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Tryout-Manager

Motivation

The forming tool design process generates large amounts of data up to the first falling parts. On the one hand, simulation results, geometric measurements, and design models originate from different software tools, which leads to a non-consolidated set of data inventory. On the other hand, the total data volume is hard to handle economically. A stable and user-friendly data structure for overarching tool tryout is missing. Often several experience-based iterations are necessary to derive the tool's active surfaces, which is both time- and resource consuming and even may lead to postponed start of production. Meanwhile, early-generated data does not involve into the manual optimization process.

Approach

Hence, to improve this process a control point based description model for reverse engineering (RE) is developed by which the generated data can be traced back to a mathematical description and a springback compensation using those control points becomes feasible. One advantage of this approach is that deterministic and stochastic deviations are made visible and can be compensated for in a differentiated manner. This becomes realizable by the smaller data volume and the individual measured and simulated components.

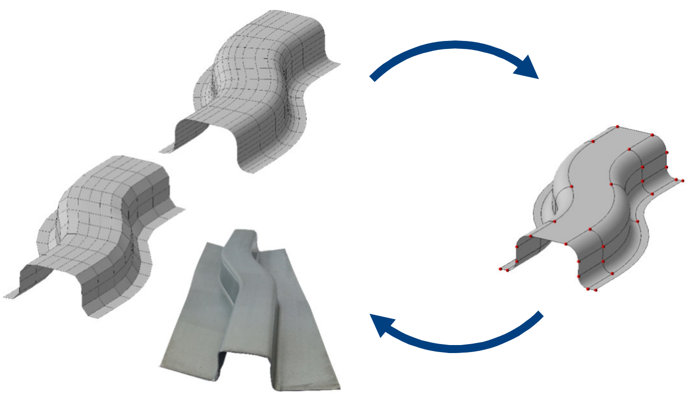

Fig. 1 translating disparate discrete and continuous data into a control point based system

Based on this representation model, by moving the control points, the application of different compensation strategies is made feasible. The resulting effective active surfaces are transferred directly to a CAD program, since these programs work with precisely those representation systems e.g. non-uniform rational B-Splines (NURBS) by nature.

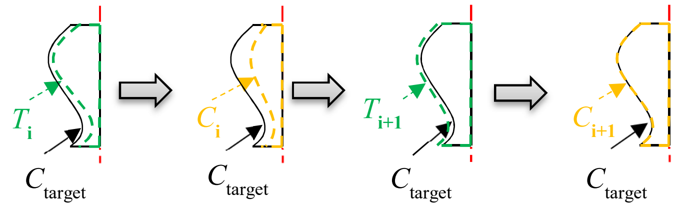

Fig. 2 iterative approach to component *(C)* deviation compensation by tool *(T)* reconstruction

Summary

The developed methodology consists of three parts:

- First, generation of data through measurement, simulation and design
- Second, creation of a uniform database through RE by a mathematical description, e.g. NURBS, for the surfaces in order to integrate a larger amount of data into the tryout process
- Third, separation of stochastic and deterministic deviations and the implementation of deviation compensation

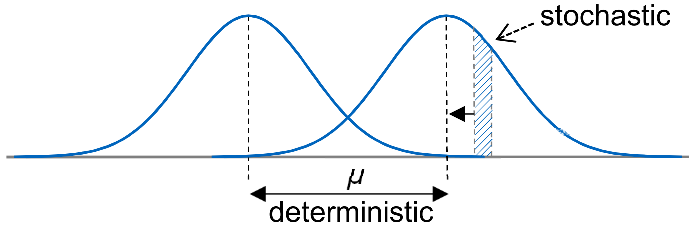

Fig. 3 separating deterministic (component measurement) and stochastic (parameter variation in simulation) deviations

Research objective

By this procedure the strongly experience-based tool tryout process shall be supported by a tryout-manager. This manager is able to separate deterministic and stochastic deviations and to derive compensated effective surfaces. The mathematical description drastically reduces the required memory and calculation time.

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