Chair of Metal Forming and Casting
TUM School of Engineering and Design
Technical University of Munich

Tryout-Manager for sheet metal forming

Final Report

Motivation

The design process for forming tools generates large amounts of data before the first tool is used. This data, consisting of simulation results, geometric measurements and design models, comes from various software tools. To ensure a consolidated database, a stable and user-friendly data structure is required in a comprehensive tool tryout.

It is often necessary to carry out several empirical iterations to derive and rework the active surfaces of the tool. This process is time-consuming and, in the worst case, can delay the start of production. In contrast, data that is generated at an early stage is usually not included in the manual tryout process.

Approach

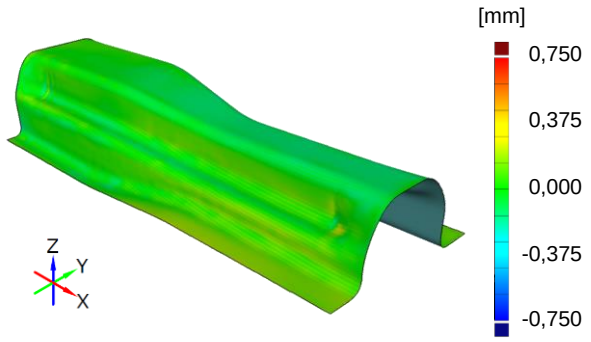
To improve this process, a description model for reverse engineering (RE) based on control points is developed. With this model, the generated data can be traced back to a mathematical description that enables springback compensation with these control points. One advantage of this approach is that deterministic and stochastic deviations can be visualized and compensated for in a differentiated manner.

This is made possible by the smaller amount of data and the comparison of measurement and simulation of individual components. Different compensation strategies can be applied by shifting the control points.

The resulting effective surfaces are transferred directly to a CAD program. These programs work with representation systems such as NURBS (Nonuniform Rational B-Splines), which can then be translated into machine code for tool post-processing.

Summary

In this method, the highly experience-based tool tryout process is supported by a tryout manager. This manager is able to distinguish between deterministic and stochastic deviations and to derive compensated effective surfaces. The mathematical description drastically reduces the required memory and computing time.



Deviations of a compensated component after six iterations by the tryout manager with control point shift of the B-splines, material: DC04

Publications

- doi:10.1088/1757-899x/1157/1/012035
- doi:10.1007/978-3-031-06212-4_24
- doi:10.1088/1757-899x/1157/1/012044
- EFB Research Report 602

Project term

11/2021 - 04/2023

Funding

IGF 21467N - EFB 10/218.

Project editor

Lorenz Maier, M.Sc.