PRODUCTION OF CHANNEL SECTIONS ON THE ROLLING MILL 600 BY HOT BENDING IN A UNIVERSAL STAND


Channel sections No. 10-20 are rolled on the large size semicontinuous rolling mill 600 according to GOST 8240-56 from carbon steels of conventional, and higher quality with temporary cold state rupture strength up to 80 kg/mm².

Rolling mill 600 consists of two-high stands arranged in series in three lines, with sufficient stiffness: the relationship between the length of the roll body and the diameter is equal to 1.62, and 1.72 for preliminary (730), and finishing (580) stands respectively. The preliminary stands have individual dc drive with a power of 3200, and the finishing stands, 2500 kW. The speed regulation range of the motors of the preliminary stand is 1-3, and that of the finishing stands 1-4. The maximum speed of the motor of the finishing stand is 330 rpm. Rolling bearings are used as a support for the working rolls of the preliminary stand, and in the finishing stands PZh 400×300. All the stands are equipped with a reliable mechanism for axial regulation of the rolls.

Sizing of channel sections rolled on the rolling mills is carried out by a method of gradual bending, which ensures uniformity of drawing over the groove elements. Treatment of the flanges at high temperature by direct pressure in the first operation enables them to be deformed after a lower number of passes in comparison with other methods. Moreover, owing to an increase in the inclinations of the side walls of the roll grooves, reduction in the depth of the notches on the rolls and reduction in the metal removal when they are reground are guaranteed.

Production of the channel section 16 was mastered in 1966: a diagram of the preliminary sizing is shown in Fig. 1a. Using this sizing method, a stable profile was obtained in accordance with the GOST with satisfactory quality. A considerable drawback of this sizing was the low temperature at the end of rolling (875°C) which led to frequent breakdowns of the rolls of the finishing stand, with protracted standstills, and it reduced the productivity of the stand.

In order to eliminate this drawback, the temperature of the end of rolling was increased by reducing the number of operations. When channel section 16 was rolled according to diagram b (Fig. 1) which was introduced in February, 1967, stands 14, and 15 were eliminated. Hence the loading of the continuous-preparing group of the stand was somewhat increased, and the mean elongation coefficient in the profiled sizing grooves remained without change (1.288).

The reduction in the number of operations and the smaller cross section of the original blank ensured the increase in the temperature of the end of rolling by 45-60°C. Fracture of the rolls of the finishing stand ceased, and productivity in the hot part was doubled.

Further improvement of the system of rolling channel section No. 16 was directed to reducing the consumption of rolls of the finishing stand, and increasing the productivity of the rolling mill. When rolling according to systems a, and b, the finishing grooves had a slope of 3%, which led to a considerable removal of metal when the rolls were reground. Moreover, due to stability condition of the collars only two grooves were arranged on the body of the shaft of length 1000 mm. The life of the series of rolls of the finishing stand did not exceed 1600 tons.

The most effective means of reducing metal removal on regrounding the rolls is increase of the groove slope. The optimal magnitude of the groove slope, which guarantees an even wear of the shafts for the flanges, and the

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Fig. 1. Sizing of the Channel section No. 16: a) preliminary; b) completed without stands 14, and 15, c) final, with hot bending in a universal stand in the train.