

WAYS TO INCREASE THE SERVICE TIME OF EXCAVATOR BUCKET TEETH

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Abstract

Excavator bucket teeth at the present time 110G13L (Gadfield steel i) is prepared from steel i. Broken in pieces this is a steel core of the resistance and the complexity viscosity eat has a unique combination of an institution. Its high elasticity (relative to stretched, beaten viscosity the cold, brittle limit) 1050°c at a temperature of birth obtained as a result of the features of stable manganese austenite core availability withstand eat - plastic deformation of steel during mechanical refinement (naklyep) is determined by a firm and strong core durability due to eat.

Keywords: Abrasive grinding , application solid coverage , manual arc mwf.

Introduction

Inception since (1882) 110G13L steel shock load (Excavators chomichigan teeth, excavator chomichigan the front walls, chains, striking elements , and crushing and grinding details) with the abrasive side eat extreme conditions, the working parts of working out is still a decent o'please rinbosari find just couldn't. This part of the resistance increase either'arms to find directed research following either'of nalish separate ko' What you need:

- injection and heat with treatment to give, methodology' additional alloy, as well as a bang with treatment to give the technology improvement through 110G13L steel performance indicator of improvement;
- 110G13L powder Latin than more effective hardening mechanism of having the alloy work out;
- parts of the design change

110G13L steel properties improve

110G13L steel from the bulk work out and run toe'citizens based on many years of experience, the main alloy elements of the composition GOST 2176-67 are standardized: carbon - 0.9-increase of 1.3%, manganese - 11.5-14.5%. The amount of sulfur up to 0.05%, phosphorus - 0.12 % should not exceed. Manganese phosphorus to the harmful effects of the characteristics of the steel, as it is not a serious disagreement between individual researchers, and researchers are discussed only in a fixed concentration of his steel. As it is known, manganese, sulfur, sulfide held low slag in the form of easily soluble. The ingredients usually have 0.02 - 0.3% S, if no harmful effects on the mechanical properties are shown.

This composition has a set of desired features, and the appropriate processing technology, stable high austenite with the heat you can get.

Balance in the context of the Fe-C-Mn structure diagram full status on the basis of 110g13l steel i austenite only 950 ° c. high temperature formed at [1]. When slowly cooled, carbide (Fe₃C) and γ C, with the addition of pearlite and three phosphide eutectic austenite structure is formed. The plasticity of this structure is low, you need to study the structure to achieve full austenite of course.

Literary analysis in horses quotes according to literature 110G13L steel i main mechanism of strengthening in austenite thin layer of crystal structure change.

The textured plastic deformation local to a single shred of particles, and the structure of the block will lead to the increase of dislocation crushing. The technique of displacement at the level of significant (50-80%), to achieve the density of boundary dislocation meappear ugly twin α [1]. The appearance of deformation twin additional help to hardening, because of dislocation are an effective barrier to the movement of twin boundaries. [3] as noted in the literature, contributes to soften hardened twin at the time of stay of internal stresses, displacement and plastic prevents cracks appear until localize the level of resources plastic while this technique increases significantly.

[2] micro-structure of steel 110g13l departure in the literature is reinforced martensitic α - and ϵ -phase formation probability shows. [3] and the adjacent regions may be formed at this carbide with the decrease in the separation of micro carbon carbon is caused by the stability of this solid solution and to lose γ - γ and α - ϵ active change brings. Local time carbide to be Impact download and friction under the sink can also be dlar [9].

[3] in the literature, at the time of the transplant as a result of reduced carbon and burn plastic displacement at the surface layer of steel 110g13l manganese of γ -martensitic given information about the availability of a transformative. However, in all cases marten phase with a small amount (less than 2%) and it does not affect the firm kinetics of solvents.

110g13l steel bulk manufacturing technology developed at the present time more than enough. Most enterprises in the technical condition of mandatory adoption Mn/c>10 (GOST 7370-64) ratio to follow. GOST 2176-67 increased the level of carbon concentration on the mechanical properties with the increase of carbon content further increased mechanical properties that worsens quotes. A core of steel with the increase of the resistance at the amount of carbon increased by 1.38%. You Mn /C<10 ratio monitor if carbide soluble manganese increases the amount of thermal processing at the level of difficulty.

