RESEARCH ARTICLE

Application of Physical Properties Analysis Method in Metal Material Production and Research

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Abstract: In recent years, with the rapid development of China's economy, the application of metal materials has played an important role in China's economic development. In the production and research process of metal materials, the analysis of material physical properties has received widespread attention. The method of material physical analysis provides people with a more convenient and reliable basis for studying the properties of metals. In people's production and life, metal materials have become an indispensable part of people's lives, and people's higher standards of living have prompted the production of metal materials to seek further upgrades and innovations. The paper makes the following analysis on the application of material physical property analysis methods in the production and research of metal materials, and puts forward several investigations and suggestions for the majority of workers engaged in metal material production.

Keywords: Material physics; performance analysis; metal material production and research; application method analysis

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1 Introduction

In the history of human development, the production of metal materials has been used as one of the criteria for measuring the strength of a country. The application of metal materials in China can be traced back to the Shang Dynasty. At that time, copperware was used in large quantities and greatly facilitated people's production. With the continuous progress of the times, more and more metal materials were discovered and widely used in people. In his life, metal materials can be seen throughout the development of human history. Today, with the continuous development of modern industry, people have put forward higher requirements for the production of metal materials. The paper explores the physical properties of metal materials to improve the stability of metal materials during use. In the production process of traditional metal materials Carry out innovative reforms to make metal materials better meet the requirements of today's society and improve the performance of metal materials.

2 Classification and development of metal materials

Metallic materials generally refer to pure metals or alloys in industrial applications. There are about 70 kinds of pure metals in nature, the common ones are iron, copper, gold, silver and so on. Alloy refers to the combination of two or more metals or metal compounds. The chemical properties are much more stable than pure metals. Therefore, alloy materials are commonly used in industry. Metal materials are generally divided into ferrous metals, non-ferrous metals and special metals. Ferrous metals refer to industrial pure iron with a high iron content, and are generally used for stainless steel materials or high-temperature materials. Non-ferrous metals refer to all metals and alloys except iron and manganese. Special metal materials are generally structural metals or functional metals, which are used to make superconducting, damping and other metals or alloy materials with special functions [1].

In the 20th century, China's industrial level was in a

stage of rapid development, and the demand for metal was great. Therefore, metal is the key to industrial development. Due to the large demand for metal materials, the current shortage of metal materials is caused. However, with the continuous progress of society, people's demand for heavy metals has decreased, and the demand for light metals and special metal materials has increased. General metallic iron has generally appeared in people's lives, and the problems of metallic iron in long-term use have prompted people to discover more metals with stable physical properties, lighter weight, and stronger hardness. With the development of industries such as automobiles, home appliances, and medical treatment, people's demand for metallic magnesium and magnesium alloys has increased. As a non-ferrous metal, magnesium has gradually replaced the status of metallic iron with its advantages of lighter weight and high hardness, and has become the most popular at the moment. One of the metals. Faced with the ever-developing aerospace technology, metallic aluminum and metallic titanium have also been greatly developed. Titanium metal has the advantages of low density, high strength, and corrosion resistance. It has become a metal material widely used in various industries in today's society, thus promoting the development of the aerospace field. Titanium also appears in people's daily life. Many badminton rackets, bicycle racks, and sporting goods are made of titanium. However, compared with the world, China started late in the application of titanium, and there is still a big gap between China and many developed countries in the world. Metal aluminum has low density, high hardness, and good metal ductility. It is an ideal material for making aviation accessories. At present, metal aluminum and aluminum alloys have gradually replaced other metal materials and become important metal materials for aerospace. With the development of science and technology, metal aluminum and aluminum alloys will definitely be better utilized. People will also discover more metal materials in continuous exploration, and use effective methods to maximize the advantages of these metal materials.

3 Performance analysis of metal materials

3.1 Casting of metallic materials

At present, most of the metal materials we see in our lives are made by squeeze casting or pouring with a mold in a low-pressure environment. These two methods are simple and feasible, and the utilization rate of metal materials is extremely high, almost non-existent. A wasteful situation. For many industries, using machines to mechanize operations can not only improve work efficiency, but also reduce the waste of human resources. In the process of extrusion forging, several points are involved, including the influence of pressure on the state of the alloy, the molding, solidification and heat conduction of the casting in the process of extrusion casting, and the conduction of pressure during the extrusion process. Since pressure is the key to squeeze casting, pressure will affect the solidification temperature, heat conduction and other parameters of the alloy. Squeeze casting technology has a large space for material selection, and general metal materials can be forged by squeeze casting. When faced with different metal materials, the squeeze casting method will also have subtle changes. For example, when casting aluminum alloy, a small amount of magnesium, copper and other metals will be added to further improve the properties of the alloy material, as a catalyst can accelerate the metal chemical reaction; if a small amount of titanium is added, it will also greatly increase the ductility of the metal; When aluminum-copper alloy is added, magnesium and titanium can also make the forged alloy have better mechanical properties and corrosion resistance [2]. In short, when forging alloys, by adding trace amounts of other metals, the forged alloys can have different properties and meet more industrial needs.

3.2 The influence of forging temperature on metal properties

In the production process of metal materials, temperature is very important for metal materials. Forging temperature refers to the range between the start forging temperature and the end forging temperature. The requirement of forging temperature is to make the metal have good resistance to deformation, ensure the quality of the forging, and reduce the material loss during forging at any time. General methods for determining forging temperature include look-up table method and analysis method.

The look-up table method is convenient for general metals. After long-term production practice, the forging temperature range of most metals has been clearly recorded, which can be found in the manual. However, it is the analytical method that pursues the development and research and application of more properties of metals.

