit Nathulalji Vyas Technical Campus, Surendranagar, Gujarat - 363030, India*

Abstract *— We are interested in production process so we are choose IDP. We are visited all ween forge company. During our project work duration We have seen very different types of forging process and also seen forging machine and observed this machine and find the problem of wastage material weight during work on steering (outer and inner) races by individually forging process. So we are working on combine forging process in industry. In this combine forging process inner races and outer races produce combine. By combine forging process reduced wastage material weight and production cost and decrease labour cost and improve the production rate per steering race set and production rate are increase and die cost also decrease.*

Keywords- component; *punch die , press, induction heating machine , iron bar,*

I. INTRODUCTION

In the older design of die in M/s All ween Forge company when making bearing inner and outer race in this process first make inner race slot and than outer race slot. By this way process is take very long time and also take very high mass of wastage material. So main problem in die which make bearing inner and outer race in different phase. So our project is make new design of die and improve efficiency of forging By change in die dimension in press machine which carried out forging process. By change new die in machine efficiency improve as well as Wastage of row material is less. The whole system is based on improvement production rate, efficiency and wastage weight reduction.

II. LITERATURE REVIEW

A. Forging process control: Influence of key parameters variation on product specifications deviations by Zakari Allama,*, Eric Becker a, Cyrille Baudouina,Régis Bigota, Pierre Krumpipeb published in 11th International Conference on Technology of Plasticity, ICTP 2014, 19-24 October 2014,NagoyaCongressCenter,Nagoya, Japan et.al[1]

Process control in forging industry is essential to ensure a better quality of the product with a lower cost at the end of the manufacturing process. To control the process, a number of key parameters must be monitored to prevent product or forging plan deviations. This paper will illustrate how a variation in a process parameter can create product specifications deviations and how key parameters influence product final state. The illustration work is done on a part obtained via hot forging .An analysis is made on product parameters such as geometry, by varying the key process parameter values previously determined from a created methodology. This later is represented as a decision support system that connects product specifications (geometry, absence of defects, etc.) or other forging specifications (tool wear, involved energy...) to the process parameters.

B. A study of direct forging process for powder super alloys by Q. Bai a, J.Lin a,n,J.Jiang a, T.A.Dean b, J.Zou c, G.Tian c et al[2]

Powder metallurgy(PM)processing of nickel based super alloys has been used for a wide range of near net-shape fine grain products .In this paper a nove forming process ,i.e. direct forging of unconsolidated powder super alloys is proposed .In this process, encapsulated and vacuumed powder particles are heated up to a forming temperature and forged directly at high speed to the final shape ,by using a high forming load .Experiments of direct powder forging have been conducted on an up setting tool- set. Microstructure, relative density and hardness of the formed specimen have been investigated. A finite element model of the direct powder forging process has been established DEFORM and validated by the comparisons of experimental with simulation results of load variation with stroke as well as relative density distribution. The stress state and the relative density variation have been obtained from FE simulation. The correlation between the stress and consolidation condition has been rationalized. The developed FE model can provide a guide to design the geometry and thickness of perform for direct powder forging. consolidation condition has been rationalized. The developed FE model can provide a guide to design the geometry and thickness of perform for direct powder forging.

C. Material-Technological Modeling of C45 Steel Die Forgings published by Yanjin Guan*, Xue Bai, Mujuan Liu, LibinSong, Guoqun Zhao published in 11th International Conference on Technology of Plasticity, ICTP 2014, 19-24 October 2014,Nagoya Congress Center, Nagoya, Japan et al [3]

A new approach to optimize 3D preform shape in multi-step die forging based on Quasiequi potential Field Method and Response Surface Method is proposed. Using the proposed method, the optimized pre forging shape is determined in the hot forging of the pendulum mass. Based on the optimized pre forging shape, the advisable blocking blank is constructed. The final perform design, including the advisable blocking blank and pre forging shape, is completed. The desired pendulum mass forging without any defects and with smaller flash is obtained.

D. Direct Drive of 25 MN Mechanical Forging Press published by Jan Hlaváč, Milan Čechura* published in 25th DAAAM International Symposium on Intelligent Manufacturing and Automation, DAAAM 2014 et al [4]

Determination In the branch of forging presses there are new ones with direct drive. Our aim was to find out its possibility and to validate its properties and functionality. Mechanical forging single point press with a nominal force of 25 MN is selected for the example of direct-drive – this is a more powerful than was ever produced. The proposed direct drive is solved by pair of torque motors. These are connected with eccentric shaft via a gear drive, because of need to reduce speed. The paper gives the engineering process ,including of the time of the stroke. We tried to discuss a questions about efficiency in this paper.

III. CURRENT SYSTEM

3.1 OVER VIEW OF SYSTEM

We are seen all product manufacturing process and our interest in steering race manufacturing process. Manufacturing of steering race is done by forging process.

 Steering race are supply in DELUX bearing Pvt. Ltd. Outer and inner race of steering race are manufacturing individually by forging process.

