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METHODS OF DECREASE THICKNESS FOR BACK END-CAPPING AREA OF STRIPE AT ROLLING ON WFHR

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The article is devoted to the search of methods of decision until now of actual task for FHPBB with traditional technology of rolling are removals of bulge of back end-capping part of stripe. Principal reason of formation of bulge is shown. Possible methods over of affecting on the indicated local part are presented. The most effective methods are set and their analysis is executed. The most real methods of decrease of thickness for end-capping part are recommended for practical application: use of the technological lubrication and additional heating of this part on 50…70 °C.

Key words: FHPBB, rolling, stripe, cobbing, temperature, coefficient of friction, bulge

By the feature of rolling of stripes on the traditional widestripe mills of the hot rolling (WFHR) is a presence of bulge $\delta h_{ї}$ = 0.10-0.20 mm on the back end-cap-ping area of the finished stripe long a 30-50 m. Appearance of such bulge is con-ditioned, mainly, by affecting absence it back tension on all areas between stands for clean group of WFHR.

Obviously, that to create some way the discrete process of rolling with the presence of back tension of end of stripe is not possible. In this connection removal of bulge on the local back area of stripe possibly only by application of the local external affecting on this area.

The analysis of row of the most effective methods of affecting at stripe below for diminishing of thickness increase on it end-capping area is executed.

1. In Japan [1] on three WFHR with traditional technology of rolling use the endless process of rolling for stripes, at which in the endless regime roll 15-16 intermediate rolls with total length a to 1000 m, welded butt on a bultwelding machine before a clean group, and then a few stripes put to rolling in the individual regime for creation of pauses between stripes for the intensive cooling of working rollers.

The half-infinite process of rolling is applied also and on WFHR, working in compound casting-rental aggregations [1-3], on which intermediate rolls roll with long a 250-270 m.

In works [4,5] another method of welding of edge-to-edge stripes is presented in the hot state on WFHR, which is carried out directly in a hearth by deformations in the process of rolling. The idea of method is based on that at passing of joint into the hearth of deformation the direction of metal flow of end-capping areas of stripes has opposite character. At its mutual contact in the limited volume of hearth of deformation and origin of necessary horizontal forces there is a process of welding of butt ends of stripes similar to blacksmith's (hot) welding.

The testing of method of the butt welding is executed at rolling of stripes with thick 3.08 and 4.05 mm, with width a 30 mm on a mill with the diameter of rollers

200 mm. Samples heated at a silite stove to the temperature ~1200 °C and it was rolled preliminary edge-to-edge in rollers with cobbing ~30-40 %.

Character of connection of samples in the hearth of deformation testifies to the considerable plastic deformation of metal and presence of considerable horizontal force which at high-quality preparation of built surfaces (or their melting), can provide the reliable welding of contiguous stripes.

In the conditions of experiment a relative area of areas of welding of stripes was 10-12 %, and other areas were busy at a dross, tension of break of welding area is 250-280 N/mm^2 (in the cold state). In the distance a 6-13 mm from guy-sutures found out a fine-grained structure (number ~10), and further from guy-sutures is a widmanstatten patter of stripes (number 3). The fine-grained structure in area of welding areas testifies to considerable horizontal deformations of stripes.

2. Application of the additional wringing out of back end-capping area of roll (stripes) in the process of his rolling is used on different mills [2,6,7]. However for a receipt in the clean stand of WFHR of stripe without a bulge on the end-capping area ($\delta h_{\ddot{I}} = 0$) it is necessary in all stands of mill to apply the actual total additional cobbing within the limits of ~2.0 mm, that it is impossible to attain at presence of slow electromechanics push devices (EMPD). For this purpose in the clean group of mill stands set with the hydraulic push devices (HPD), speed of influence of which on a stripe is made by a to 2.0 mm/s.

3. One of parameters, qualificatory the size of force of rolling, the coefficient of friction serves. It size in the first stands of clean group of WFHR is 0.39-0.27, in the last three stands – 0.26-0.20, diminishing as far as the increase of speed of rolling at the decline of the relative drafting.

At the decline of coefficient of friction in 1.5 times the size of normal contact tension diminishes in 1.12 times and is sufficient for the noticeable decline of increase thickness on a back end-capping area at presence of the technological oiling, that is arrived at the use as greasing of mineral oil.

For realization of this method of affecting area of back-end of stripe all stands (except for the first stand of clean group) must be equipped by the special collectors and the technological greasing to transport on the special pipelines from the workshop of the cold rolling of stripes.

4. Application of acceleration of rollers for stands of clean group is the confessedly method of diminishing of stripe thickness [2,3]. At the acceleration of rollers at rolling of back-end a stripe is heated on 7-10 °C, tension for metal flow and friction coefficient diminish, that causes diminishing of middle normal contact tension and force of rolling. So, from data of [2], at rolling of stripes a 1.5 x 1050 mm on a mill 2000 with an acceleration a 0.05 m/s^2 on length ~a 550 m the thickness of stripe diminishes on ~0.15 mm.

5. Increase of temperature of back-end of roll. At the use in a line between draft and clean the groups of cages of WFHR with traditional technology of intermediate back winding device (IPD) the back-end of stripe is formed from more hot front end of intermediate roll. Removal of bulge of back-end of stripe possibly by the local additional heating of double-three internal convolutions of intermediate break-

down bar in a coil, as a result force of rolling of stripe, resilient deformations of cage and thickness of stripe diminish. At the internal diameter of coil 600-650 mm length of the additionally heated area of breakdown bar will make ~a 4-5 m. The degree of removal of bulge of end-capping area will be determined by the temperature of the additional heating of the examined local area. For realization of the indicated heating of internal convolutions of coil of intermediate breakdown bar at it unwinding of IBD in it internal cavity enter a rod with the water-cooled induction heater, protected from beats by the convolutions of breakdown bar, power of which suffices for heating of metal to the necessary temperature.

Conclusions. The short analysis of possible methods of diminishing of bulge of back-end of stripe is realized at rolling on traditional WFHR. By the most effective method there is the endless rolling of stripes, which supply by the butt welding of intermediate rolls by general length a to 1000 m. The new method of the butt welding of intermediate breakdown bars is considered and tested directly in the hearth of deformation. The estimation of influence of temperature of back-end of stripe on the size of bulge is executed. It is shown that for it moving away it is necessary additionally to heat the end-capping area of stripe on 50-70 °C.

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