The amount of manganese from 12 to 19% with rising plasticity and crack the deterioration of characteristics and properties develops the tendency of the formation of structure dendritic. Full of details to ensure that the structure will be able to 110g13l steel i austenite you need to give bulk to heat treatment. Carbide be obtained of its essence, the alloy is from toblab and then stabilizing. The optimum range for heating is the temperature of 1050-1150°C. [9]. Carbide the process of achieving it at a lower temperature slows the growth of these grains is accelerated, while in the high temperature austenite.

Toblab bad cracks in the heat of steel in the process leads to the appearance of bulk reason held far sketchpad. Such as sketchpad to guard not to put in the oven for toblab of 200-300°C temperature was increased when security is recommended.

Sketchpad room in the mold of secondary separation and rapid increase is observed in the process until temperature cooled carbide. Standard with thermal processing of their reach and homogenization austenite (be stabilized alloy) is very difficult. Since the increase and thermal austenite same as that of the processing cycle for the reduction of sh [4] after being poured from the use of the residual heat, and the following thermal processing in bulk mode, it is recommended to use:

1100-1180°C temperature from the mold and get the bulk at 1050-1080°C. after transfer to oven for 3-5 hours in water and heated to homogenization toblab.

In such a case, the process from the first hours of the next crystallization

liquidation heterogeneous homogenization at will be eliminated and will have the spherical shape of the border and carbide eutectic carbide

However, the standard thermal processing, also, also with the use of the residual heat from bulk, can not get enough grains and finely increase the resistance to impact viscosity austenite To achieve such a condition of 650°C start carbide through to the sink, and then to 1050°C and heated to to lab ($\gamma-\alpha+\gamma+K-\gamma$) should be performed [3].

[7] the bulk of the literature steel 110G13L come in re-processing crystallization offered strengthened as a result of this explosion, 1050°C., heated in water to work highly recommended. Microstructure softening bettering the formation of twin grain boundaries and more consistent, especially at low temperatures, while the hammering Viscosity will help you to increase significantly.

The optimization of thermal processing mode 110G13L steel and carbon-manganese alloy content and the ability to carry the load of the part, improves the elasticity of metal and solid and can significantly increase, but its main drawback does not eliminate - the initial low stiffness and excavator bucket teeth excessively abrasive side for the performance of specific kinetic strengthening eat slow. The bulk of the work as a means of extra special steel 110G13L alloying widely in the literature to improve the use of indicators will be covered. Alloying main elements Al, as, Cr, Select, Mo, the oldest and largest, v, nb , Cu is recommended. There will be a constant of silicon in alloy composition and many researchers have to pour its contents of the recommended 0.5% limit. The amount of silicon content in steel from 0.17 to 1.11 kc with the growth and decrease the value of 4 times the crack and hotng that appear will increase [9].

To reduce the harmful effects of phosphorus is added to the aluminum to steel i 110G13L. It has phosphidiga refractory phosphorus content of the aluminum bonding properties of steel. Phosphide crystallization particles from the solution of metal in flat hard steel in the initial stage of crashes and is distributed in a volume. At the same time, low soluble iron and manganese across the boundaries of the particles does not split inserts of phosphides . You have tried to suppress the harmful effects of phosphorus and molybdenum hun [4] and vanadium [4] with the use of elements as well as information on how you can lose the alloy is also available.

Alloying austenite regulate the stability of the main functions of alloy, the micro structure of silicate minerals and, in some cases to get a special thin softening

carbide . To achieve the stabilization of austenite nickel 3-5% of copper or 2% with alloying elements will help. American and English literature 3-5% and in ready state structure of element added bulk alloy steel known about austenite gadfield were published. However, with a top eat in or copper nickel alloyed against the practice of marrow does not change [6]. Carbide strong form elements (titanium, vanadium , niobite) with alloying [7] due to the structure of the special micro- carbide will help soften zinc . In the meantime, austenite in reduced carbon and its stability will decrease. At the time of heating of melting difficult to find carbide be difficult to achieve. In the initial stages of the design process, speed up to eat and to strengthen the resistance increases. At the same time, significantly strengthening (naklyep) with form elements with leg carbide is weakened dramatically [8].

Chromium with molybdenum and alloyed in austenite heated to temperature carbide that can be achieved is formed. Austenite stability and bof the same ir (homogeneous) increases [9]. Consolidation speed increases compared to the standard steel. In the meantime, he felt that alloying with molybdenum to improve the working conditions of excavator bucket teeth does not give you the results [10]. Results from the analysis of the literature, it is meant that the steel 110g13l details that we have come out of ways to improve the performance of bulk in the first place, and all of them aimed at increasing their ability to carry the load by increasing the viscosity of plasticity martial arts

Today, abrasive resistance remains the issue of increasing transparency eat according to design, and alloy alloy steel 110g13l has one of the ways to solve it is to develop more effective than engine.