 Steering race part name is SRP0002000. In company are take 35000 (outer & inner) order every month. Company are produce 5000 races Per day.

3.2 MANUFACTURING PROCESS OF PRODUCT

As Per Process Plane Company import raw material. If imported raw material successfully pass from Inspection Department it is thrown for heating. While metal is heating above recrystallization temperature it is further moves for cutting In Same domination With automatic pneumatic cutting Machine. Pieces of metal is then pressed as Upset by Crank Press forging machine. Then it is sent to close die forging to gain Outer circumference shape with use of Screw press forging machine. Inner part of work piece is removed as waste by piercing process with Crank press machine. Bearing race is cooled in atmospheric temperature in storage area for some time. In this unit one bearing inner and outer race are forge individually .While mass of stored bearing race gets atmospheric temperature then it is forwarded to annealing process for softness requirement. Again inspection Department is active for quality testing of work-pieces microstructure and Hardness Now work-pieces is ready for other Machining process in unit 2 for Turning. Work-pieces lots are in there final machining process stage now. Here rough surface of work-piece is removed with help of 10 diffident Jyoti CNC machine of same turning process for fast production .Final Product is inspecting then packaged and stored in warehouse.
As per Export Criteria Products is Dispatched to Orbit bearing Pvt. Ltd., Turbo BearingPvt. Ltd., Deluxe Bearings Pvt. Ltd. and other company.

3.3 DISADVANTAGES

In old forging process steering race inner and outer is made separately first inner is made and than outer race is made so working hour of that process is more and need of worker is more and time taken for that product is also very high.

 In this process die is more require because inner and outer race is made separately. Here wastage of material is very high in mass so benefits is low.

IV. CURRENT SYSTEM IMPLEMENTATION BY USING COMBINE FORGING PROCESS

While metal is heating above recrystallizations temperature it is further moves for cutting In Same domination With automatic pneumatic cutting Machine. Pieces of metal is then pressed as Upset by Crank Press forging machine. Then it is sent to close die forging to gain Outer circumference shape with use of Screw press forging machine. Inner part of work piece is removed as waste by piercing process with Crank press machine. Bearing race is cooled in atmospheric temperature in storage area for some time. In this unit one bearing inner and outer race are forge individually.

 Outer race manufacturing process is done by five step.

Step 1:- (heating & cutting)
Raw material is heating by induction heating machine at 1200C. Heating process is mostly require for forging process on work-piece. Raw material is cutting as per require length by using pneumatic sensor cutter.

Step 2 :- (upsetting)
Upsetting is one type of forging process. Upsetting process is done by crank press forging machine. In this step the length of work-piece is deform in diameter. In this process upper and lower die shape is flat.
In this process load capacity is 100 tons.

Step 3:- (closed die forging)
This is main step of forging process. In this process bearing outer and inner shape is made in circumference. In this process upper punch die is shape of combine outer and inner circumference of outer race. In this process machine load capacity
is 300 tons.

Step 4 :- (piercing)
Piercing process is one type of removing unwanted material. Wastage material is removing in Inner circumference of combine inner and outer race. This process is done by crank press forging machine:- 3, it's load capacity is 100 tons.

Step 5 :- (Dividing outer & inner)

In this process outer and inner race are dividing for crank press machine.

TOTAL WASTAGE MATERIAL WEIGHT

 In combine forging process total wastage material weight is less as compare toolder forging process.

 Main reason is that here new die is used to work in this process so two process is done very accurately.

 Here total wastage material is only 30gm as input weight and in older design total wastage material is 80gm as per input weight.

 In here material is reduce in wastage so overall affect in manufacturing so its increase.

 Wastage material is also used in other way in different thing so its also not loss.

V. COMPARISON OF NEW AND OLD FORGING PROCESS

OLD FORGING PROCESS

- In old forging process steering race inner and outer is made separately first inner is made and than outer race is made so working hour of that process is more and need of worker is more and time taken for that product is also very high.

- In this process die is more require because inner and outer race is made separately. Here wastage of material is very high in mass so benefits is low.

NEW FORGING PROCESS

- In new forging process steering race inner and outer is made individually in this process when outer race is made that time inner race is also made so wastage material of this process is less so benefits is much more as compare to older forging process.
- In this process die is less require because inner and outer race is made combine. worker is less need as compare to the older forging process and time taken is less because both inner and outer race is made same time.

VI. REFERENCES

[1] www.allweenforge.com

[2] Refinement of steel microstructure by free-forging Journal of Achievements in Materials and Manufacturing Engineering

[3] Sustainability issues of research and development of forging- Journal of Achievements in Materials and Manufacturing Engineering

[4] Closed Die Hammer Forging of Inconel 718- Published by S. Chenna Krishna,1 SatishKumar Singh,1 S. V. S NarayanaMurty,1 Ganj iVenkata Narayana,2 Abhay K. Jha,1 Bhanu Pant,1 and Koshy M George1