academic publishers

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE (ISSN: 2692-5206)

Volume 04, Issue 03, 2024

Published Date: - 10-05-2024

MATERIALS WITH PRESSURE PHYSICAL BASIS OF WORKING METHODS

Tojiboyev Begijon Mamitjonovich
Candidate of technical sciences, associate professor, “Materials Science and Technology of New Materials” department, Andijan Mechanical Engineering Institute
tojiboyev80@list.ru (+99894) 685-84-52
Axunjonov Anvarjon Sobirovich
ahunjonovanvarjon@gimail.com (+99890) 269-18-25

Lecturer of the Department of “Materials Science and Technology of New Materials” at the Andijan Mechanical Engineering Institute
Otaqo‘ziyev Akramjon Adaxamjonovich
Lecturer of the Department of “Materials Science and Technology of New Materials” at the Andijan Mechanical Engineering Institute ataqoziyev@gmail.com
(+99890) 624-77-45

Abstract
In this article, considering the conditions of working metals under pressure and the properties of elasticity and plasticity, the influence of the structural changes in them, the level of pressure resistance and the elements in the steel alloy is studied.

Keywords
Steel, alloy, structure, pressure, strain, grain, steel, chemical element.

Enter

Methods of pressure processing of materials are based on the use of their plastic properties. It is known that the plasticity of materials refers to the ability to keep their shape and size after loading without cracking or shrinking under the influence of an external load.

The plasticity of metals depends on their temperature, chemical composition, structure, grain size and shape, temperature and other parameters[1].

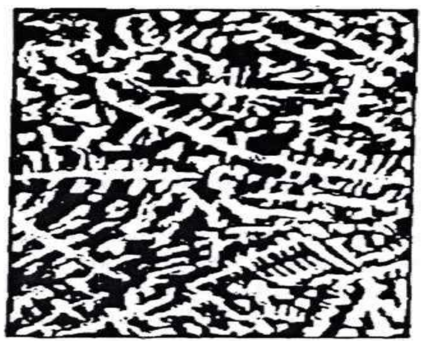
Consequently, different metals and their alloys have different degrees of plasticity. For example, copper is more plastic than iron, and low-carbon steels are more plastic than more carbon steels. Plasticity decreases as steels contain S, Mp, Si, S, R and alloying elements (Sg, W, Ti, Mg, etc.), while Ni, V, and others increase plasticity. As the grain size increases, its plasticity decreases. It should also be noted that as the temperature of the metal and its alloys increases (if it is not overheated), its plasticity increases, that is, its resistance to deformation decreases. Experiments show that when steels are heated to the required temperature, their resistance to plastic deformation decreases 10-15 times.

The main part

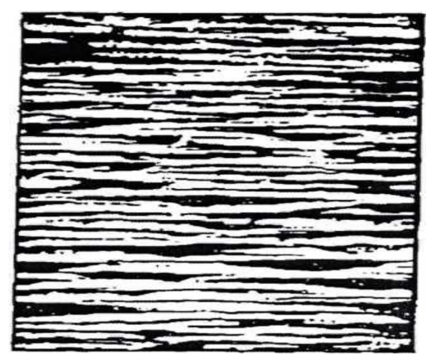
Resistance to deformation increases when the rate of deformation of metals increases. The reason for this is that the process of recrystallization (recrystallization) does not pass to gold when metals are heated to the required high plasticity and pressure is applied. Therefore, it is necessary to work metals with a greater force compared to working at a lower speed. It should also be said that, in addition to the above-mentioned indicators, the plasticity of metals is also greatly affected by the burning nature of external forces and the force of friction between the tool and the zagotovka. For example, if the stretching forces of the metal are small, and the compressive forces are large, the deformation is transferred easily[2]. Experiments show that if a brittle material like marble is compressed unevenly in all directions, it can undergo plastic deformation. Therefore, it is possible to work with pressure if the fragile materials are correctly defined under certain conditions.

