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IMPROVEMENT OF THERMAL TREATMENT OF MATERIALS OF PROCESS MACHINE PARTS

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Abstract: In world practical person is conducted big volume of the research work, directed on development of the technology and technologies, providing efficient using the modern achievements of the science and technology, modernization existing equipment and introduction them in production. In this sphere development and improvement of the complex of the technical facilities for fabrication of the main detail's worker organ processing machines with the most efficiency gain special importance.
The Keywords: toughness, wear capability, toughness, limit to fluidity, striking viscosity, longevity, defects crystalline lattices, density , grain.

Introduction

Currently, on the world market, cotton fiber is the main natural raw material for the production of textile products. According to the international Advisory Committee on cotton (ICAC), China, the United States, India, Pakistan, Brazil, and Uzbekistan hold a stable leading position in the supply of cotton fiber to the foreign market [1]. Dynamic and stable development of the cotton gin industry, introduction of modern technological equipment at the enterprises of the industry, increase of efficiency and rational use of production capacities are the basis for the production of competitive products and sales on the world market.

In the world practice, a large amount of research is carried out aimed at the development of innovative equipment and technology, which provides for the effective use of modern science

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and technology, the modernization of existing equipment and their introduction into production. In this area, the development and improvement of a complex of technical means for manufacturing the main parts of the working bodies of cotton processing machines with the highest efficiency are of particular importance.

High technologies determine the level of output, its competitiveness and, ultimately, the efficiency of all production activities. In the globalized world economy, the survival of any country and its economic potential depend on the degree of development of high technologies and their use in the production sphere. High technologies, first of all, include the latest methods of material processing, developed on the basis of the latest achievements of fundamental Sciences, and, in particular, non-traditional methods.

In our Republic, comprehensive measures are being taken to develop the cotton industry, re-equip and modernize cotton gins, increase the profitability of production and processing of raw cotton, and ensure the competitiveness of products. The development action Strategy of the Republic of Uzbekistan for 2017-2021 defines tasks, in particular, to " ... increase the competitiveness of the national economy, reduce energy and resource expenditures, and widely introduce energy-saving technologies ..." [1]. One of these tasks is to create and improve technical means for the rational production of saw blades for cotton processing machines.

The efficiency of cotton processing machines is determined by the high-quality production of the most mass and responsible part of the working body - the saw blade. Given the prevailing influence of the saw blade teeth on the quality of processed raw cotton products, it is necessary to ensure high-quality manufacturing of the disc in compliance with both the geometric parameters of the tooth and the roughness of its working surfaces [2].

During operation, chain and Linter saws are subjected to various types of destruction: abrasive wear, plastic crumpling, and breakage. As a result, the initial profile of the teeth and their geometric parameters change. This reduces the height of the tooth, there is a wear area on the back surface of the tooth, increases the radius of transition areas, there is a curvature of the top of the tooth in the direction of rotation of the saw cylinder. Thus, the performance of saw

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blades is drastically reduced and in accordance with the technical regulations, they should be replaced with new or restored disks.

Restoration (renovation) of worn-out saw discs is carried out by cutting on saw-cutting machines SPH, PNC and SNP [3,4] for reuse in cotton mills.

To increase the wear resistance of the teeth of laser saws, various strengthening technologies are used, including electric contact heating and laser beam treatment. As a result of instantaneous heat exposure, the entire top of the tooth with a length of 0.8...1.5 mm and a disk thickness of 0.95 mm is generally quenched. Due to the hardening of the tooth along the entire thickness, it does not resist bending under operating loads, which often leads to premature failure of the saw blades due to breakdowns of the teeth.

A more effective method is deformation mechanical hardening in the form of surface treatment with shot [2]. With this surface plastic treatment, only the surface layer with a depth of 0.20...0.25 mm is strengthened (microhardness increases), and the middle part of the tooth remains in its original state, which significantly increases the tooth's resistance to bending. Thus, it is quite

it is obvious that by increasing the durability of saw blades for gins and linters, it is possible to significantly increase the operational reliability of saw cutting machines and increase the efficiency of their use in cotton mills.

Based on the literature review on the topic can draw the following conclusions:

Thus, based on literature review, information on the technical condition of cotton processing factories, we can formulate the objective of the present research: development of technological bases for improving the working surfaces of the teeth of the gin saws of the cotton machines.

