



ISSN: 2329-8227 (Print)
ISSN: 2329-8219 (Online)
CODEN : FMERA8

ARTICLE

Frontiers in Manufacturing Engineering (FME)

DOI: <http://doi.org/10.7508/fme.01.2021.01.03>



RELATIONSHIP BETWEEN CASTING PROCESS AND MECHANICAL BEARING HOUSING

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ARTICLE DETAILS

Article History:

Received 20 January 2021
Accepted 13 March 2021
Available online 22 March 2021

ABSTRACT

After China has entered the reform and opening -up of the modern socialist country, the level of economic development, scientific and technological progress and the level of industrialization have shown a certain trend of development, this has effectively promoted the process of China's machinery reform and industrialization innovation, especially the performance optimization of large-scale mechanical parts for China's machinery industrialization process is also very important. Focusing on improving the performance of the mechanical bearing seat, this paper mainly analyzes the influence of different casting technology levels on improving and changing the performance of the mechanical equipment in China.

KEYWORDS

Casting process, Mechanical bearing seat performance, Influence analysis.

1. INTRODUCTION

The bearing seat can fix the bearing, support the operation of the bearing, and also bear the pressure brought by the bearing to ensure the normal torsion and rotation of the bearing and the normal operation of the mechanical equipment. The bearing seat plays a great role in the operation of the machine and equipment, so it is very important to ensure the performance and quality of the bearing seat. Casting is an important technology for producing bearing housings, and it is also the key to ensuring the quality of bearing housings. China's casting output is very high, but there are still some shortcomings in the improvement of related casting technology. This paper studies the impact of casting technology on the impact strength and wear resistance of bearing housings through experiments, and determines the best casting technology parameters. With the progress and development of the times, under the background and development needs of the new era, in order to have strong working ability, process technicians need to change the technical concept, pay attention to the innovation of technical methods, and apply them to practice.

2. OVERVIEW OF BEARING HOUSING STRUCTURE

A bearing can choose various types of housings, and because different types of bearings can be selected, it often brings different housing sizes. According to the different requirements of the bearing and the bearing seat, the classification of the bearing seat is not completely the same, and the use should be carefully checked and selected according to the design. According to the shape of the bearing housing, the outer spherical housing is also called a bearing unit. It is called an outer spherical housing without a bearing. The outer spherical housing is divided into 200 series, 500 series, 300 series and 600 series according to the bearing series. According to the shape, the outer spherical bearing seat

is divided into vertical seat (p seat), rectangular seat (f seat), diamond seat (fl seat), circular seat (c seat), boss circular seat (fc seat), boss rectangular seat (fs seat), dark hole seat (pa seat), hanging seat (fa seat). According to the body type, it can be divided into integral type and non-separable type. The integral type (non-separable type) has a vertical bearing seat and a screw-fastened bearing box cover. Originally developed as a bearing housing for light trucks, but can also be used for previous longitudinal bearing sets. The rigidity of non-separable vertical housings is higher than that of separate housings, and some can bear heavier loads. The outer spherical housing is also a one-piece housing. The main function of the bearing seat is to effectively support and fix the bearing. At the same time, it can also bear and share the pressure transmitted from the bearing, so as to ensure the stable operation of the machine and improve the structure of the equipment. In addition, it also has the effect of mitigating the torsion spring and vibration of the bearing, effectively ensuring the normal operation of the equipment. The bearing seat plays a very important role in the normal operation of the equipment. The quality and performance of the bearing seat need to be repeatedly confirmed, so as to ensure the normal operation of the machine. At the same time, the quality of the bearing seat is closely related to the application of the bearing seat. Once the quality of the bearing seat does not meet the production needs, it will affect the service life and work efficiency of the bearing. Therefore, the study of the bearing seat is of great significance and lays the foundation for the follow-up work.

