

ahanmirhosseini.com

Cementation Of Steel - The Technological Process And Its Description. Cementation Of Steel At Home

By itself, the carburizing of steel is a process based on chemical-thermal treatment. Its essence consists in the diffusion saturation of the surface of this material with a sufficient amount of carbon when heated in a certain medium.

CEMENTATION OF STEEL. THE PURPOSE OF THIS ACTION

The main task of this process is to enrich the upper layer of machine parts and elements with the required amount of carbon, the percentage of which in this case can be 0.8-1.1%. As a result of such an operation, after hardening, a high level of hardness of the material is obtained, while its plastic core is retained.

VARIETIES

According to the degree of strength of core formation, it is customary to distinguish three main groups of processed material:

- With a non-hardened core. This group includes such grades of cemented carbon steels as 10, 15, 20. They are used in details with small dimensions and low-relevance functions. In this case, under the quench layer, during the quenching, austenite is transformed into a ferrite-pearlite mixture.
- With a core hardened weakly. This group includes chrome low alloy steels of such brands as 15X, 20X. Here, additional doping with the help of small vanadium additives ensures the production of a finer grain, which leads to an improvement in ductility and viscosity of the material.
- With a strongly hardened core. The steels of this group are used in the manufacture of parts that have a large cross section or complex configuration, and are also influenced by significant impact loads or subjected to considerable stresses. They introduce nickel (12X2H4A, 12XH3A, 20XH). Due to the scarcity of this material, it is sometimes replaced by manganese, while using a small amount of vanadium or titanium to crush the grain.

In general, the carburizing of steel is used to form a high percentage of the surface hardness of the workpiece, as well as to achieve high wear resistance, which is created by the use of heat

treatment after this process.

WHAT ARE THE DETAILS OF THIS OPERATION?

Cementation steel is used for the following products:

- cogwheels ;
- "fingers";

- shafts;

- axes;

- leverage;

- "worms";

- Bearing parts (large rings and rollers), etc.

METHODS OF CARBURIZING

If there are several types of the specified material, then for each of them the own methodology of the given process will be applied. As a rule, cemented steel can be produced under various conditions and environments, and also at an obligatory temperature of 850 to 950 degrees Celsius. Therefore, several methods of this action are divided:

1. The carburizing process occurring in a solid carburettor. In this case, it is possible to use organic substances (animal bones, wood, etc.) and inorganic (coke) in combination with various activators. Carbon enrichment will occur during the chemical reaction of its oxidation. The use of activators in this case contributes to its better and faster flow. This method is particularly suitable for achieving large carburizing depths. It is effective for piece-making of steel products. However, this process is very laborious, it entails a large expenditure of effort, time and energy.

2. Carburization process occurring under the influence of gases. In this method, it is customary to use enriched gases (natural, main, etc.) or the category of inert gases (nitrogen). It all depends on the individual approach. In addition, cemented steel based on gases is created with a small percentage of aliphatic limit hydrocarbons, propane or alkanes. Most often this method is used in large-scale production, but it is very expensive in terms of cash. A similar method is used in thermal production. In this case, mixtures of organic high-molecular compounds (for example, turpentine, ethyl alcohol, etc.) are introduced into the hot rotary kiln, which, in turn, have the ability to decompose under the influence of catalysts (nickel).

3. The process of liquid carburizing. It is used in cyanide and cyanide baths. Each of these environments has its own characteristics, advantages and disadvantages. For example, cyanide baths are not classified as harmless. They are classified as dangerous carriers not only for the environment, but also for humans. Therefore, when working with such material, it is necessary to try to comply with all prescribed security measures in order to avoid unfavorable consequences. But the method based on the non-cyanide bath is not recommended because it leads to

irreversible pollution of the environment and causes great damage to it. These methods, if they are used in practice, are only for obtaining small depths of carburizing.

HEAT TREATMENT OF CEMENTED PRODUCTS

This process is also a very important step in the processing of parts. After all, even after carburizing, the product does not have a high percentage of wear resistance and reliability. Therefore, the final step in this case is the work on hardening and tempering. The hardening process is characterized by a number of features and properties. The entire carburization process is influenced by grain growth, and its return across the cross-section is not the same and is consumed unevenly. Therefore, in the work several stages of quenching are distinguished, each of which occurs under certain temperature conditions.

CONCLUSION

Having read the above, we can say that the organization of this process in the manufacture of steel products is very important. This action will significantly strengthen the surface layer of the part. With certain skills in this area and the availability of necessary materials and equipment, cementation of steel at home can be carried out.

ahanmirhosseini.com