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ગુજરાત ટેકનોલોજીકલ યુનિવર્સિટી
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Abstract of the Thesis

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Discipline/Branch: Mechanical Engineering

Title of the Thesis: Investigation & Optimization of process parameters of Roll Bending machine in realizing Conical Shells in Aluminum 6063

Abstract

In the current research, for sheet metal forming by a roller bending machine, achieving accurate geometry of components is the crucial task of many manufacturing industries. This is because of "Springback", which refers to the elastic recovery of the deformed component. The microstructure and macroscopic mechanical properties of the sheet undergo changes during its forming process, resulting in inaccurate geometry of the component. These changes are common and inevitable in each phase of the production process. Hence, predicting and controlling Springback as per the geometrical shape requirements is one of the key factors influencing the quality of rolled sheet metal parts. In this research work, the investigation is made on realizing accurate conical shell-shaped components by a roller bending machine for the material of construction (MOC) Aluminum 6063. Effects of sheet metal thickness, number of passes, roller pressure, and roller rpm on Springback for Aluminum 6063 are analyzed. After testing the spring back analyzed with regression analysis. In the validation phase, select a single input parameter range to develop an Abaqus model. This model has been generated on Abaqus software, and after getting the result, validate the result. Validation of the work has been compared to analytical work and practical work.

This PhD Thesis would be useful for Academicians, Researchers and Industrialist.

List of Publication(s):

1. Nimesh Patel, Prof. Dr. Jeetendra Vadher & Dr. Hetalkumar N Shah (2022). Investigation of Roll Bending machine in realizing Conical Shells, Aegaeum Journal, Volume 10, Issue 9, 2022, ISSN: 0776-3808

2. Nimesh Patel, Prof. Dr. Jeetendra Vadher & Dr. Hetalkumar N Shah (2022). Review on Spring back effect in bending of Conical Shells in Roll Bending machine, Gradiva Review Journal, Volume 8 Issue 10 2022, ISSN NO : 0363-8057

3. Nimesh Patel, Prof. Dr. Jeetendra Vadher & Dr. Hetalkumar N Shah (2022). Investigation & Optimization of process parameters of Roll Bending machine in realizing Conical Shells in Aluminum 6063, International Multidisciplinary Engineering Conference (IMEC'22), Sankalchand Patel University, Gujarat