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Influence of vertical step on forces and dimensional accuracy of SPIF parts – a numerical investigation

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Abstract. Single point incremental forming (SPIF) is a new flexible sheet metal forming process characterized by low costs and the possibility to produce prototype parts without the need for a specific die. This is one of the reasons why this process is nowadays used for manufacturing of highly customized small series parts. The process involves the usage of a hemispherical punch which gradually deforms the sheet metal blank fixed by two simple clamping rings, by following a path until the final shape of the product is obtained. The aim of this paper is to investigate and analyse the influence of the vertical step over forces involved in the process and obtained geometrical accuracy, which is one of the main drawbacks for large scale implementation of the process. A numerical analysis was carried out through finite element method with different step size for frustrum pyramid shaped parts made from the same material. In this way, the most appropriate vertical step can be chosen for further experimental research in order to obtain the most accurate parts and with as little stress as possible on the equipment involved in the process.

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