

## “Mesh sensitivity of crash simulations: comparison of manually and batch meshed models“

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### Abstract

The results of numerical simulations are primarily influenced by three factors. One factor is the mathematical model, in which the physical phenomena are described. Certain assumptions, based on the experience of the user, are made to simplify the resulting set of equations. The second factor is the numerical scheme, used to solve the mathematical model by discretizing the equations in time and space. The third factor are the characteristics of the underlying mesh on which the space discretization is carried out.

In this study, the sensitivity of crash simulation results with respect to the properties of the underlying mesh is discussed in more details. Two manually meshed models, made by an expert, and four automatically meshed models, made with the new BatchMeshing tool in the HyperMesh 7.0 environment are used in a front crash simulation with various LS-Dyna versions. Two different discretizations for the longitudinal beams are used to investigate the effects on the simulation results due to changes in the element size.

The variation in local values (intrusion, acceleration, velocity and displacement in certain points) as well as in non-local values (internal energy, section forces) are presented and discussed.

For this test case, the batch-meshed models produce less mesh sensitive results compared to the hand-meshed models. The batch-meshed models show less scattering in the simulation results and a lower sensitivity against element size than the hand-meshed models. The time needed by the BatchMesher building up a model is less than one fifth of the time of the hand-meshing process.