3. BACKGROUND ANALYSIS OF THE INFLUENCE OF CASTING PROCESS ON THE PERFORMANCE OF MECHANICAL BEARING SEAT

As we all know, bearing housing is an important part of modern machinery and plays an important role in the normal operation of

mechanical equipment. The bearing seat has the effect of reducing the torsion and vibration of the bearing, which can effectively ensure the normal operation of the mechanical equipment. At the same time, the quality of the bearing seat is closely related to the application of the bearing seat. In a complex environment, the bearing seat is prone to overload work, and problems such as deformation and collapse are likely to occur. The working strength of the mechanical bearing seat is very strong, and it is affected by the self-weight of the upper mechanical equipment and the force generated by it. At the same time, when the equipment is operating, vibration, powder layer, etc. will affect it. Under the harsh working environment, the bearing seat is prone to deformation, fracture and overload, which affects the normal production. In addition, the production of the bearing seat is cumbersome, and the bearing seat has the characteristics of complex structure and uneven deformation, so the shape is easy to change under the uneven thermal environment during the casting process [1].

In addition, the production and use of the bearing seat have a great influence on the bearing. Once the performance of the bearing housing does not meet the industry requirements, this will have a certain impact on the durability and basic working efficiency of the bearing housing. Moreover, in harsh working environments, housings are susceptible to both internal and external factors. Overloading of loads can cause deformation or damage to the housing. However, in the production, processing and casting process of the bearing seat, the bearing seat also needs to choose different casting processes according to the relevant requirements of the casting mold. In addition, it is necessary to improve the technical level of technicians to ensure the accuracy and size of the casting mold, to ensure the performance of the bearing seat, and to avoid the bearing seat from being affected by internal and external factors. Therefore, this paper studies the impact wear test of the bearing seat under the influence of various technical parameters. It mainly studies the influence of casting technology on the performance of bearing housing, finds the best casting technical parameters, and provides development basis and direction for the modernization of the machinery industry.

4. STUDY AND ANALYSIS OF EXPERIMENTAL MATERIALS AND METHODS

4.1 Test material and casting process parameters

In this paper, the performance of casting samples is tested and data analysis is carried out in combination with scientific casting process methods. Through a large amount of practice and combined with the research of scholars, it can be found that the performance of the bearing seat will increase with the increase of the pouring temperature and the increase of the pouring time, resulting in the performance of the bearing seat rising first and then decreasing, which ensures the accuracy of the inspection results in each period. The test material in this paper is the bearing seat of ZG35CrMo steel, the size of the bearing seat is 2360mm×1640mm×1280mm, the thickness is 52-256mm, the chemical composition is measured by X-ray spectrometer, and the gravity casting system is selected in the casting process.

4.2 Casting process parameters

Foundry technology has become the core of accelerating the development and innovation of China's machinery manufacturing industry. In the development of machinery manufacturing industry, it is necessary to perfectly combine casting technology and production. Enterprises reform their manufacturing methods to speed up the development of the machinery manufacturing industry. In order to improve the performance and quality of the bearing housing, it is necessary to improve the casting process. During the experiment, the gravity casting system was selected, and the casting process parameters were optimized. In the specific casting process, three ranges of casting temperatures of 1460°C, 1480°C and 1500°C are selected. By precisely controlling the casting and pouring time, the casting time is guaranteed to be within 90 seconds. In order to control the casting time, this paper also studies the characteristics and performance of the bearing housing in different casting times [2].

4.3 Experimental procedure

After the bearing housing is cast, standard V-shaped specimens and impact test pieces are made. After the impact test, the samples were carefully examined using a JSM6510 electron microscope (SEM) Abrasion

tests were carried out on samples of approximately 50 mm x 10 mm. A MM200 abrasion tester was used. The parameters are set as the rotation speed of 400U/min, the working pressure of 100N, and the wear time of 30min. General tests are carried out at room temperature. In order to ensure the accuracy and probability of test results, the consistency of abrasives during the test must be maintained. After the test wear was completed, it was carefully observed with a JSM-1 scanning electron microscope.

