METAL OXIDATION

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Abstract: Heating metal in furnaces can cause oxidation. The higher the temperature, the greater the rate of oxidation. This as a result of the amount of mixture The ratio and the oxidizing ability of the gas mixture change. In addition to oxidizing gases, reducing gases are present in the atmosphere of the furnaces: and neutral gases Oxidation does not occur in neutral and reducing atmospheres.The following oxides are formed from the oxidation of steel metal slag is formed.

Keywords: Alloyed in steel harvest happened they were sad on conducted Investigations show that the alloying elements play a major role in the second and third layers of the soot, indicating a high iron content in the outer layer. Among the elements that increase the resistance of steel to burning, Al, Si and Cr can be examples.

Introduction: They react with oxygen more quickly than iron, forming Al 2 O, SiO and Cr These thin, dense layers partially protect the metal from burning as a result of various influences.

Sulfur oxidizing in gases to be metal burn accelerates and increases the amount of S in the outer layer of the metal[1].

During the heating of metals, the formation of metal soot is accompanied by decarburization of the surface layer, that is, the burning of carbon, which reduces the amount of carbon in this layer. decrease harvest to be possible. Carbon burn - leads to a change in the mechanical properties of the product. For example, in the manufacture of springs, due to the burning of carbon on the surface of the steel, the spring breaks relatively quickly. When determining the burning of carbon on the surface, in addition to its depth, it is necessary to determine the amount of carbon in this layer. Carbon burning H 2 O, CO 2 , O 2 and H2 The combustion process of carbon occurs due to the following reaction:

The most many carbon caustic environment H2O , then CO2 and the last one H 2 . In addition, the carbon burning process is affected by temperature and the carbon content of the steel. impact does. Elements inside carbon burn to the keepers Take, Co, W what input possible. Cr and Mn carbon burn slows down. Yes, What, V carbon does not offer any resistance to burning.

Oxidation and carbonization are related. Usually, carbonization is prevented by oxidation. Therefore, if soot is formed on the surface of a metal, then the carbon contained in the metal is prevented from burning. If the surface is removed by mechanical processing or grinding after heat treatment, the carbonization is not harmful, and the carbonized layer is completely removed.

Metal in the content carbon from burning storage for of the oven It is necessary to create an environment in the work area that prevents carbon from burning[2-3].

Heating order concept

Heating order – metal to heat temperature, to heat speed and The heating procedure is determined by the following indicators:

finished to heat temperature;

heating intervals number;

every one the interval duration and temperature;

to heat for spending was full time;

in the oven heat to the temperature and worker on the field demand made determined by the calorific value and the temperature during the entire heating process.

Temperature - the highest temperature of the workpiece generated in the combustion zone of the furnace[4].

Heating rate is the rate at which a layer heats up over time or in thickness .

Heating duration - preparation surface part and all area The time taken to heat the material to the required temperature is calculated.

The initial heating temperature for forging and stamping blanks made of metals and alloys is determined depending on the chemical composition of the metal, the mechanical properties of the blank after forging, and the completed heat treatment procedure[4].

