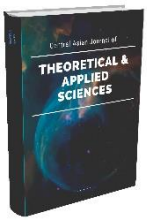

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Development of Technology to Increase the Evenness of Parts Made of High Manganese Steel

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Abstract: *Mechanical engineering consists of a number of technological processes in manufacturing enterprises, forming a kind of technological chain. This chain is closely related to the working unit of each unit and the working quality of the machines before it. Taking this issue into account, it can be concluded that the influence of technological chain equipment on the quality indicators of machinery manufacturing enterprises and heavy industrial products is great. Therefore, the more efficient operation of the technological equipment of machinery manufacturing enterprises and heavy industry without distortion depends in many respects on the strength of their details. This requires the study of the process of operation of the details, which are mainly rubbed with each other.*

Keywords: *Mechanical engineering, steel, modifier, alloy, crystallization, hardness, smelting, detail, relationship, temperature.*

INTRODUCTION

Despite all the research, scientific research and experimental work carried out by World Scientists, several shortcomings are observed in the resistance of steel of the 110G13L brand to mowing. Therefore, together with professors, scientific researchers of the Tashkent State Technical University and mature and experienced specialists of the Olmalik KMK JSC and the Central repair mechanical plant (SRMZ)under it, a number of measures were carried out to improve the operational properties of cast products on the basis of selecting modifiers or creating a quality structure based on the selection of other modifiers to improve.

In the period of liquefaction of steels using electric arc furnaces at the production enterprises of the Republic, measures are being implemented to obtain quality casting products. In addition to extensive research to improve the efficiency of liquefaction, research is underway to improve the technologies to do

so. In this regard, it is important to increase the priority of research on improving technologies that ensure resource and energy efficiency in liquefying Steels, which are widely used in industry.

LITERATURE ANALYSIS AND METHODOLOGY

In this regard, special attention is paid to development in the research centers of developed countries, including Russia, Germany, the USA, England, Japan, China and other countries with the aim of creating competitive techniques and technologies in production. In particular, with the help of modifiers of various composition, they carry out a number of research work on obtaining quality castings from parts with high strength properties of steel and increasing the service life of machine-building details made from them.

Research has been carried out by scientists around the world in a comprehensive direction on the possibility of heating and cooling the alloy, changing its internal structure, chemical, physical and mechanical properties, changing the structure of steel by heating and cooling, and results have been achieved.

Modern mechanical engineering is the main consumer of metals produced in our country. In instrumentation, in the automotive and aviation industries, in electronics and radio engineering, a huge number of machine and pribor details are made from metals.

The metals used in the technique are mainly divided into two gruppas – ferrous and non-ferrous metals. Ferrous metals include iron and its compounds (cast iron, steel, ferrocotylates). The rest of the metals and their alloys form a group of non-ferrous metals.

Until now, iron and its alloys, which are considered the main mechanical engineering material, are of particular importance within metals. 90% of the metals produced worldwide are iron and its alloys. This is explained by the fact that ferrous metals have important physical and mechanical properties, as well as iron ores are widespread in nature, while the production of cast iron and steel is inexpensive and uncomplicated.

To increase the strength of steel parts by developing the composition of several modifiers, foreign scientists have conducted many studies. In particular, Moscow, St. Petersburg physicist-chemist, academician of the Academy of Sciences Pyotr Alexandrovich determined that according to the Rebinder classification it is divided into two groups.

In 1882,this steel (110g13l)was named Gadfield steel by the English metallurgist Robert Gadfield for its strength being higher than that of other steels (st-30,st-40, st-45). Gadfield steel (110g13l) with high resistance (11-14.5% Mn,0.9–1.3% S, GOST 977-88) is also distinguished by high pressure and impact forces, as well as high plasticity.

The steel offered by Robert Gadfield is used to make tank tracks (gusenisa), tractor plugs for driving land, rail rails, various details that work under strong blows and friction, as well as window bars that cannot be sawed in prisons.