The analysis method is determined by the three aspects of metal plasticity, quality and anti-deformation ability, and the appropriate forging temperature is given through the analysis of these three aspects. If the temperature is too high during forging, it will cause problems such as cold brittleness of the metal material, insufficient strength of the metal material, etc. Therefore, special attention should be paid to the forging temperature during the forging process.

3.3 The nature and organization of the metal

The composition of the metal can change the properties of the metal. Under normal circumstances, pure metals have good forgeability, but some pure metals have poor ductility and hardness, and their corrosion resistance does not meet the specified requirements. Although the alloy increases the hardness of the metal, it causes the deterioration of the forgeability of the metal. Different metals have different organizational structures, and the internal organization of these metals determines the characteristics of the metal. The metal structure is divided into a centered cubic structure and a row of hexagonal structure. Generally, the metal plasticity of the centered cubic structure is better than that of the row of hexagonal structure. Due to the inherent problems of the internal structure of the metal, cracks may occur during forging. Sometimes the metal forged in the process of forging metal does not meet the requirements. It is not a problem in the forging process, but a defect in the internal structure of the selected metal material itself. Therefore, it is important to choose different metal materials in different scenarios. There are many types of metals. It also provides a lot of space for the selection of forging materials [3].

4 Application of material physical analysis methods in applied technology research

4.1 Application of material physics application technology in daily life

First of all, thermal analysis is widely used in daily life as part of the physical analysis methods of materials. Modern thermal analysis methods refer to the measurement of physical properties and temperature relationships of substances under the control of programs. In thermal analysis, we can understand the glass transition, melting, crystallization, eutectic temperature, purity, identification of substances, etc., and we can understand the changing laws of substances when studying the phase transition curve.

Secondly, polymer materials can be identified by melting point. When investigating the aging of the influent alloy is =, the change in the resistance of the metal at different temperatures can be analyzed through the curve, and then the change in the metal can be analyzed.

Finally, in the analysis of the material fatigue process, the change in the internal density of the material can be observed through the curve, and then it can be inferred whether there are cracks on the surface of the material, which has important significance for the performance of metal materials [4].

4.2 Application of metal material application technology

Metal material performance analysis requires mastering the necessary physical knowledge, focusing on the relationship between metal physical properties and metal composition, organization, and structure, as well as the main testing principles, methods and expected effects of metal physical properties. Only by choosing a reasonable physical property method in the metal research process can we pave the way for the application and development of the use of metal materials and lay a foundation for further development.

Material physical properties analysis methods include a variety of material analysis methods, among which there are many analysis methods for metal materials, and they are widely used in the production process of metal materials. However, in order to further develop metal materials, the physical analysis methods of materials should not be limited to the analysis methods of metal materials. More knowledge can be obtained from the analysis of other materials and applied to the production of metal materials. Material physical analysis methods include the thermal properties of the material, the electronic properties of the material, the magnetic properties of the material, the optical properties of the material, and the elasticity of the material. These are all related to the physical properties of the material. In the production process of metal materials, thermal properties and elastic properties are used more. Because in the production process of metal materials, it is inevitable to heat the metal, and the heating temperature will affect the internal structure of the metal, resulting in a change in the elasticity of the metal [5].

In the processing of metal materials, in order to ensure the quality of the metal materials, some non-metallic impurities such as sulfur are usually added, or some gases such as oxygen, hydrogen, nitrogen, and nitrogen oxides are added. In the metal smelting process, it is necessary to ensure that the internal structure of the metal is good, and the internal bubbles are small and tight.

In the production process of metal materials, most metals go through the three steps of deoxidation, decarburization, and desulfurization. If the carbon content, oxygen content, and sulfur content in the metal are too high, firstly it will form harmful substances to harm the human body, and secondly, it will cause the metal to be damaged. Plasticity and resistance to high and low temperatures are reduced, which ultimately leads to low utilization of alloys.

Many processes in the production of metal materials involve chemical reactions, and most of the metals

contain impurities. These compounds or impurities will affect the properties of the final metal materials, and therefore need to be removed by chemical reactions in the preliminary production. However, in the production process, some chemical reactions cannot completely remove impurities, or introduce some new impurities. This requires us to innovate the production process, minimize the introduction of impurities, increase the efficiency of chemical reactions, and try our best Remove unnecessary impurities all at once. In fact, the chemical reaction is affected in many ways. According to our known knowledge, impurities can be removed very well. In the process of metal material smelting, the metal material that has been filtered for the first time will be reacted many times. Until the requirements are met, the current smelting technology has reached a relatively good level. In the face of different metal substances, we currently have many methods for smelting. The metal materials smelted by different methods have different characteristics to meet different production needs [6].

Physical analysis methods provide a theoretical basis for the production of metal materials. In many cases, the physical analysis method is to obtain the physical property curve of the metal, and analyze on the basis of the curve to obtain the characteristics of the metal. According to the theoretical characteristics, the next step can be carried out. In the actual production process, the situation that occurs in the metal production process is different. Affected by many factors, the theoretical value and the actual value will have a large deviation, which affects our judgment, so we must use it better Theoretical knowledge must be linked with reality, and the reasons for the deviations must be found in order to better carry out the production work.

5 Conclusion

In recent years, metal materials have been in a period of rapid development. The continuous development of science and technology has increased people's understanding of metal materials. How to improve the quality of metal materials in the forging process of metal materials and apply the advantages of metal materials to more Localities are issues worthy of attention, and they are also links in the continuous improvement and innovation of metal materials in the future development. If you want to use metal materials to the extreme and benefit the people, you need to continuously explore the development of metal materials to make progress in the end.

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