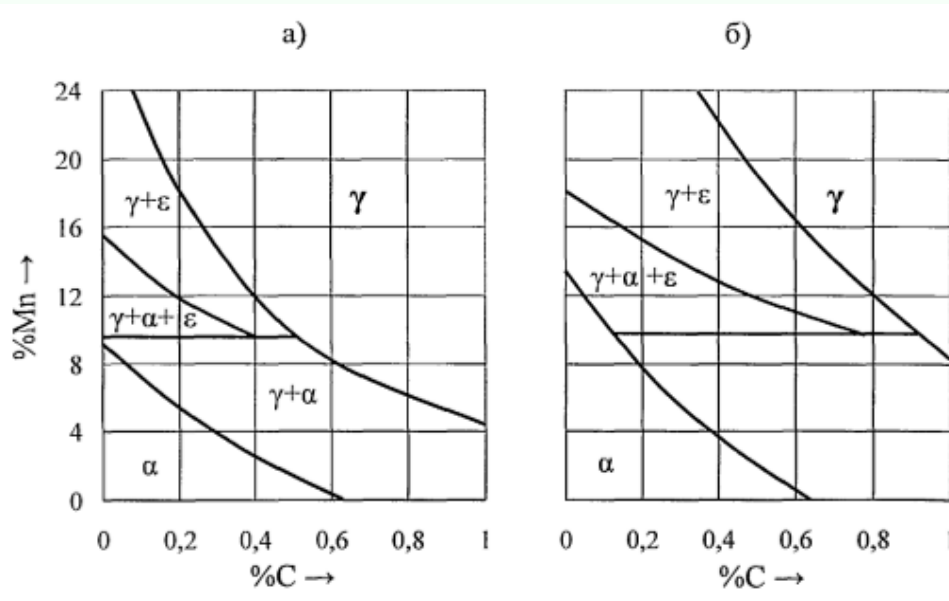
Able to high plasticity (metastable) austenite of steel

Metastable of steel 110g13l steel at the present time the austenite (MAP) is known to work if replaced by many directed at, then Bogachev -mint is carried out by the principle [47]. $M_n < T < M_d$ a temperature in the range of deformation due to plastic deformation in the process of metastable martensiting be harvested if the phase of austenite strengthens, m_d - deformation of the chamber is formed martensiting at the critical temperature. At the moment stretched martensite than four bar rolling changetakes more dynamic Bengali [11].

M_n , which is formed as a result of cooling from extremely low compared with marten, and displacement as a result of additional martensite to the consolidation

γ -phase grid connection of martensite is associated with more level. Metastable austenite in a steel dislocation when the density increases, the energy of mechanical deformation will take strengthening. Map of a part of the incoming energy, work austenite in addition, α - and ϵ -phase (phase hardened stay) is formed, the displacement and stress free microvolumes to harden technique of martensite is spending up to.

Metastable austenite chrome through the thermal processing [12] and chrome-nickel steel you can get in, but the phase of the maximum of the steady austenite the most acceptable from the standpoint of effectiveness to get to the top and hardened C- mn and C- Mn -Cr [13] the system. Fe-c- Mn system diagram of the condition on (2-picture), close to the deformation of 110g13l steel alloy for martensitic HMK (a centralized cubic volume of the grid) with a small amount of ϵ -phase grid a gp -stage. a large amount of ϵ in the phase of manganese (more than 20% Mn) alloy occurs in [9].



1-picture. Fe-c- Mn system condition diagram

Core of steel running in fights or micro abrasive eat percussion download metastable austenite (MAP) γ to change a firm's optimal combination of hard alloy and deformation Kinetic aggregation is required [10]. The low level of displacement of the technique in (cavitation erosion, contact zarbiy to download) the amount of carbon 0.3-0.6% 30x10g10 type is unstable in deep chrome -the advantage of manganese steel are given to change and γ - ϵ -optimal kinetics will

be able to a active. Low-emission strengthening of austenite marten the lack of casesis caused by the contribution of ing [14]. Austenite particles that form the boundaries of marten falls across the tint prevents deformation of the shell and the contact a strong shot at riveting download. Zarbiy -abrasive design which is typical of the change in displacement and eat a large plastic γ - selectng of extended kinetics [15] the map and about 0.8 percent carbon, 8-10% manganese and 3-6% increase in the chromium martensite is preferable to a solid. Residual plasticity and contributes to maintaining a high inclination has in resilience austenite Manganese and carbon content allows you to manage changes smoothly with chrome marten in alloying because small fluctuations in temperature leads to significantly change the stability of mn and austenite .

