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# **Experimental and numerical comparison of the Nakajima formability test with limit strain prediction using the time-dependent algorithm.**

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This work presents an investigation on the determination of forming limit curves (FLCs) by finite element simulations and experimental approach.

Nakajima formability test has been chosen for the experimental studies and numerical analysis. The onset of localized necking has been determined using the criteria studied in the authors' earlier works, based on the analysis of the principal strains evolution in time. The criterion is based on the analysis of the through-thickness thinning (through-thickness strain) and its first time derivative in the most strained zone. The onset of necking is assumed to occur at the point corresponding to a sudden change of the slope of the strain rate vs. time curve. The limit strains have been determined for different specimens undergoing deformation at different strain paths covering the whole range of the strain paths typical for sheet forming processes. Therefore, determined limit strains allowed us to construct experimental and numerical FLC determined using the presented algorithm. The FLCs have been compared with the conventional FLC determined according to the ISO 12004 standard, showing quite a good agreement. These results indicate that the used methodology of the limit strain determination can be used in finite element simulations as a potential alternative tool to determine formability limits for the sheet forming processes.

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