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IMPROVEMENT OF MECHANICAL PROPERTIES OF STEEL WIRE BY THERMAL PROCESSING

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ANNOTATION

This article talks about increasing the mechanical properties of steel wires by thermal treatment, controlling the structure of thermal treatment steels, and the stages of thermal treatment.

KEYWORDS: thermomechanical processing, heating temperature, semi-softening, mineral oils, isothermal temperature, plasticity

INTRODUCTION

Heat treatment is a method of controlling the structure of steels, in which the alloy is heated to a certain temperature and cooled at different speeds. Heat treatment can be divided into three types:

- Pure thermal treatment;
- Thermomechanical treatment;
- Chemical-thermal processing. Pure heat treatment consists of:

Softening;

- Normalization;
- Finding;

release.

Structural changes that occur during heat treatment form the basis of the process. The main factors affecting the internal structure of the alloy during heat treatment are:

- Heating temperature;
- Heating time;
- Cooling rate of heated alloy.

MAIN PART

The heating temperature of the workpiece is determined from the FeC state diagram, depending on the intended purpose and the internal structure of the steel before heating. During heating and cooling of steel, the temperature that causes phase changes in its internal structure is called critical temperature and is designated by t1kr.

Softening. The purpose of softening is to bring the structure out of equilibrium to equilibrium. Usually, softening means heating the product to a certain temperature and cooling it together with the oven. There are the following types of softening:

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- Recrystallization;
- Premature softening;
- Full softening.

• For recrystallization, the item is heated to 650-700°C, and after being kept at this temperature for a certain time, it is cooled together with the furnace. In this case, ferrite recrystallizes and cementite grows a little. The plasticity of the material increases.

• For semi-softening, the product is heated to a temperature 10-30°C higher than the GS line, and after holding for a certain time, it is cooled together with the furnace. The purpose of this thermal treatment is to round the perlite in the form of a plate. Although its hardness is slightly lower than that of plate-like perlite, its plasticity is high.

• Pre-eutectoid steels from the GS line, post-eutectoid steels from the RSK line are heated to a temperature 30-50°C higher in order to relatively grind their grains and reduce their residual internal stress, and after holding at this temperature for a certain time, the furnace along with cooling we mean full annealing. Holding time at high temperature should be sufficient for phase changes to occur in the product material. As a result, due to the cooling of fine-grained austenite, pearlite grains are also crushed.

In order to reduce the cooling time, austenite is kept at the temperature with the least stability until it completely decomposes. After the austenite has broken down into pearlite, it is slowly cooled. Such thermal treatment is called isothermal softening. It takes 2-3 times less time than softening.

Normalize. The purpose of normalization is to prepare the product for further heat treatment, and to improve the structure of medium carbon steels. Normalizing differs from full annealing by the cooling rate. Normalization means heating the steels at a temperature 30-50°C higher than the GS, SE lines and cooling them in the air after holding them for a certain time. Since the rate of cooling the product in air is greater than cooling with the furnace, the process of decomposition into pearlite takes place at a lower temperature. As a result, the structure of the product is smaller than in full softening. Due to this, the durability and hardness of the product will be 15-20% higher. Normalizing is used as a preparatory stage of thermal treatment of steel or as a final stage for medium carbon steels.

Quenching. The purpose of the acquisition is to increase the strength of machine-building materials. The main difference of tobing from other purely thermal processing is that it is cooled at a high speed. The melting temperature is determined according to the Fe~Fe3C phase diagram. There is a risk of austenite growth if it takes a long time for the tempering temperature to be the same across the entire cross section of the product. The time of keeping the product at a certain temperature in the oven depends on its shape, the method of placing it in the oven and its type. Carbon burns when the raw materials are heated in a high-temperature oven. As a result, the amount of carbon on the surface of the product decreases. In order to prevent this, ovens with controlled working environment are installed in machine building.

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Choosing the right storage medium is important. From the isothermal decomposition diagram of austenite, it is known that the minimum cooling rate required to obtain the curve should be the attempt. But it is necessary to slow down the cooling rate at the limit of decomposition into martensite, so that the internal thermal stresses that occur in the product are reduced as much as possible. Water, mineral oils, salt solutions are used as cooling media. Water is used to weld carbon steels, and mineral oils are used to weld high-alloyed steels. If the cross-section of the draft is large and the shape is not complicated, it can be cooled continuously in one medium (Fig. 4.1, curve 1). Two environments are used for cooling in high-carbon steels. For this purpose, it is cooled with water until the stability of austenite exceeds the minimum period, and then it is slowly cooled in oil at a temperature 80-100 °C higher than the temperature of decomposition into martensite. If the structure of the device is complex and the size is large, then a stepped tap is used. In this case, the tool is kept in a liquid medium at a temperature higher than decomposition to martensite, and then cooled in air. In this way, the temperature is the same throughout the volume before it breaks down into martensite. In most cases, complex parts of machines made of medium carbon steel are tempered at isothermal temperature. In this case, the steel is quickly cooled to bainite. After the bainite disintegrates, the cooling is continued. As a result, undisintegrated austenite appears in the steel structure.

CONCLUSION

A good ratio of plasticity and hardness occurs in such tempered steels. In the practice of mechanical engineering, there are methods of finding that allow self-discharge. For this, only a part of the heated object is cooled. Due to the heat of the uncooled part, the cooled part heats up to the discharge temperature. As a result, the discharge process occurs by itself. In this method, products with different parts of different hardness are obtained. The greatest hardness achieved as a result of tempering is called tempering of steel. It mainly depends on the amount of carbon in the steel. The greatest hardness of steel cooled in various environments is surface hardness. From the surface to the layer consisting of 50% martensite and 50% trostite is called intermediate tempering depth. A sample with a diameter of 25 mm and a length of 100 mm is used to determine the penetration depth.

REFERENCES

1. Abdurahmonov S.E., Ahmedov P.S. Payvandlash mashinalari va jihozlari./O’quv qo’llanma -N.: NamMPI, 2004 y. -120 bet.
2. Ro’ziev.Q.I. Alimov M.O. Binolarning yog’och, plastmassa konstruktsiyalari./O’quv qo’llanma-T.: TAQI, 1993 y. -120 bet.
3. Ishmatov Q. O’qitishning interfaol metodi./O’quv qo’llanma-N.: NamMPI, 2003y. -24 bet.
4. Ishmatov Q. Pedagogik texnologiya. /O’quv qo’llanma-N.: NamMPI, 2004 y. -95b.
5. Farberman L.B., Musina R.G. va b. Oliy o’quv yurtlarida o’qitishning zamonaviy usullari. /O’quv-uslubiy qo’llanma-T.: OO’MMMI, 2002 y.-192bet.