

Thickened holes edge including compressed rollover for improving tensile fatigue strength of thick sheet

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Abstract

Body-in-white parts are generally punched to make many holes for joining, attachment and reduction in weight. The static strength of high strength steel sheets is almost proportional with the strength of the sheet, whereas the fatigue strength becomes gradually smaller. In addition, onset and progress of fatigue cracks of the punched high strength steel sheets are accelerated around holes due to concentration of stress, particularly for rough fracture surface and sharp burr of the sheared edge. For the purpose of improving fatigue strength of the steel sheet, the edge of the hole was thicken. Thus the fatigue strength was improved as compared to the normal piercing hole. However, in the thickening of the holes edge using punching process, rollover occurs at the top of holes edge and it lead to the occurrence crack due stretch of the sheets during the process. In order to further improve the stiffness and tensile fatigue strength, the shape of holes edge was altered by compressing the rollover of the holes edge of the thickening sheet. In this study, the effect the holes with thickening edge including compressed rollover formed by a punching on the tensile fatigue strength of sheets was investigated. It was found that the thickened and compressed holes edge of thick steel sheet are effective in improving tensile fatigue strengths.

Keywords: Thickening; Tensile fatigue strength; Rollover