Research part

It is known that metals and their alloys (except for mercury), which are widely used in engineering, construction and other fields, have a lot of (size between 10 sm^3 and 10 sm^3) amorphous crystallites (grains) from a complex of thin non-metallic oxides, nitrites and silicates. consists of, and they are thoroughly interconnected. When working with pressure, they are first densified due to their porosity, then the grains and non-metallic materials are also deformed, and this mechanism is extremely complex[3].



Macrostructure of (a) and after processing (b).
Figure 1. Cast steel zagotovkapi up to high pressure work



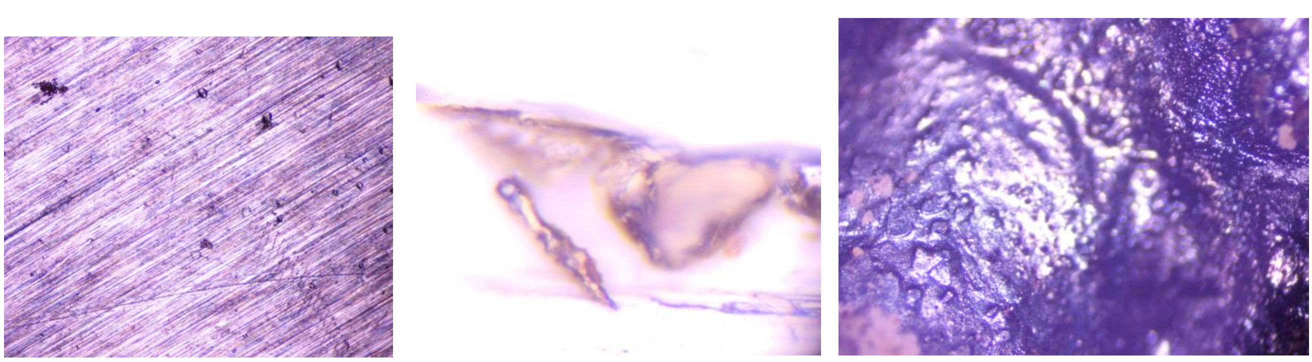


Figure 2. Laboratory results of microanalysis of our sample

The module of this process can be schematically compared to the situation of coins that are placed side by side with their edges slightly tilted. As they move relative to each other, they become slightly deformed and turn along the slope plane. When working with metals with pressure, the value of the external load, which affects their strength and accuracy, should be such that it should be greater than the resistance to elastic deformation of the metal and less than the temporary resistance to stretching. Only then, there will be no cracks in the metal, and it will easily take the expected shape. In this case, the atoms of non-metallic materials with very thin inter-grains slide first along the planes where they are most closely located (along the planes with the smallest resistance), and then along other planes. In this case, as a result of stretching and crushing of grains in the direction of deformation, the shape of the crystallite lattice is broken, and the metal is refined[4].

Metals are divided into cooling and quenching according to the pressure treatment temperature. If the pressure treatment of metals is carried out at a temperature lower than the temperature (T) -0.4 T (Gk.), it is called cold treatment. In this case, the metal grains and the tso.megalar materials between them move in the direction of deformation, and are crushed and almost completely crushed by liquefaction.[8-7] Fig. 1 shows the macrostructure of cast steel zagotovka before and after cold working with pressure.

If metals are treated with pressure at a temperature higher than -0.4 T1Gk, it is called hot-saloe. In this case, instead of deforming grains, it is necessary to heat the crystal full of Ula Marks and other indicators at a working temperature, hold it at this temperature for a certain time, and then work. For example, pre-eutectoid steels from AS3 critical temperature, eutectoid and post-eutectoid steels from AS, critical temperature heated to a slightly higher temperature, it is processed only after keeping it at this temperature for a certain time. As an example, shows the diagram of the macrostructure of a crankshaft made by different technological methods. From the point of view of the service life of the crankshaft, it is preferable that the normal force acting on it during operation falls in the direction of the fiber. Figure 90 shows the effect of fiber orientation in steel sheet bending[7-8].

