

# Digitizing Rollforming with Smart Sensors

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**Abstract.** Rollforming is a highly productive manufacturing process for complex profiles or precision tubes used in automotive, aerospace, building and many other industries. Shorter product cycles and increasing customization of products require new concepts in manufacturing. Digitalization enables companies to cope with these new challenges. Digitized machines and processes become one of the key factors in advanced rollforming. The application of smart sensors is a first step towards digitized rollforming. Edge devices enable the connection of different types of sensors in order to form smart objects which in turn can be assembled into smart factories. The new quality of collected smart data allows for instance the development of new rollforming applications and more detailed FE rollforming simulations.

Higher flexibility in rollforming production and smaller lot sizes require fast methods for choosing the right rollforming line. This paper presents a new model for the prediction of torques in rollforming lines based on FE-simulations without friction, supporting the selection of rollforming lines or machine parameters. A semi analytic model is derived to predict the required driving torques of the rolls for different machine configurations without performing additional time consuming FE-simulations. The model is verified with data of servo roll-drive sensors.

In realistic FE-simulation of subsequent processes, material and geometrical variations of the rollformed profiles due to tolerances in the blank need to be taken into account. The data acquired by sensors during manufacturing are applied in rollforming process simulations allowing to create detailed digital fingerprints of rollformed profiles. These results in turn, can be used in more detailed, more realistic subsequent simulations like a profile bending process or a crash. First results of this approach are presented and underline the need of the digital twin concept.