It is known that variation of the structural state is of decisive importance in forming the characteristics of the structural strength of materials of working mechanisms of technological machines. The possibilities of changing it by traditional methods of volumetric heat treatment are almost exhausted. At the same time, the regulation of the final structure opens up new horizons due to a directed change in the starting (initial) structure, which immediately precedes the implementation of the final heat treatment stage. This can be achieved by implementing

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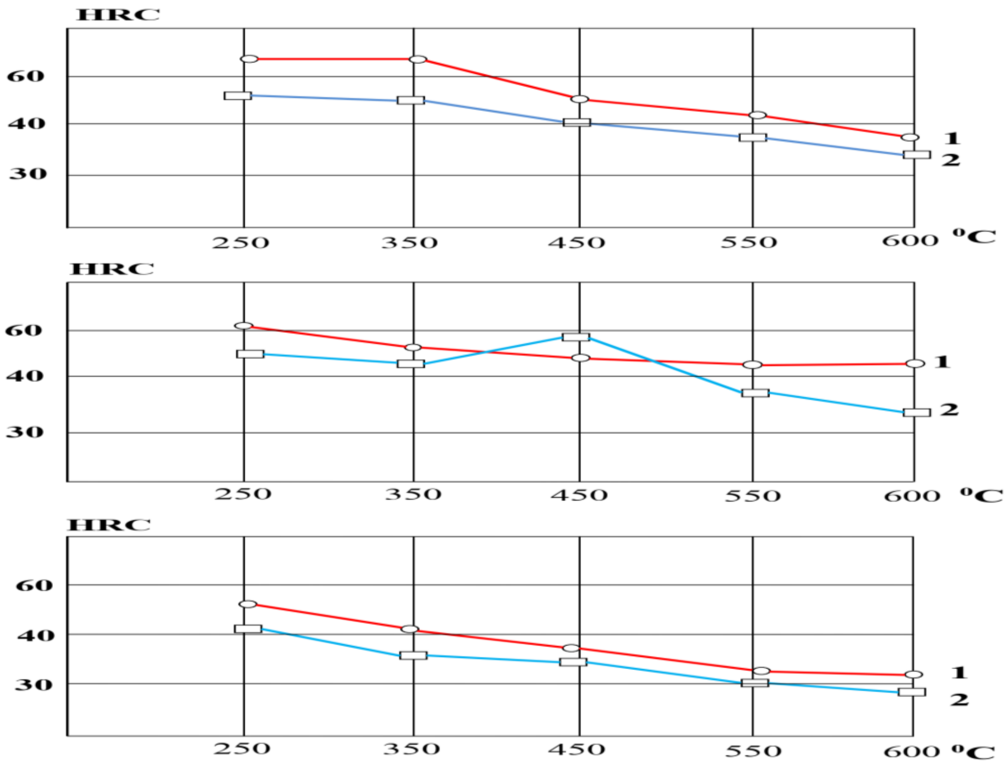
known or developing original schemes and modes of heat treatment at the preparatory stage of heat treatment.

One of the possible options for improving the technology and improving the service properties of thermally processed products is the use of heat treatment with multiple heating, including phase recrystallization [1].

The essence of the method of heat treatment with double phase recrystallization with optimal mode is to create the necessary thermal prehistory of steel. During the first phase recrystallization, heating is performed to extreme temperatures of 1100 0C for carbon and low-alloy steels. After accelerated cooling at these temperatures, the structure with the maximum level of defect in the crystal structure is formed. When high-temperature heating occurs dissociation of refractory nitride, carbon nitride and oxygen-containing phases and their transition to a solid solution. This process is intensive in the area of heating temperatures of 1100 0C. The beginning of dissolution of these phases is characterized by the chemical micro-uniformity of the solid solution. In this case, during cooling, during the γ-α transformation, a structure with an increased level of defect in the crystal structure is formed [2].



Pre-release temperature, °C

Figure 1. The change of hardness depending on the temperature of preliminary tempering.