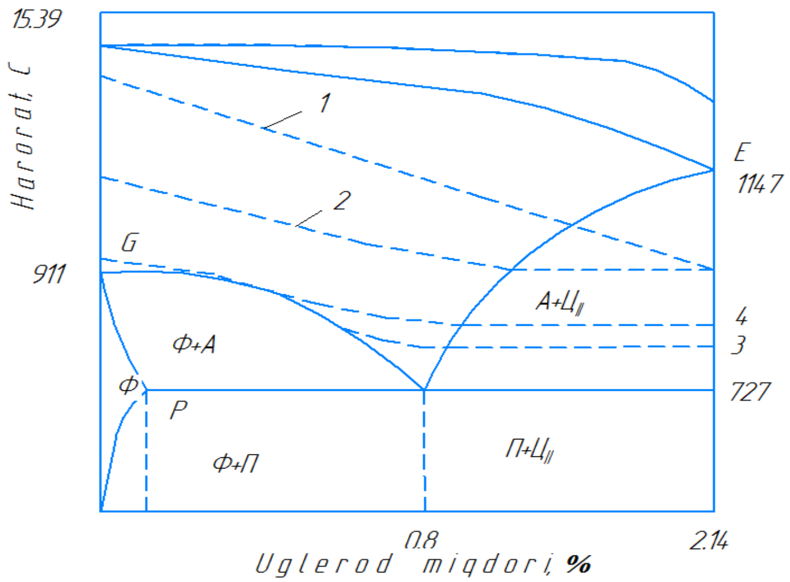
The temperature at which a metal becomes relatively ductile and exhibits little resistance to deformation during hammering and stamping is called the forging temperature. For a practical range of temperatures for hot forging, the highest and lowest values of heating are used. and alloys situation in the diagram is drawn up, diagram in the making from experimental tests (to plasticity try, to deform to resistance try, It is widely used to determine the critical temperature of structural grain growth and xk).

The plasticity and resistance to deformation of steels can be explained by the spatial changes that occur in metals. Structural and spatial changes occur when steels are heated to different temperatures. iron - carbon situation from the diagram without difficulty determination (Figure 3.1). Figure 3.1 shows the final temperature limit for hammering using dashed lines.

Figure 3.1. Intermediate forging and stamping based on the iron-carbon phase diagram temperature: 1 – at speed to heat high indicator; 2 – preparation simple heating; 3 – the lowest intermediate limit of heating a steel billet to

eutectoid; 4 – Eutectoid steel billet lowest heating range

The structure with high plasticity in steels is the austenitic structure, two



phased in the structure plasticity feature decreases. Carbonized and medium-carbon in steel 1100 - 1200 °C to heat temperature between complete austenitic

(A) structure harvest does. Carbon steels for the most high plasticity 1200

It is formed at heating temperatures up to °C, which can be considered the highest temperature in the forging range for carbon steels. In high-carbon steels, at heating temperatures <1100 °C, the structure becomes two-phase - austenite (A) and cementite (C) structures are formed, with brittleness at the grain boundaries of cementite. nets harvest will be. Steels plasticity feature increase for

cementite structure in grains fragility net so grinding necessary,

As a result, the cementite structure in metal blanks separates into individual grains. necessary. Such in case of metal hardness and strength remains high. High carbonaceous steels hammering the most high border temperature

≅ 1100 °C should be assumed, taking into account the reduction in plasticity due to the formation of a two-phase structure at this temperature during hammering.

The iron-carbon phase diagram provides a practical aid in determining the lowest temperature limit for the hammering process, i.e., the state at which the phase transition occurs at the highest temperature. In some cases, carbon steels can also be hammered in the ferrite (F) + austenite (A) structural state, if high plasticity is formed in the ferrite, this process is considered effective. In pre-eutectoid steels, in the austenite (A) + cementite (C) structural states hammering temperature low to the indicator has will be. Such The temperature should be as low as possible so that cementite networks do not form.

When determining the lowest intermediate temperature for forging, the weight of the workpiece, the next thermal processing to give order and cooling methods also It is important to take into account.

In Table 3.2 steel and colored alloy blanks for modern The initial and final deformation intermediate temperatures used in manufacturing plants are presented.

When hot-pressing metals, two opposing processes occur:

deformation process - the refinement of metal due to deformed grains;

recrystallization process - the formation of new grains from deformed atoms harvest to be and the buds size growth as a result refinement.

Table 3.2 Initial and finished for steel and non-ferrous alloy billets deformation intermediate temperature

Alloys names	Initial to heat temperature, °C	Completed to heat temperature, °C
Steel Copper Aluminum Magnesium Titanium	1050- 1350 750- 850 470- 500 370- 430 930- 1150	700- 950 600- 700 350- 400 300- 350 800- 900

Depending on the rate of recrystallization and deformation, four types of medium deformation can be classified:

is reflected in the volume diagram of recrystallization (Fig. 3.2).

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