

Effects of Driving-Roller Groove Shape and Side-Roller Distance on Deformation Behavior in Three-Roll Bending of Structural Channels

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ABSTRACT

Roll bending is a useful technology for manufacturing a wide variety of products in small quantities. Flexible forming is possible with this technology because it can manufacture products with various bending radii by adjusting the amount of displacement of the side-rollers [1]. However, the roll bending of structural channels causes irregular deformation. For this reason, the roll bending has only limited application. It's necessary to clarify the deformation behavior to prevent the irregular deformation. The purpose of this study is to clarify the deformation behavior in the roll bending of structural channels.

In a previous report, we clarified the effects of the processing conditions, that is, the distance between the side rollers and their displacement, on the deformation behavior in the three-roll bending of structural channels using ungrooved rollers [2]. Furthermore, we clarified the effects of the constraint position and area, caused by the driving roller, on the deformation behavior in the three-roll bending of structural channels under the condition of a fixed distance between the side rollers [3]. As a result, it was found that the constraint of the web edge of the structural channel caused by the driving roller may lead to the deformation of the flange portion.

To clarify in more detail the effects of the constraint of the web of the structural channel, caused by the driving roller, on the deformation behavior in the three-roll bending of structural channels, a numerical simulation was carried out by using LS-DYNA on driving rollers with various groove shapes. Furthermore, the present paper reports the effects of the distance between the side rollers on the deformation behavior in the case of using the driving roller with various groove shapes.

REFERENCES

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