

Boron steel: armour for heavy equipment

Boron steel is an alloy of iron, carbon and other elements with boron added as an alloying agent. In small quantities, it positively affects the formation of the steel microstructure, making the metal stronger.



Boron steel is used to manufacture parts for agricultural and industrial machines: grader blades, caterpillar tracks, crushers, knives and saw blades, ploughs and discs for harrows, among others. For the machines to work longer without breaking down, such parts must have high strength, as well as shock and wear resistance.

Metinvest Group offers machine builders hot-rolled steel alloyed with boron that is produced in accordance with Ukrainian, European and international standards, including DSTU EN 10083-3, EN 10083-3 and BS EN ISO 683-2:2018.

Products are supplied to the customer in thick sheets, coils and cut sheets for quenching and tempering, a heat treatment technology used to harden metal. For example, in agricultural engineering, a part is cut out of hot-rolled steel, heated to a high temperature, shaped and quickly cooled in water or oil. This gives the product its final hardness and strength.



Advantages of boron steel

- High strength in hardened condition
- Formability: easy to manufacture complex structures and parts in the hot-rolled state
- Plasticity and good machinability when hot rolled
- Wear resistance: the hardened part lasts longer
- Viscosity and crack resistance
- Good resistance to mechanical stress

Boron steel: three most popular grades

Metinvest's first boron-alloyed steel grade was 30MnB5, which Ilyich Steel began to produce in 2015. On the Ukrainian market, it replaced the universal Soviet 65G spring-steel grade, which could be adapted for agricultural

machinery using certain processing methods. Meanwhile, in Europe, agricultural equipment manufacturers did their best to use low-alloy boron steels. Such steel was also needed to replace broken parts on imported equipment. In addition, after quenching and tempering, the parts have increased operational stability: their service life is two to three times longer than that of 65G steel products. It is not surprising that those Ukrainian companies that made the switch then to 30MnB5 have grown into the flagships of the industry today.

For enterprises whose hardening technology involves the use of oil instead of water, Metinvest in 2017-18 mastered the production of sheets and coils from 38MnB5 grade steel. This is a more durable and wear-resistant steel that can be tempered in oil, like 65G. This allows companies to switch to high-strength metal without incurring high costs and with minimal technological changes.

Metinvest's third most popular boron steel grade is 27MnCrB5. This alloy is further micro-alloyed using chromium and manganese, which provides an even greater depth of hardening and higher strength with a low carbon content. Products made using such steel are particularly convenient for manufacturing parts that need to be welded.

In 2015-18, Metinvest made 23,500 tonnes of products using boron steel grades.



Today, boron steel products are made in Ukraine at Ilyich Steel and Azovstal, as well as in Italy at Trameal and Ferreria Valsider. Metinvest sells these products to agricultural and industrial equipment manufacturers in Ukraine and the CIS, as well as in Western and Central Europe.

Boron alloys for Miilux

Miilux Poland is the Polish division of the major Finnish group Miilux Oy, which specialises in producing tempered heavy plates and wear-resistant parts for mechanical engineering. When the company first began production, it bought hot-rolled steel for quenching and tempering on the open market.

Especially for Miilux, Metinvest has mastered the production of the B16S, B20S and B27S boron steel grades. The Group's specialists adjusted the chemical composition, created the smelting technology and developed a special rolling mode at Azovstal and Ilyich Steel. This is how Metinvest became a key supplier of hot-rolled products for the Polish company. The Group now produces semi-finished products for Miilux in addition to selling the manufacturer's finished products in the CIS through its own sales network.

Miilux Poland produces three hardness categories of high-strength, wear-resistant steel. For example, the HB 400 and HB 450 grades are suitable for the manufacture of excavator buckets, while the HB 500 grade can be used to make the teeth of underground tunnelling machines.

Metinvest's partnership with Miilux is an illustration of mutually beneficial cooperation where the end user benefits the most.