International Journal of Engineering Research And Advanced Technology (IJERAT)
ISSN: 2454-6135 [Special Volume. 02 Issue.01, May-2016]

Design and Analysis of Forging Die for Connecting Rod to Achieve Deferential Thickness at Both the End (S/E And B/E) of Connecting Rod.

Prakash Kummur

Mr. M R Prabhushankar.

M Tech student IV Semester , Assistant Professor , Dept of IE&M , JSSATE Bangalore

ABSTRACT

Forging is a process in which to transform the shape of metal using heat and localized compressive forces.die is the shaping partof the forging process. The project work emphasizes on the design and development of forging die. In today's scenario, the main weightage of investigation is to reduce the cost of product while upholding the strength and improving productivity. To solve problem, in this regards elimination of extra milling machine by designing proper forging die. Before going to the die designprinciple, a detailed study is conducted on forging processes, forging equipments, forging dies and materials. After studying thevarious aspects involved in the die design, die design for connecting rod is made. Here in the design of forging die, the product ismade most accurately so as to get the forged product free from all defects and as per the requirements given in the productdrawing. In industrial view the forging die for connecting rod helps for the mass production of product without any defects of thematerial after forging. For the analysis of die defects all the required data are collected and based on this study the suitableactions should be suggested for reducing the die failures and for increasing the die life for connecting rod. The product thusobtained by forging is at good strength and free from any defects.

Problem definition

In sansera engineer pvt ltd, while forging of a connecting rod they r getting same thickness at both end(S/E and B/E) of the connecting rod. But the customer requirement is should have deferential thickness, so in order to get deferential thickness they are using two vertical milling machine to remove extra material so it causes reduces productivity, increases manufacturing cost, reduces quality of product.

The aim of this project is to get the deferential thickness at both end of connecting rod in forging itself, so that working of extra two vertical milling machine can be eliminated resulting in reduces manufacturing cost, improving productivity as well Improve the quality of the product. To achieve this suitable forging die is designed.

1. INTRODUCTION

Forging is one of the past known metalworking process. Usually, forging was done by a smith using hammer and anvil. In the designof forging die, the product is made most accurately so as to get the forged product free from all defects and as per the requirementsgiven in the product drawing. In industrial view the forging die for connecting rod helps in the mass production of product without anydefects of the material after forging. For the analysis of die defects all the required data are collected and based on this study thesuitable actions should be suggested for reducing the die failures and for increasing the die life for connecting rod. The objective of Forging Die Design of a Connecting rod is to give a quality die product to the customers as per their drawings andspecifications. A detailed study is done about the forging processes, forging dies and materials, die manufacturing methods and diedesign considerations for making the die that are free from any defects. Thereby reducing the die failures and increasing the die life.The analysis is going to do using ANSYS software

2. WORKING PROCEDURE

2.1 Design and Development

Number of Forging Process RequiredAfter studying product drawing it was found that in order to get the connecting rod forged three forging processes are required

- Fullering
- Blocking
- Finishing

The impressions for fullering, blocking and finishing can be made on a single die block.

2.2 Detection of Parting Line

Since the connecting rod is symmetrical, the parting line is selected as that line which divides the connecting rod into two symmetricalsections. Thus the parting plane is that plane which passes through the centre portion of the production such that the cross section atthat parting line of the product will be same as shown in the product drawing.

2.3 Fuller Design

The length of connecting rod is 814.3 mm. considering all the dimensions of connecting rod, the fuller is designed. Thus the length offuller is taken as 814.3mm, width as 460mm and it is tapered as shown in product drawing. The fillet radius is given as 6mm.

2.4 Blocker Design

For the finishing impression of the die, the dimensions are given such that it is equal to 1.015 times the dimension of the product (thatis the dimension given in the product drawings). The change in dimension is given in order to compensate for the shrinkage of theproduct during cooling. At the check portions dimensions are slightly increased.

2.5 Finisher Design

For the finisher the dimension are that they are 1.015 times that of the product in order to compensate for the shrinkage of the productduring cooling product drawing for finisher design.

2.6 Die Block Selection

Thus the design of fuller, blocker and finisher is completed. The next step is to determine the size of the die block. Since the size ofconnecting rod is smaller we can accommodate the fuller, blocker and finisher in a single die block. The width of the connecting rod atthe paring line is 224mm. The width of flash and gutter is 260mm thus total maximum width required for both blocker and finisher is224+260+260+(2x55) that is 924 mm taken as 950mm.The length of connecting rod is 640+(3x180)mm that is 1180mm taken as1200mm. Considering all the dimensions mentioned above the standard die block of dimension 1200x950x500mm3 is selected. Dieblock material is DIN 2714.

2.7 Die Layout

The next step is to locate the position of these impressions on the proper laying of the center lines for fullering, blocking and finishingimpressions at suitable place on the die block dimensions. The finisher is located at the side of the finisher at some distance away fromit. Fuller is located at one suitable corner of die block. The location of fuller, blocker and finisher is shown in the product drawing.

2.8 Locking Arrangements

Referred product drawing for locking arrangement, female blocks are made on the bottom die, but reverse is the case with impression.Four locks are arranged, each at the corner at the die block.Results of DesignThe product obtained after forging was free from all defect except that lap was formed at the parting plane of check portion of theconnecting rod. It was not a major defect the lap was removed by grinding. The dimensions of the product were also accurate. About100 connecting rods were forged and dies did not find any fault.

3. CONCLUSION

During the first phase of the project a detailed study of Forging processes, Forging die and materials, Design considerations wasdone.DIN 2714 tool steel is using for the die block of a connecting rod. With these data die design of a connecting rod was done. With this forging die we eliminated two vmc machines which reduces the manufacturing cost and improve the productivity as well improve the quality of the product.

4. REFERENCE

1. Dieter, G.E., Mechanical metallurgy, SI metric edition, McGraw-Hill, (1998).
2. Edwards, L. and Endean, M., Manufacturing with materials, Butterworth Heinemann, (1990).
3. Beddoes, J. and Bibbly M.J., Principles of metal manufacturing process, Arnold, (1999).