The ability of Fe - Mn alloys with austenite to solidify as a result of deformation was demonstrated by the English scientist R.E.Gadfield discovered in 1884.

He increased the manganese content in steel by 11-12% and found that the high ductility and resistance effect of Steel after cooling in water at temperatures of 1000 °C has abrasive mowing. Gadfield patented a new steel, and since then it is known by its name (Gadfield steel), and in the CIS - high manganese steel 110g13l. Since then, a lot of work has been carried out to study 110g13l steel, to improve its properties and to create new varieties of steel that are resistant to mowing in order to replace it. However, until now, Gadfield steel is the main material for the production of casting, which works under gilding-abrasive mowing.

PART OF THE EXPERIENCE

For high manganese complex modifier 110G13L grade steel, the demand for castings and parts made of edirage, burn-resistant steels is currently increasing in Belarus, the most common of which is high manganese 110g13l grade steel however, a number of shortcomings have been identified in the production of such castings.

Research has been carried out in several organizations to find a solution to the above problems and to find the scientific basis for the process of developing a new type of modifier to increase the strength of steels.

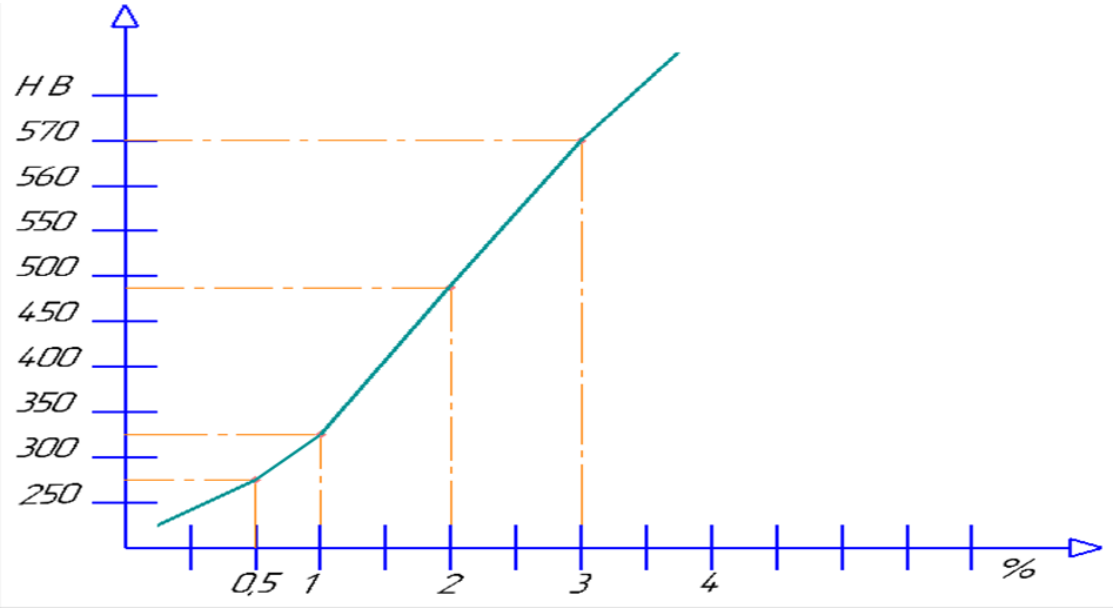
Several research works were carried out at the induction melting furnace (INDUCTION MELTING MACHINE)in laboratory conditions of Tashkent State Technical University. We can take as an example the aluminum metal that gave the best results from these studies. By the method of increasing the mechanical and physical properties of aluminum alloys, materials with modern resource-saving and environmentally friendly and decorative technology are created, which improve the strength and durability of this alloy. Aluminum is distinguished from other metals by its corrosion resistance, gilding compactness, lightness and ease of processing. Alternatively, the most abundant metal on Earth is aluminum, in terms of reserves it is the third largest of all elements after oxygen and Silicon.