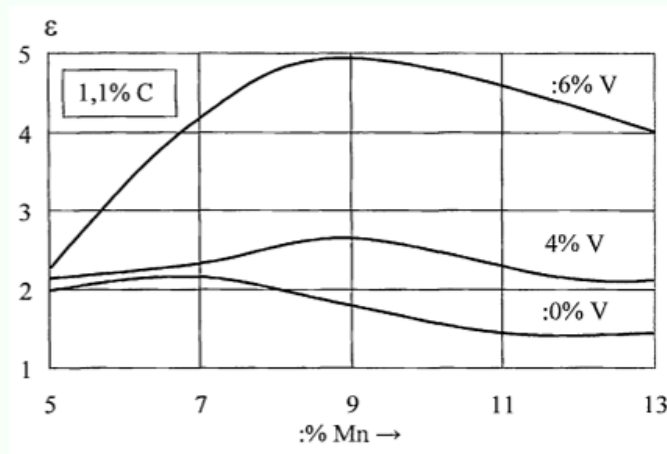
Chrome-austenite further changes to improve performance in the environment of metastable manganese of steel abrasive γ - directed α intensification alloying if it works, the further consolidation of the alloy thin and thin it hard to take carbide at the phase of silicate minerals.

Silicon to 3%, with the change alloying γ - α significantly's intensity will help to increase. Silicon reduces carbon solubility austenite , this brings his instability . M_d the temperature of 200 °c. is raised. However, the added bulk and stiffness and reduces frost resistance of silicon full map be used for the production of excavator bucket teeth.

Carbide strong form elements (V, Nb , oldest and largest) to alloy with microstructure grinding will help. As noted, W and v 2% additional alloying manganese chrome alloy-manganese steel with a core of resistance to the effects of the nature of food does not change, but its absolute value increases [10]. Grinding molybdenum , copper or nickel [9] will help you to increase the intensity of particles with alloying . Which elements form a solid solution of carbon carbide not strong, and as a result of the unstable phase will strengthen austenite critical and its ability to change, in addition to this, in the form of thin γ carbide - α in addition to encouraging change with the presence of additional centers. Thus, consolidation depth increase .

Vanadium ie the stiffness and initial alloy in the initial stage of the firm to achieve eat, teeth hammer the return of a hard surface until it appears on its surface to eat your design voltage resistance. Vanadium content with the increase of the voltage required for the deformation in the initial period o sharply eatwas central. This, basically, with the dispersion of austenite strengthening is associated with [13].

In the meantime, the level of exposure depends on the content of manganese steel to vanadium, 1.19-manganese in the picture for steel 1050°C and 300 from being to lab°C for 3 hours shown after being laid off (free abrasive friction, steel 9XC as the benchmark).



2nd picture. See the effects of mn and V relative to the resistance design of steel magnets eat.

The design resistance of steel without mn vanadium eat in 5-7% due to change in the range of more than martensite will change. It is reduced due to the stabilization of austenite manganese increase. Vanadium increase the effect of hardening steel in a high, increases with the increase of the amount of vanadium. It should be noted that, to get this after I've poured bulk noticed this is difficult, and would require thermal treatment of this complex to give [14].

Excavator bucket teeth for the production of bulk and full metastable similar details austenite the use of steel is reduced to the level of the limiting factors brittle when cold, α - phase and decreases with the increase of the amount of carbide, this can cause broken teeth excavator bucket and technological difficulties. Chrome-austenite steel 110g13l steel poured into the mold at the time of metastable manganese they received for the dissolution of temperature and compared to the expansion levels by 5-10% higher requirements. Fe - Cr - Mn - c system in bulk full of 110g13l steel carbide metastable austenite condition to achieve from the steel to achieve to lab temperature up to 70-120°C is required to obtain high temperatures [15].

Metastable austenite the positive characteristics of steel to achieve them, it is not the size of the whole, but only on the part of the dentist bucket excavators designed to make direct contact with the abrasive alloys is achieved when used as the basis of this 110g13l steel excavator bucket with teeth that are specific to the characteristics of the studies indicating a high level of resistance is achieved by zarbiy download. Together with many additional phases on the basis of quartz abrasive reinforcement carbide rot decay mode significantly increases the likelihood of access to the cycle.

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