χMCF V3.0: AN INTERFACE STANDARD FOR EXCHANGING WELD INFORMATION WITHIN CAD/CAE

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ABSTRACT
Joining technologies play an important role in modern automotive structures whose designs are mainly determined by functions vs. weight and cost. This leads to the application of a variety of materials with a wide spectrum of mechanical and physical properties and, hence, requires joining technologies specifically tailored to the joining partners. These joining technologies have to be cost-optimized and to deliver desired mechanical properties like high fatigue and crash strengths.

In order to characterize a specific joint completely, numerous attributes like geometry, process parameters, strengths etc. are necessary. Different divisions like CAD, CAE Manufacturing or different OEMs use often only a subset of these attributes. Therefore, each engineering function has been using their own way to describe joints leading to incompatibilities or gaps in data transfers. In order to allow a seamless data flow from CAD data creation through the various virtual and physical optimization & verification steps (CAE, Testing, Feasibility, Manufacturability/Production Planning) and finally to manufacturing control processes a comprehensive standard for the characterization of joints is required.

More than 15 years ago, the AK25 (Working Group 25) "Joint Technologies" of the Research Association of German Automotive Industry (FAT/VDA) began to develop the standard χMCF (Extended Master Connection File) for joints, in co-operation with several leading vendors for pre and
post-processors in CAE and fatigue software. While the focus was around a seamless process especially for fatigue prediction of welds in the beginning, meanwhile, the project has significantly
grown into a cross-functional standard that can also support the definition and automated virtual builds of full vehicle assemblies.