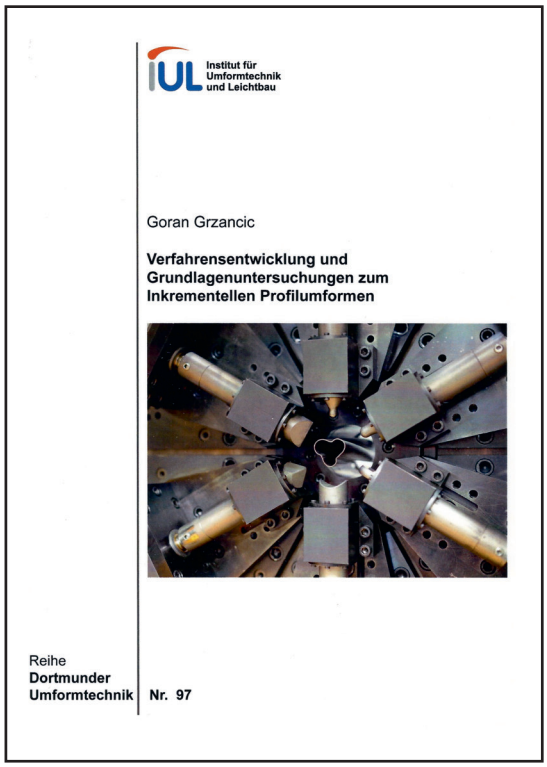
English version below

Institut für Umformtechnik und Leichtbau

Verfahrensentwicklung und Grundlagenuntersuchungen zum Inkrementellen Profilumformen

Goran Grzancic



Reihe Dortmunder Umformtechnik - Band 97

Shaker Verlag

ISBN: 978-3-8440-5889-5

Sprache: Deutsch

Zusammenfassung

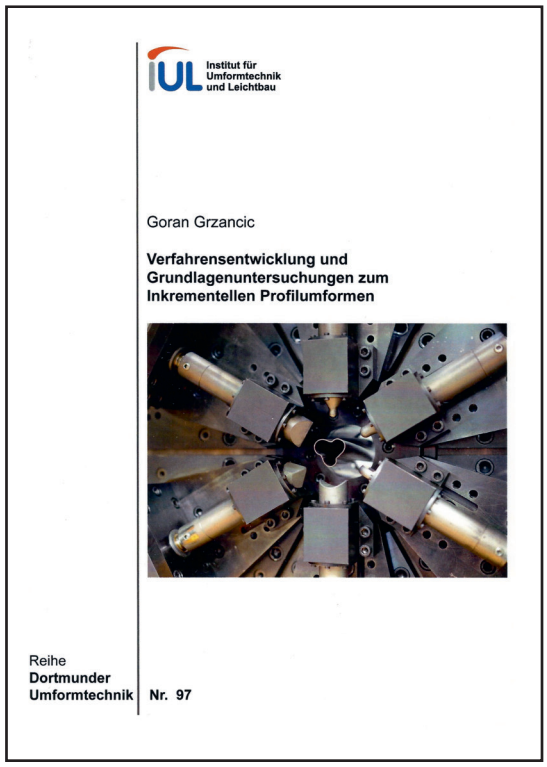
Great product diversity, driven by individual product requirements, leads to an increase of the number of variants in many industry sectors. Consequently, the demands on the corresponding manufacturing systems change towards higher flexibility. This requirement also affects the fabrication of profiles. In addition, the general need for lightweight design in terms of load-adapted structures exists in profile manufacturing. The new process principle of incremental profile forming shows great potential for satisfying both requirements.

In order to fully tap this principle's great potential, the understanding of the process physics needs to be attained. For this reason, a flexible machine system was developed first within a systematic approach. Based on the machine, a fundamental process analysis was conducted and an analytical process model for the prediction of the acting forming mechanisms as well as the process forces during the forming process was developed and validated by means of experimental and numerical approaches. Besides the process analysis the component properties were investigated. On the one hand, an understanding of the complex springback behavior of the part was developed. On the other hand, the geometric accuracy as well as the surface quality was improved significantly by using alternative process kinematics as well as advanced tool concepts. Finally, the great potential of the process was proven based on feasibility studies as well as the development of additional technological concepts, confirming the flexible usability as well as the large variety of components which can be manufactured by the incremental profile forming process.

Institut für Umformtechnik und Leichtbau

Process development and basic investigations for incremental profile forming

Goran Grzancic



Series: Dortmunder Umformtechnik - Volume 97

Shaker Verlag

ISBN: 978-3-8440-5889-5

Original language: German

Abstract

Great product diversity, driven by individual product requirements, leads to an increase of the number of variants in many industry sectors. Consequently, the demands on the corresponding manufacturing systems change towards higher flexibility. This requirement also affects the fabrication of profiles. In addition, the general need for lightweight design in terms of load-adapted structures exists in profile manufacturing. The new process principle of incremental profile forming shows great potential for satisfying both requirements.

In order to fully tap this principle's great potential, the understanding of the process physics needs to be attained. For this reason, a flexible machine system was developed first within a systematic approach. Based on the machine, a fundamental process analysis was conducted and an analytical process model for the prediction of the acting forming mechanisms as well as the process forces during the forming process was developed and validated by means of experimental and numerical approaches. Besides the process analysis the component properties were investigated. On the one hand, an understanding of the complex springback behavior of the part was developed. On the other hand, the geometric accuracy as well as the surface quality was improved significantly by using alternative process kinematics as well as advanced tool concepts. Finally, the great potential of the process was proven based on feasibility studies as well as the development of additional technological concepts, confirming the flexible usability as well as the large variety of components which can be manufactured by the incremental profile forming process.