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CAE software interoperability: Impact of in-use properties of a welded part on crash analysis

As many other players in the field of CAE, Transvalor is facing increasing needs regarding interoperability from its customers. One major goal remains the ability to simulate the complete manufacturing chain analysis and therefore this may require the use of several CAE simulation tools from different software vendors (ISV). More precisely, a common trend is to connect 'Process Simulation' with 'Structural or Crash Analysis' as the final product performance may depend on properties inherited from the manufacturing process.

In this article, we focus on a practical case studied in conjunction with the French company Faurecia Automotive Seating. It aims at illustrating the benefits of the VMAP standard format and it consists in simulating laser welding for the assembly of steel seat components process and the impact on subsequent crash-test analysis.

The study case consists of a primary welding simulation conducted with TRANSWELD® software. The computation results (e.g. heat transfer flux, metallurgical properties and hardness) are then transferred to LS-Dyna® to analyse fatigue and perform crash computations. More specifically, the loss of hardness of dual phase steels due to martensite tempering is correlated to material failure. Another point of interest is the prediction of assembly crash based on local metallurgical phases distribution.

Data transfer between TRANSWELD® and LS-Dyna® used to be done exporting numerical results to a text format file, which was heavy and limited. Moving to a standard format like VMAP, dedicated to FEM results and based on binary storage, will be of great interest to improve workflow efficiency. Moreover, FEM results stored in VMAP format will be compatible with other software supporting this format.

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