Adam Opel AG Introduces New Lightweight Design Strategy benefiting from ESI PAM-STAMP

ESI's Simulation Software Enables Accurate Prediction of Distortion of Advanced High Strength Steel, from Early Design Stages

Paris, France – March 7, 2017 – ESI Group, leading innovator in Virtual Prototyping software and services for manufacturing industries, supports Adam Opel's new lightweight design strategy with its stamping simulation software ESI PAM-STAMP. By detecting part distortion early in the design process, Opel is now able to efficiently counteract distortion of stamped parts made of Advanced High Strength Steel (AHSS). The new process, supported by PAM-STAMP, leads to improved part quality, while delivering important weight reductions that translate into a lower carbon footprint for Opel's vehicles.

Subject to new regulations around CO_2 emissions, the automotive industry must come up with innovative solutions to produce lighter weight vehicles that require less fuel while maintaining, and preferably improving, occupant safety levels. Replacing existing steel grades with thinner Advanced High Strength Steel (AHSS) grades is a promising option as these offer performance flexibility, lower cost and reduced weight. However, AHSS presents a major disadvantage in the manufacturing process as the high yield strength can be associated with considerable springback and twisting after forming.

To overcome this manufacturing challenge, German automotive manufacturer Adam Opel AG recently ran an engineering project in collaboration with Thyssen Krupp System Engineering and ESI Group. The team developed a design approach in which a geometrical stiffness was induced through a double-S profile in the punch radius of metal forming tools. Replacing the original punch radius with a double-S profile, the team proceeded to precisely determine the influence of the size and shape of the punch on the wall opening, springback and twisting behavior of the final part.

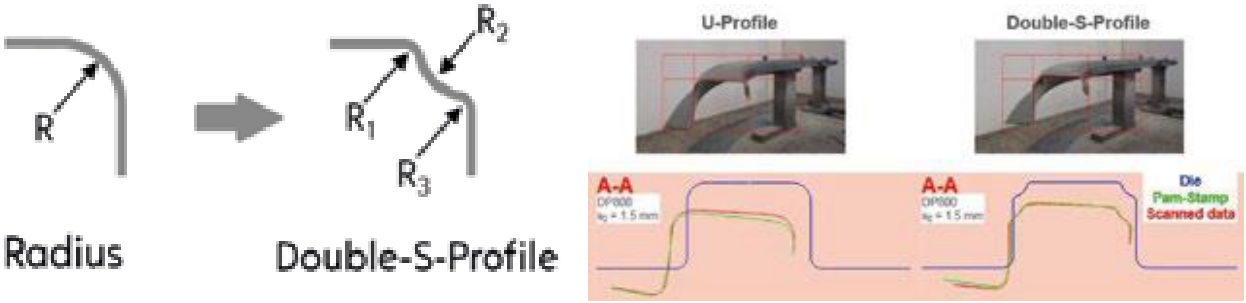

Image: (Left) Radius versus Double-S profile; (Right) Comparison of stamping simulation and physical try-out results for trimmed and untrimmed parts vs nominal shape using ESI PAM-STAMP.

The Opel team then investigated the influence of blankholder pressure using PAM-STAMP, and determined the combination of punch radii and blankholder pressure, that delivered the smallest possible deviation from the nominal part shape. Contrary to initial expectations, the team discovered that a decrease in blankholder pressure reduced the deviations.

To verify the results, Adam Opel AG produced the actual tools and compared the physical try-out test data with the results obtained using PAM-STAMP simulation. The results were in excellent agreement, for both trimmed and untrimmed geometries, and clearly showed the impact of geometrical modifications on wall opening, bending springback and twisting. Based on these results, Opel decided to proceed with further investigation of the use of AHSS grades in their manufacturing processes.

"This project was a major success due to the close collaboration between Opel, Thyssen Krupp System Engineering and ESI. It helped us predict and control the distortions, resulting in an efficient compensation of stamped parts using Advanced High Strength Steels (AHSS). We were able to tackle the challenges related to the model's geometry and its use within an intensive context, such as optimization," said **Dr. Niels Koch**, Project Leader for Advanced Manufacturing Technologies, at Adam Opel AG.

For more information about ESI PAM-STAMP, please visit www.esi-group.com/pam-stamp

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