

The invention relates to the metallurgy, particularly to the process for the thermal treatment of mill balls from the steel. The process comprises rolling, the after deformation subcooling in the air, hardening and self-tempering. According to the invention the hardening begins being performed after subcooling the hypoeutectoid steel in the air at temperature between  $A_{r3}$  and temperature below  $A_{r3}$  by 30°C, the hypereutectoid steel – at temperature between  $A_{r1}$  and temperature below  $A_{r1}$  by 30°C. Application of the process provides for increasing the hardness and impact resistance of the mill balls from steel, which is achieved due to reduction of the transition time through the critical point of conversion of austenite into martensite during the hardening.