

Flatness Measuring on Cut Flat Steel

Flat steel is besides round steel also a part of the Štore Steel production programme. Most of the flat steel is intended for goods vehicle springs.



Flat steel is sold in rolled length and according to customer's demands in shorter lengths as well. It is cut in the Rolling Mill on shears and band saw and in the Cold Finishing on circular saws with robotic bundling of cut bars.

The flat material is after rolling checked according to different criteria for flatness, shape, surface and internal defects. The problem of flatness of a lot of material is by not rejecting bars, which are not flat at certain locations but to recut them and recheck them afterwards.

The problem with this procedure is great amount of manipulation between two mills and a lot of additional manual control after sawing. That is why we have been looking for a solution with automatic robotic flatness control during cutting on the circular saw for quite some time. In the second half of 2017, we contacted the company MONODAQ from Trbovlje. We made an enquiry for a measuring device and immediately after the first contacts realised that they have a good solution for flatness measuring on a circular saw by a robot. We also agreed on additional feature of rejecting bars that have been marked in the rolling mill. In the Rolling Mill certain bar sections are marked due to various reasons at the inspection after rolling. They have to be rejected at or after cutting.

The measuring device is composed of a linear actuator on which four sensors travel along the bar length driven by a step motor and belt drive. Two are dedicated to measure the flatness of the profile thickness and width and two to detect colour chalk marks on the width and thickness. The measurement alone is very fast and executed in roughly five seconds. The measurements are analysed with the corresponding software and displayed on the screen.

The concept of setting the two saws, robot and the system of already existing roller conveyors enables the setting of the measuring device to the saw in a way to perform the measurement automatically during the sawing cycle with automatic placement and transport of rejected and accepted bars. It is also important that there is no prolongation of the sawing cycle due to extra measuring. That was achieved by changing the measurement procedure. We wanted to avoid placement of bars to the measuring location to perform the measurement. The procedure was chosen, where the robot only moves the bar close to the measuring location, where measuring sensors then travel on linear actuator along the bar.

The sawing and measuring procedure is performed as follows. A short bar is cut first by the saw, the robot picks it up and leans to the measuring device. The flatness and marks are checked. Based on the information from the measuring device, the bar is moved to one of the roller conveyors. Good bars are placed on the first and bad bars are placed on the second. Meanwhile the saw has already performed the next cut of a short bar, which is again checked. When the wanted package height and width are reached, the good material is moved to the packaging location. The bad material is gathered on the other roller conveyor and is also taken to the packaging location when the maximum bundle size is reached or at the position end. This measuring device will save us time and material transport. It will also increase the measurement accuracy when compared to the present manual control.

Štefan Zidar, head of production in Cold finishing

Above left: measurements display on the screen; Above right: measuring sensors travel on linear actuator along the bar