## Effect of Blank Dimension on Formability of Forging Blank Consisting of Two Metals

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## ABSTRACT

As one of global warming countermeasures, it is needed to reduce the energy consumption of vehicles. Lightweight parts are used in automobiles industry for it [1]. There have been a number of reports about the lightweight parts. For example, there are methods to make hollow parts of metal by back extrusion [2] and to use FRP that is lighter than metals [3]. But, shape that is formed by back extrusion has limited shape. Cost of FRP is more expensive than that of the metals. We think lateral compression forging is more effective. Because, we can manufacture complex parts using it. The parts are cheaper than FRP. Therefore, we have tried to forge on a blank that aluminum alloy is inserted in stainless steel [4]. In the forging method, the blank with aluminum alloy and stainless steel is pressed. It is more lightweight than conventional stainless steel parts. It is possible to manufacture hollow forging parts, if aluminum alloy melts out using difference of melting points. We established forging analysis method by comparing numerical analysis with experiment and confirmed the analysis method have reliability[4]. Purpose in this study is to evaluate effect of blank dimension on formability of the blank using this analysis method. The analysis results were compared with forging analysis results using stainless steel pipe as a blank. In both numerical analysises, we treated stainless steel pipe having different inside diameter. These are 7mm and 10mm. In the results, in case of the stainless steel pipe as blank, inside diameter of the end face was smaller than that of the symmetry plane. But, in case of the blank, inside diameter of the end face was bigger than that of the symmetry plane. Verification experiment was conducted using condition same as these numerical analysises. We confirmed them in the verification experiment results, too. Next, we focused equivalent stress distribution. In case of the stainless steel pipe, equivalent stress on the inside was bigger than the other region. But, in case of the blank, we confirmed that the stress difference in stainless steel was reduced when dimension of inside diameter was enlarged. The blank have effective on forming hollow product.

## REFERENCES

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