FE analysis on the Influence of Width Direction Deformation on Springback control in V-bending by Sheet Forging

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ABSTRACT

In recent decades, lightweighting has become an important subject especially in sheet metal industry for saving resources and reducing the emissions of the carbon dioxide. Aluminum have been adopted as one of important automotive material because of its low density. However, there have some problems in the press engineering. Such as the springback.

Traditionally, a series of empirical methods were used to obtain target bending angle. However, such methods are relied on the ability and experience of engineer. Therefore, control of the springback is necessary when Aluminum sheets are applied as automotive parts.

According to the view of material mechanics, it is considered that springback could be controlled through varying the mechanical state. In our prior study, a sheet metal forging method was added after V-bending process used a punch with a single lump on the tip [1][2]. And the results shown that the target bend angle and the spingback amount decreased with increasing forging amount. Thus, springback could be quantitatively controlled by forging process.

Actually, warp would be occurred in bending process if the ratio of width to thickness relatively small. However, previous study didn't consider about it. Therefore, in this study, in order to confirm the effect of warp on spingback control, the V-bending and continuous forging processes were conducted using FE analysis. Here, the model of these processes in consideration of warp was re-modified firstly. Then, based on the analytical results, identified the starting and ending point of correction of warp, respectively. Here, ending point of correction of warp also means the starting point of forging. From the analytical results, it was confirmed that warp would be occurred if the ratio of width to thickness is small. Furthermore, it was found that springback was also reduced to some extent at the warp correction stage.

REFERENCES

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