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PRODUCTION PROCESSES OF BROAKBAND STEEL

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Figures for rolling of stripes with traditional technology presently work on many metallurgical enterprises of different countries of the world. Similar figures, put into an operation a few ten of years back, saved in basis the structure of technological process, which does not provide the receipt of rolling steel on a type, mechanical properties and cost. New aggregates, many failings, providing increase qualities of products are removed in which, came on changing to these figures.

Keywords: stripe, rolling, continuous, figure, technology.

Last years in foreign metallurgy there is transformation for technological discrete chainless of production of hot-rolled broadband steel (ingot-scabbing-BFHR) to the combined processes: a machine of the continuous casting of blanks (MCCB) for the receipt of thick slab is a broadband figure of the hot rolling (BFHR), and also casting-rental aggregates (CRA), providing rolling of stripe from thin slab.

At the production of cold-rolled stripes etchant-rental complexes create in which continuously-etchant aggregates (CEA) combine with an endless process on the continuous figure of the cold rolling (CFCR). New technologies with new composition of equipment provide the receipt of high-quality stripes with the rejection of thickness of stripe on all length at limited to 0.03 mm with the minimum rejection of mechanical properties [1-3].

Receipt of high-quality products in the conditions of figures with traditional technology of rolling it is possible to provide due to the equipment of figures by the modern systems for checking and automatic control the process of the cold rolling [4,5]. In the case of the use of thick cast slabs with MCCB loss of metal on an area to BFHR eliminated practically, substantially power expenses are grow short. The substantial improvement of technical and economical indexes for production of stripes is arrived at on CRA, in the line of which slabs is used, and instead of individual cold rolling apply the endless process of rolling with the use of storages of hot-rolled strip. In a number of cases there are combine in one endless process of CEA and CFCR from a storages stripe in the line of CEA and before CFCR.

Main dignity of the offered technology is placing of basic stake of plastic deformation in the draft group of cages, where a roll has a maximal temperature, with producing from the last cage of draft group of semi-finished rolled product in a 3-12 mm [6]. The high temperature of roll and small speeds of rolling in the first cages of draft group provide the decline of power inputs on deformation within the limits of 10-15 % as compared with the existent types of BFHR [7].

As a result of change of the deformation-speed regime of rolling in draft and clean groups of cages the increase of temperature of stripe appears in the cages of clean group is possible, that noted higher, than on serial BFHR. Offered scheme of BFHR (NT) - 9 cages provides the increase of speed for rolling of stripe in the last cages of draft group.

Force of rolling goes down from 16-19 to 8-9 MN from a cage N 1 to the cage N 4 (BFHR) and to the cages NN 6 (7) BFHR (NT). After decrease of temperature at back winding on an intermediately-back winding device (IRD) force of rolling increases on all figures with subsequent decrease of force to 4-4.5 MN in the last clean cage. Thus in cages NN 4-6 force of rolling is substantially less than on BFHR (in cages NN 5-7) on BFHR (NT). It is substantially the increase of thickness for stripe goes down on a back end-capping area.

An intermediate roll is winded up on «Coilbox» (IRD) or on drum reels (two pieces) with protective screens with speed to 10-12 m/s. Before a clean group, consisting from three cages (quarto- or sixrolling) an induction furnace is set, allowing to regulate (to stabilize) the temperature of thin intermediate roll before rolling in a clean group,. The presence of quench provides the receipt of the set temperature of deformation of metal on an exit from a clean group scope at limited 700-800 °C. Application of thin intermediate roll facilitates the receipt of the required temperatures of end rolling and mechanical properties of the prepared stripe.

Application of three cages in a clean group (but not 5-7 cages in BFHR) abbreviates power inputs at the acceleration of rollers from speed a 10-15 m/s in a clean cage a to 20 m/s and more after the gripping of stripe by a coiler in the set regime of rolling for stripes.

Stabilizing of temperature on length of intermediate roll (possibly increase of temperature to the back-end of roll), and also application of the intermediate rewinding of thin roll, compensate absence of pulls of ends for rolls and allow to roll stripes with the thickness decrease against a face value of back-end and decline expense of metal to clipping.

At rolling of the same shape of stripe (v = 10 m/s in the last cage) total power of rolling in clean cages almost in two times less than, and total power in all cages of BFHR (NT) on 3-5.5 % less than, than on serial BFHR. At speeds of v = 15-20 m/s, id est after the acceleration of figure, total power of rolling in all cages of figure goes down on BFHR (NП) at v = 15 m/s on 15-16.5 %, and at v = 20 m/s - on 26-27 %, mainly, due to the decline of power of rolling in the first three cages of figures at less speed of rolling. In addition, more than power, expended on the acceleration of three clean cages of BFHR (NT) decrease in two times from of decrease of mass of the revolved parts.

In all cases the set thickness of stripe for all figures corresponded to the front area and was equal 2.5 mm. The augment of thickness of back end-capping area of stripe is conditioned by his less temperature on length of roll and absence of back pull of stripe on all interchange areas of BFHR.

As follows from calculations, at rolling on the serial figure of BFHR maximal bulge (0,074 mm) corresponds to the area of back-end, where the thickness of stripe appeared equal 2.574 mm. As practice on the similar figures (BFHR 1680 OAO the «Metallurgical combine «Zaporozhstal») shows [8] an augment of thickness can be and anymore, because the thermal regime of stripe in a roll on IRD is not controlled and not regulated. This remark can be attributed to all figures, having IRD and on which additional devices for stabilizing of the thermal regime of rolling stripe in clean cages is absent.

Conclusions. It is executed analysis of change for basic parameters of rolling stripe steel at the broadband figures of different type.

LIST OF LITERATURE

1. Мазур, В. Л. Первоочередные задачи и пути их решения при модернизации листопрокатных мощностей Украины [Текст] / В. Л. Мазур, А. К. Голубченко // Металлургическая и горнорудная промышленность. – 2013. – № 2 (279). – С. 1-5.
2. Совершенствование прокатки сверхтонкой полосы из непрерывнолитых тонких слябов [Текст] / Ф. Стелла, А. Карбони, П. Бабич, И. Фарук // Сталь. – 2003. – № 11. – С. 58-65.
3. Новый способ горячей прокатки тонких полос [Текст] / И. Грот, Л. Сьеревогель, М. Корнелиссен и др. // Черные металлы. – 2004. – Июль-август. – С. 30-32.
4. Коновалов, Ю. В. Справочник прокатчика [Текст] / Книга 1. Производство горячекатаных листов и полос. – М. : Теплотехника, 2008. – 640 с. – Библиогр. – с. 626-640. – ISBN 5-98457-060-2.
5. Коновалов, Ю. В. Справочник прокатчика [Текст] / Книга 2. Производство холоднокатаных листов и полос. – М. : Теплотехника, 2010. – 608 с. – Библиогр. с. 596-608. – ISBN 5-98457-084-х.
6. Николаев, В. А. Варианты реконструкции непрерывных станов для прокатки полос [Текст] / В. А. Николаев, А. А. Васильев // Производство проката. – 2012. – № 6. – С. 2-9.
7. Спосіб виробництва холоднокатаних штаб [Текст] : пат. 71395 Україна / Ніколаєв В. О., Васильєв А. О. ; заявник й патентовласник Запоріж. нац. техн. ун-т // Опубл. Бюл. №13, 10.07.2012.
8. Николаев, В. А. Формирование толщины полосы при прокатке на широкополосных станах [Текст] / В. А. Николаев, А. Ю. Путноки. – Запорожье : Дикое Поле, 2011. – 180 с. – Библиогр. : с. 166-179. – ISBN 978-966-2994-67-4.