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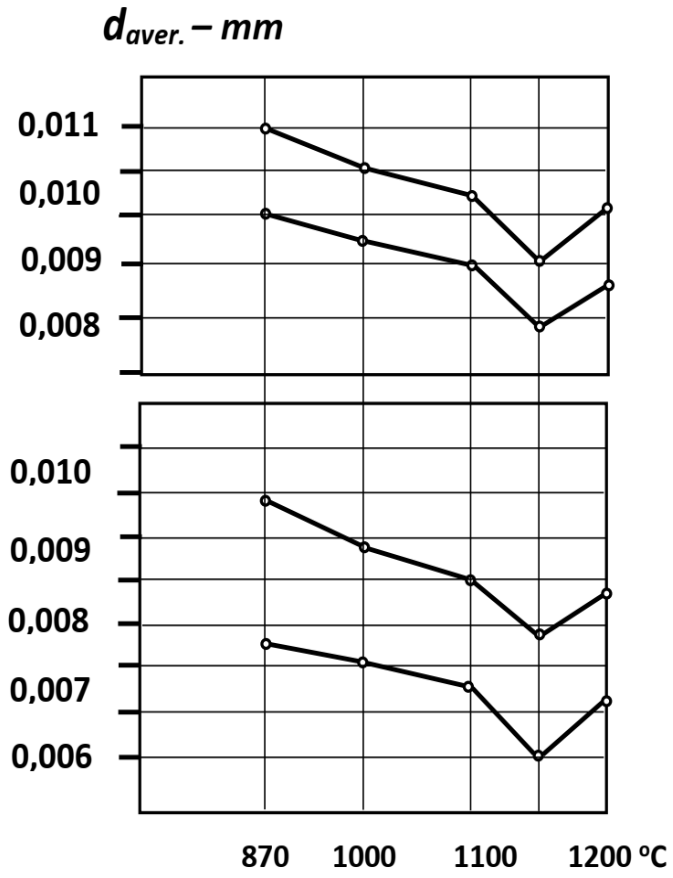
Briefly describing the main properties of tool steels, first of all we will focus on the hardness (Fig. 1). Hardness characterizes the resistance of the material to plastic deformations and therefore affects the stability of the shape and size of the tool when working. The hardness depends on the carbon content in the steel martensite, the dispersion of the released carbides when heated, and the amount of residual austenite in the steel. With increasing hardness, there is a natural decrease in tool wear, which affects the roughness of the treated metal surface



Pre-quenching temperature °C
Figure 2. The growth of the average diameter of austenite grains depending on the temperature of preliminary tempering and intermediate home away from home

The strength characteristic of tool steels is the ultimate bending strength (Fig. 2). This is due, first, to the fact that most tools work under conditions of stress, close to bending; secondly, testing materials for bending is a less rigid method of loading than, for example, stretching–compression, which allows you to identify in more detail the influence of the structural state and composition on the properties of steel. The strength of steel increases with increasing

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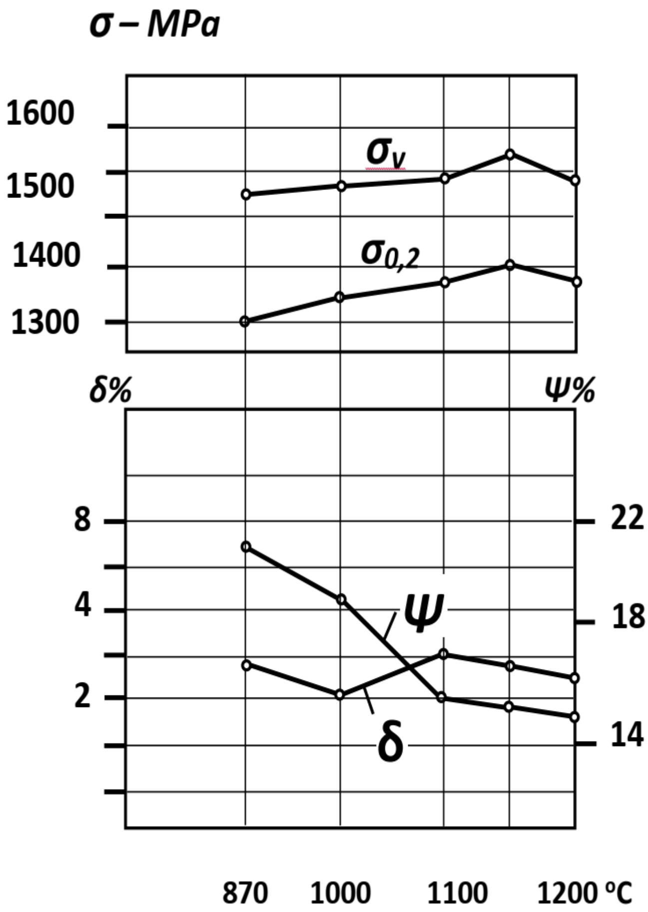
hardness of the order of 52-54 HRC. Internal stresses, grain size, and carbide distribution have a great influence on strength (Fig. 3).