As for nonmetallic materials, they remain until they are deformed. In this case, the thickness along the fifibers, especially its impact viscosity increases by 1.5-2 times in the direction perpendicular to them. Therefore, this point should be taken into account when designing details[5].

The temperature of recrystallization when working with heat and pressure of metals, for example, -450°C for iron, 280°C for copper, -100°C for aluminum, -0° for zinc, -80°C for tin, -30 for lead. will be °C. CO_2, when metals are heated and worked under pressure at a temperature lower than the recrystallization temperature, it is called cold working.

When carbon steels are heated and pressed, non-axially deformed grains are formed.

Conclusion

From the above information, it is known that in order to obtain high-quality products with effective pressure processing of metals, to correctly determine the processing mode, and in practice to take into account their deformation resistance factors, a nomogram is used, which shows the dependence of their real resistance on temperature, deformation rate and degree.

References

1. Atakhonova. S.Q. Instructional manual for practical exercises in "Material structure and detail quality control". ―USMON NASIR MEDIA‖ publishing house, Namangan, 2023. 130 pages.
2. Atakhonova, S. Q., & Murodjon og, S. U. B. (2022). Analysis Of Magnetic Materials. Texas Journal of Multidisciplinary Studies, 6, 23-26.
3. Kakharovich, K. U., & Atakhonova, S. Q. (2022). Analysis of Signature of Stainless Steel in Uzbekistan and Abroad. International Journal of Human Computing Studies, 4(3), 17-21.
4. Tursunovich, T. A., & Muxtorjon o'g'li, T. M. (2024). STRENGTHENING OF A METAL SURFACE WITH AN ELECTRIC ARC. Ethiopian International Journal of Multidisciplinary Research, 11(04), 325-330.
5. A.E. Odilkhojayev Construction materials Tashkent-2020
6. . Otaqo'ziyev, A., & Axunjonov, A. (2023, September). ENRICHMENT OF THE CHEMICAL COMPOSITION OF CEMENT USING FOUNDRY WASTE. In " ONLINE-CONFERENCES" PLATFORM (pp. 379-380).
7. Otaqo'ziyev, A. A., & Axunjonov, A. S. (2023). GIL TUPROQNING BAZI XOSSALARIDAN KELIB CHIQIB QUYMAKORLIKDA ISHLATILISH SOXALARINI TANLASH.: GIL

TUPROQNING BAZI XOSSALARIDAN KELIB CHIQIB QUYMAKORLIKDA ISHLATILISH SOXALARINI TANLASH.
8. Makhammadjanov, K. A. O., Otaqoziyev, A. A., & Mutalipov, X. O. O. (2021). Research protective metal coatings to face the elements. Asian Journal of Multidimensional Research, 10(10), 1213-1217.
9. Adaxamjonovich, O. Z. A. (2024). ANALYSIS OF THE MAIN TECHNOLOGICAL STAGES IN THE PREPARATION OF CEMENT. Ethiopian International Journal of Multidisciplinary Research, 11(04), 320-324.
10. Tsiklis, D. S. (2012). Handbook of techniques in high-pressure research and engineering. Springer Science & Business Media.
11. Khvostantsev, L. G. E., & Slesarev, V. N. (2008). Large-volume high-pressure devices for physical investigations. Physics-Uspekhi, 51(10), 1059.
12. Proskurovsky, D. I., Rotshtein, V. P., Ozur, G. E., Ivanov, Y. F., & Markov, A. B. (2000). Physical foundations for surface treatment of materials with low energy, high current electron beams. Surface and Coatings Technology, 125(1-3), 49-56.
13. Madden, J. D., Vandesteeg, N. A., Anquetil, P. A., Madden, P. G., Takshi, A., Pytel, R. Z., ... & Hunter, I. W. (2004). Artificial muscle technology: physical principles and naval prospects. IEEE Journal of oceanic engineering, 29(3), 706-728.