4.4 TEST METHODS

After the bearing seat is cast, the standard V-notch sample is made into an impact sample, and the impact sample is tested. After completing the experiment, the samples were observed using an electron microscope. The sample size of the wear sample is 50mm×10mm. The wear experiment was carried out with an MM200 machine. The parameters of the MM200 wear testing machine are set as the rotation speed of 400r/min. The working pressure is controlled at 100N. The wear time is controlled at 30min. The entire experiment was performed at room temperature. In the course of the experiment, in order to ensure the authenticity and accuracy of the experimental results, it is necessary to ensure the wear material. After the experiment, the samples are observed by a JSM-1 scanning electron microscope.

5. TEST RESULTS

5.1 Impact performance

After the impact test is completed, the shock absorption rate of the bearing seat will change with the increase of temperature. It increases as the temperature rises, and after increasing to a certain level, there is a downward trend. The impact test results at the pouring temperature of 1460-1460 °C show that the impact absorption energy is the impact absorption energy of the 69J sample, and the impact performance is the worst at that time. The impact test results at the pouring temperature of 1480°C show that the 75J sample has the same impact energy absorption capacity, and its absorption capacity is higher than that of the original sample. The test results show that when the pouring temperature is above 1520 °C, it has the same impact energy absorption capacity, and the impact absorption capacity is greatly improved. When the pouring temperature is below 1530°C, the shock absorption capacity is 97J, which is the same as the maximum shock absorption capacity of the test shown in the test results. When the casting temperature is 1540°C, the impact test results show that the impact absorption capacity of the sample is 91J when the casting temperature reaches 1540°C. Based on the results of the impact test, the evaluation temperature was set to 1530C in order to show the best impact performance of the mechanical housing. By measuring the optimal impact strength of the mechanical bearing seat at 1530°C, it was found that the longer the casting time, the greater the impact strength and the smaller the impact strength. The impact test results under the condition of 45s casting cycle show that the impact absorption capacity reaches 61J, and the impact absorption capacity of the sample with a flow delay of 60s is 68J. The impact test results show that under the condition of pouring time of 75s, the impact absorption capacity is 79J. In the impact test with a pouring time of 90s, the impact energy of 97J was absorbed by the impact sample. When the injection time is 90s, the impact performance of the sample is the best, and the impact absorption capacity of the sample gradually decreases with time.

The sample poured at 1530 °C has the smallest and deepest impact opening, and the sample poured at 1530 °C has the highest impact performance [3].

5.2 Wear resistance

The effect of pouring temperature on the wear resistance of the samples decreased with increasing temperature and increased with increasing temperature. The wear amount of the sample is 14×103mm³ at the casting temperature of 1530°C, 17×103mm³ and 18×103mm³ at the casting temperature of 1520°C and 1540°C. By studying the effect of pouring time on the wear of the samples, the results show that the wear trend gradually decreases with the increase of pouring time. When the pouring time is 90s, the wear of the sample is the smallest, the wear amount is 28×10-3mm³ to 14×10-3mm³, and the pouring time is 75s and 105s, respectively. The impact performance and wear performance

of the bearing seat are the best when the pouring temperature is 1530°C and the pouring time is 90s. Therefore, it is determined that 1530 °C is the best pouring temperature of the bearing seat, and the time is most suitable for 90s.

6. CONCLUSION

In short, in order to effectively promote the development and progress of industrialization, it is necessary to control and optimize the performance of related mechanical equipment. When using multiple bearing housings of different sizes, the performance of the parts itself is largely affected by the service life, which affects the bearing housing life. In this paper, the casting process is improved on the basis of the existing research results, and it is pointed out that the performance of the bearing seat is affected by the pouring time and pouring temperature, so as to help the relevant staff to conduct in-depth research on the performance of the bearing

seat, and carry out further optimization and innovation of measures.

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