

**OPTIMALISASI PARAMETER PADA PROSES SHEET METAL
FORMING TERHADAP MECHANICAL PROPERTIES
MELALUI METODE ELEMEN HINGGA**

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ABSTRAK

Proses pembentukan lembaran logam (*sheet metal forming*) adalah salah satu metode manufaktur yang umum digunakan dalam industri manufaktur. Proses ini menghasilkan nilai-nilai seperti *effective plastic strain*, *effective stress*, dan *springback*, yang merupakan parameter penting dalam menilai kualitas suatu lembaran logam. Nilai-nilai ini dipengaruhi oleh beberapa parameter utama, di antaranya radius dies, kedalaman penekanan, dan kecepatan punch. Material yang digunakan dalam penelitian ini adalah *Steel Plate Hot-rolled* (SPHD). Penelitian ini bertujuan untuk mengevaluasi kualitas tegangan, regangan, dan *springback* pada material kerja yang dihasilkan dari variasi ketiga parameter tersebut. Proses *sheet metal forming* metode v-bending dilakukan menggunakan software simulasi dengan memvariasikan radius dies antara 89°, 90°, 91° dan kedalaman tekan 7,7, 7,8 dan 7,9 mm. Dari hasil simulasi metode v-bending, nilai *effective plastic strain* dan *effective stress* terendah diperoleh pada radius dies 90°, kedalaman tekan 7,7 mm, dan kecepatan punch 38,5 mm/s, dengan nilai *effective plastic strain* sebesar 0,39, *effective stress* sebesar 410,16 MPa, dan sudut sebesar 89,47°. Proses *sheet metal forming* metode u-bending dilakukan dengan memvariasikan gaya tekan 19,69 kN, 21,08 kN, dan 21,88 kN. Dari hasil simulasi u-bending, *effective plastic strain* dan *effective stress* terendah diperoleh pada kecepatan 19,69 kN dengan nilai rata-rata terendah *effective plastic strain* dan *effective stress* 0,23 dan 274,68. Hal ini menunjukkan bahwa parameter tersebut memiliki pengaruh terhadap nilai *effective plastic strain*, *effective stress*, dan *springback*.

Kata Kunci: *sheet metal forming*, radius dies, kedalaman tekan, *springback*

**OPTIMIZATION OF SHEET METAL FORMING PROCESS
PARAMETERS ON MECHANICAL PROPERTIES
THROUGH FINITE ELEMENT METHOD**

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ABSTRACT

The sheet metal forming process is one of the commonly used manufacturing methods in the manufacturing industry. It produces values such as effective plastic strain, effective stress, and springback, which are important parameters in assessing the quality of sheet metal. These values are influenced by several key parameters, including dies radius, pressing depth, and punch speed. The material used in this study is Steel Plate Hot-rolled (SPHD). This study aims to evaluate the quality of stress, strain, and springback in the work material resulting from the variation of these three parameters. The sheet metal forming process of v-bending method was carried out using simulation software by varying the dies radius between 89o, 90o, 91o and press depth 7.7, 7.8 and 7.9 mm. From the simulation results of the v-bending method, the lowest effective plastic strain and effective stress values were obtained at a dies radius of 90°, a press depth of 7.7 mm, and a punch speed of 38.5 mm/s, with an effective plastic strain value of 0.39, effective stress of 410.16 MPa, and an angle of 89.47°. The sheet metal forming process of u-bending method was carried out by varying the pressing force of 19.69 kN, 21.08 kN, and 21.88 kN. From the u-bending simulation results, the lowest effective plastic strain and effective stress were obtained at 19.69 kN with the lowest average effective plastic strain and effective stress values of 0.23 and 274.68. This shows that the three parameters have an influence on the values of effective plastic strain, effective stress, and springback.

Keywords: *sheet metal forming, radius dies, depth of press, springback*