

Concurrent Design of Metal Forming Part and Tooling via Integrated CAE Simulation

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ABSTRACT

In the current product development paradigm, product cost, time-to-market and product quality are three overriding issues, which determine the competitiveness of the developed products. In product development life cycle, the first 20% of design activities commits to about 80% of product development cost. How to conduct “right the first time” design is critical to ensure the low cost, shorter time-to-market and good product quality. To address these issues, it is necessary to employ state-of-the-art technologies. Traditionally, CAD/CAM technologies provide solutions for the representation of design intent and the realization of the design physically. However, it is difficult to address some critical issues in optimal design of forming process, tooling structure, material selection and properties configuration, and finally the product quality control and assurance. CAE technology fills this gap as it helps practitioners generate, verify, validate and optimize the design solutions before they are practically implemented and physically realized. In this paper, the concurrent design of metal forming part and tooling via integrated CAE simulation is conducted. The process, procedure and framework of the integrated CAE simulation for metal forming product development are presented. Using a widely used metal forming component as a case study, how the CAE technology helps optimal design of the metal forming activities is illustrated and the efficiency and validity of the technology is verified.

Keywords: CAE simulation, metal forming, concurrent design.