NATIONAL METALLURGICAL ACADEMY OF UKRAINE

THE RECEPTION TECHNOLOGY OF MECHANICAL ENGINEERING PRODUCTS FROM HIGH CHROMIUM IRON–CARBON ALLOYS WITH NANOSTRUCTURE MATRIX

The technology is intended for reception of mechanical engineering products (rolls, mills spheres) from high chromium iron–carbon alloys (where carbon and chromium content is 3–3,5% and 12–21,5% accordingly) with the nanostructure matrix (thickness of the α-phase bainite plate an makes 20-30 nm) at the expense of realization of bainite transformation during cooling products from foundry heating.

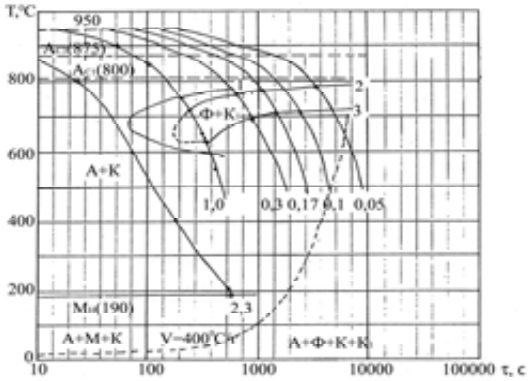
The technology provides:

- reduction of the charge expensive alloying elements: chromium - on 24%, nickel - on 50%, titanium, vanadium, tungsten - on 100%;
- increase of wear resistance of details in 1,5-2 times;
- increase of heat resistance in 1,5 times;
- increase of service life of details in 2-3 times.

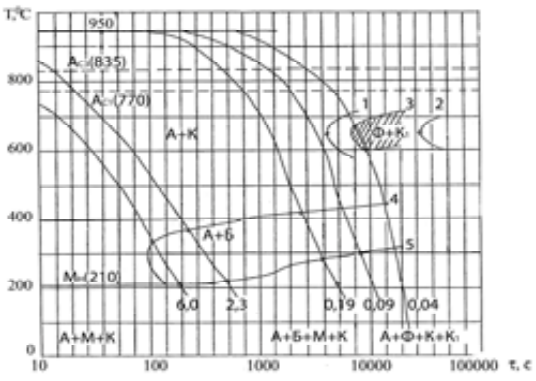
Is developed:

- the isothermal and thermokinetics diagram of austenite decomposition are constructed in iron–carbon alloys with 12-21% of Cr;
- the critical temperatures Ac_1, A_{cm}, M_B are determined depending on the content of chromium, alloying elements and cooling speed at crystallization;
- the regimes of heat treatment with isothermal soaking in area of bainite transformation for concrete products are developed.

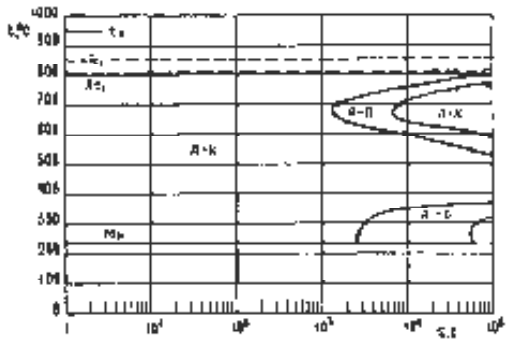
The regimes of heat treatment are protected by the patents of Ukraine (the declaration patent 59272 A; the declaration patent 69795 A).



a

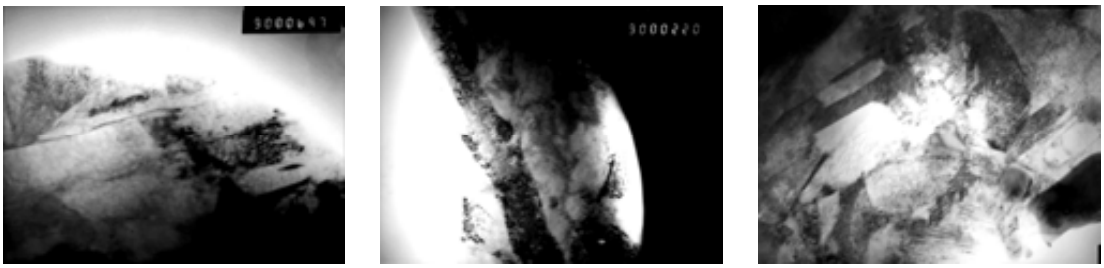


b



C

The diagrams of undercooled austenite decomposition of high chromium cast-irons: a - cast-iron such as ИЧХ16; b - cast-iron such as ИЧХ16НМФТ; c - cast - iron with 21% chromium content; a, b, c – $V_{cool.hard.}$ = 0,4°C/min



a b c

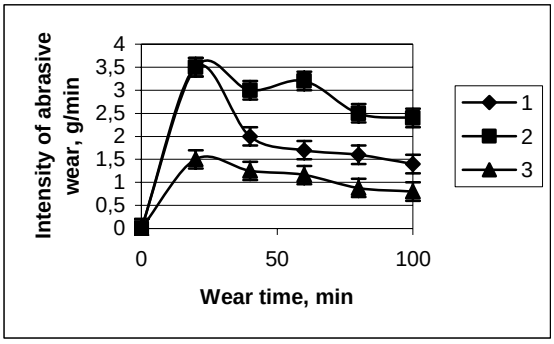
Fragments of austenite decomposition products of cast-iron such as ИЧХ16НМФТ: a, b - x30000; c - x 37000

(I_i x 10^{-3} g/min)

1 – cast condition;

2 - T_{AUST}=950°C, t=50min, T_{ITHOT}=650°C, t=2h 50min, quenching in water;

3 - T_{AUST}=950°C, t=50min, T_{ITHOT}=350°C, t=1h 20min, quenching in water



Change of intensity of abrasive wear of cast-iron such as ИЧХ16НМФТ