Table 1

№	When aluminum is added In percent as a modifier (%)	Hardness value (HB)
1	0,5	257
2	1	341
3	2	487
4	3	570

As you can see from this table, the result was also known in the form of different hardness sizes when we added secondary aluminum to 110g13l grade steel as a modifier in four different percentages. The study carried out was shown in our work on the basis of Table 1.it was found that the most optimal option is when 3% aluminum is added as a modifier.

1-chart.



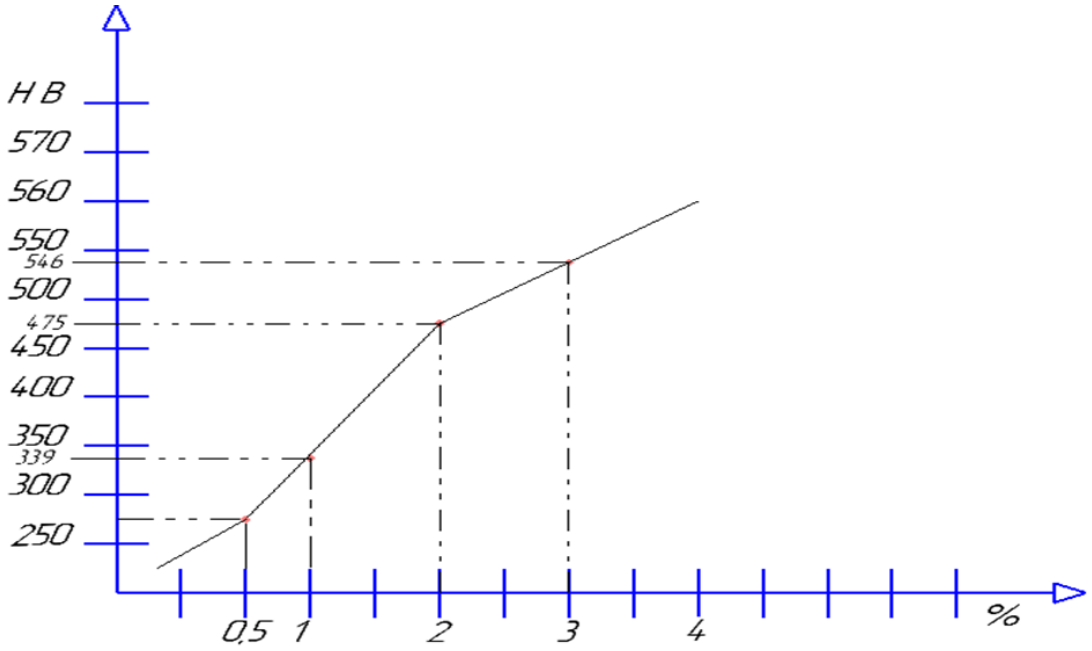
1-chart. The graph described when aluminum was applied as a modifier.

Table 2

№	In percent when ferrochrome is added as a modifier (%)	Hardness value (HB)
1	0,5	276
2	1	339
3	2	475

The result was also in different Table 2 views when we added four different looks to ferrochrome 110g13l branded steel as a modifier.

2- chart



2-chart. The graph described when ferrochrome was applied as a modifier.

In order to study the structure, mechanical properties and chemical composition of the solution dissolved in the laboratory conditions of the University, verification work was carried out at the modern innovation Technopark on the territory of Tashkent State Technical University, the Center for advanced technologies under the Ministry of innovation development of the Republic of Uzbekistan and the Central Analytical Laboratory of "Olmalik KMK" JSC.

Conclusion And Discussion

When we measured the hardness of the selected modifiers, it was reflected that aluminum and ferrochromes had good results.

In addition, the results of other modifiers are also being determined to be higher.

Conclusion.

1. The following recommendations were developed as a result of theoretical and practical research on the topic of the development of technology for increasing the eyelessness of parts made of high manganese steel:
2. The general properties of steel of the 110g13l brand were studied.

3. To increase the durability of steels, several types of modifiers were selected and the properties were studied.
4. It was found that the Optimal modifiers are correctly selected and have a high hardness

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