Due to the increasingly shorter development times in the automotive industry the aspect of a continuous virtual product validation is getting more important. For example, in the field of the body in white construction the metal forming-specific process steps in the press shop and the hemming processes in the body shop are designed with the aid of finite element simulations. Even though the computing speeds of the latest finite element solvers are increasing constantly, there is still a huge effort in time to do the pre-and post-processing of a hemming simulation. In order to improve the response time of the hang-on-parts' manufacturing process verification, a metamodel-based part analysis is aspired. Based on a categorization of the part outline, which has to be analysed, a validation of the hemming process is carried out by using mathematical metamodels in terms of predicting failure probability and production feasibility. By splitting up the part outline into individual segments a fast analysis can be achieved. Here, an automated process is evaluating each segment individually with a special diagnostic technique. The system delivers output results, such as plastic strain values, the tendency of wrinkling, flange length, roll in, etc. Especially in an early development phase, this procedure is advantageous to compare and evaluate different hemming concept alternatives in an efficient way. The high variety of
hang-on-parts, which have to be validated, requires that the simulation outlay has to be as small as possible. With this new diagnostic technique an automated hemming validation of hang-on-parts can be executed without doing a finite element simulation. So, there is no simulation model which has to be set up, calculated and evaluated. This helps to reduce the time effort and the amount of simulation loops for validating a hemming process. Furthermore, the degree of the part maturity is increased in an early development phase very efficiently. © (2015) Trans Tech Publications, Switzerland.

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