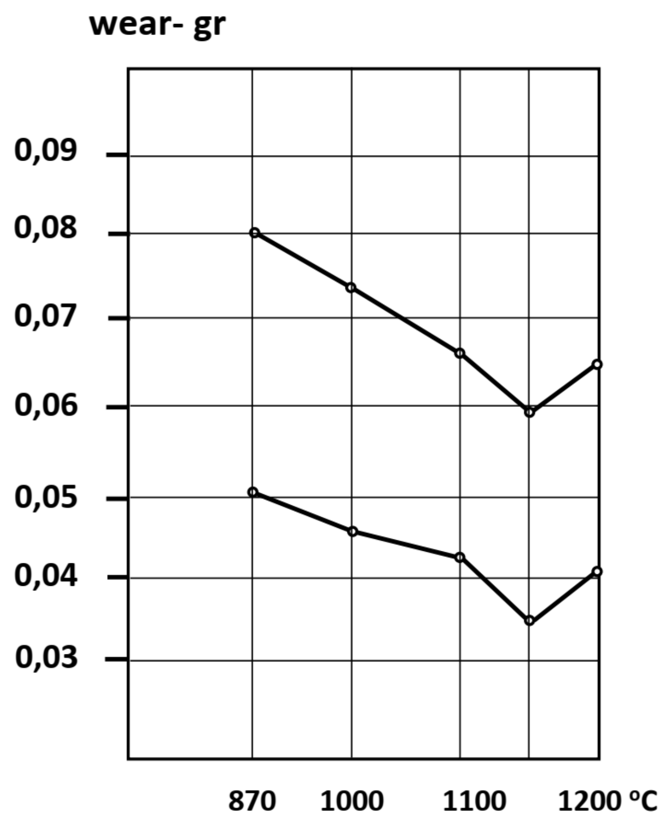
The characteristic of the resistance of tool steels to brittle fracture is the specific work of destruction during impact bending of uncut samples. The impact strength is more thanизizg, sensitive to grain size, changes in the composition of steel and carbide non-uniformity. A significant increase in viscosity is achieved by reducing the carbon content in the steel and tempering at elevated temperatures, when the hardness is 40-52 HRC.

Thus, the tempering temperature significantly affects the hardness of the steel. According to these curves of hardness change depending on the tempering temperature, you can set the range of permissible values of the tempering temperature of steel.



Pre-quenching temperature °C

Fig. 3. Change of yield strength and impact strength depending on the pre-quenching temperature



Pre-quenching temperature °C

Figure 4. The change in the resistance depending on the temperature of preliminary tempering

Therefore, heat treatment with double phase recrystallization looks more acceptable. In particular, in the same years, Japanese patents were published, which described the double hardening of ball bearing steel, which several times increased the durability of ball bearings. This was due to the grinding of grain and secondary steel carbides. More complete studies on the formation of the steel structure during heat treatment with double phase recrystallization have shown that there are optimal modes that ensure the grinding of austenitic grains, the dispersion of excess phases and the maximum density of dislocations. These modes include the first phase recrystallization with heating to extreme temperatures. As shown by L. I. Mirkin, for carbon and low-alloy steels, the extreme temperature is 1100°C. After heating the steel to this temperature and cooling, an increased dislocation density is formed. Our work has shown that extreme temperatures cover a wider range of 1100-1150°C, and the formation of the maximum defect of the crystal structure is associated with the beginning of dissolution of

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refractory impurity phases in steel, the formation of zones with chemical micro–inhomogeneity, which leads to an increase in the density of dislocations in the α-phase [4]. Repeated phase recrystallization, carried out with heating of usually accepted temperatures, takes place under the conditions of inheritance of elements of the original sub microstructure. Thus, after a new α-γ-α transformation, a structure with a high density of dislocations, fine grain, and dispersion phases is formed.

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